

**Water supply system during the Sassanid dynasty
and Islamic era of Arjan City**

**دراسة نظام الري وإمدادات مياه مدينة "ارجان" في العصر الساساني و
القرون الإسلامية الأولى**

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Abstract

Southwestern parts of Fars province, officially entitled Argan (Arjan), received attention of the dominant governments in Sassanid dynasty and from the early centuries to mid-centuries of the Islamic era due to its privileged natural and geographical situation. The central city of this well-known province was called Argan or Arjan. The most important factor for the prosperity of this city was the proper communication status, as well as the natural talents available there such as Tab River which flew through the city. The founders of the city used indoor and underground canal system to utilize the water of the aforementioned river for household and agricultural consumptions. Historical and geographical sources have briefly described this water supply system and irrigation system. Serious archaeological studies have not been conducted in this area. Field surveys conducted within the city and surrounding areas has shown that the consumption of the water of Tab River has been done by means of the famous dam of Argan. In addition, the water required for the surrounding orchards and gardens had been running from behind the dam towards the city via numerous channels like Qanats. This method led to the prosperity and cultivation of the agricultural economy and also welfare of the citizens in hot seasons of the year. The above-mentioned irrigation and water supply systems were greatly used until the complete

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destruction of the city. After the destruction of Argan dam, the channels became out of Fashion and new systems replaced the previous methods.

Key words: Argan(Arjan), Irrigation, Qanat, Agricultural economy .

Introduction

The historic town of Argan (Arjan) was one of the most important cities of Sassanid dynasty and early Islamic era which was founded in the southwestern region of Iran on the borderline of Fars and Khuzestan Provinces. According to archaeological studies, as well as historical and geographical texts written from the early Islamic centuries to the middle of Islamic era, this city had a relatively simple, but effective water supply system and it has been dilapidated at the time of the destruction of the city.

In this study, the important historical and geographical texts pertaining to the early centuries of the Islamic era to the Middle of the Islamic era are used to go for the reconstruction of the water supply and irrigation systems in Arjan alongside the few archaeological studies conducted in this region. Although many of the areas that will be examined in this study have not still received ongoing and systematic archaeological excavations, we will refer to the related historical texts to compensate for the lack of archaeological data. The combination of survey method, historical texts, few results of excavations, and archaeological studies was recognized as the most suitable method for the conduct of this study. It is sought to provide answer to this question: what role did the underground channels play in the water supply of Arjan city?

Historical geography of Arjan

The ancient province and city of the Sassanid era is located on the border between Fars and Khuzestan Provinces to the southwest of Iran with an extent of fifteen thousand square kilometers. During the Islamic era, the process of boom and expansion of this province continued. Maroon (Tab) River passes through the ruins of the ancient city of Arjan, which is now about 7 kilometers of the North of North East of Behbahan. This river city was called Tab in the prime of the city. According to numerous historical and geographical resources written and compiled in the early Islamic era and/or in the Middle Ages of Islamic era, the Sassanid king, Qobad First, campaigned against the north of Mesopotamia in the third period of his rule (531-488 B.C.).

After the defeat of the Romans and occupation of two cities of Amida and Myafarqyn , he forced the residents of these cities to move into a

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place on the border between Fars and Khuzestan Provinces and issued the order of the construction of a city (Ibn al-Faqih, 12: 1970; Dinavari, 2004: 956; Tabari, 1996 Vol. 2: 583; Hamzeh Isfahani, Bitā: 45; Ibn Meskawayeh, 1990, Vol. 1: 160-155; Ibn Athir, 1992, Vol. 4: 321). Qobad added some parts of Ramhormuz, Isfahan, and *Ardeshirkhoreh* organized a province and called it Qobad Khoreh. Ibn Khordadbeh has referred to Arjan as one of the five provinces of Persia (Ibn Khordadbeh, 1889: 47), while Estakhri sees Arjan as some part of Shapur khoreh (Estakhri, 1989: 102). However, the name of this city and state was engraved as Argan-Argan on official seals of the Sassanid era (Hertzfeld, 1907: 81-89).

The authors from the early centuries to the middle of the Islamic era have also referred to the city and its province under the names of Argan (Moghadasi), Arghan (□odūd al and Jihani), and Arghoon (Sharaf Ali Yazdi). Probably, they have not had much familiarity with the name of the city in the Sassanid era. Salby views the migration of Mesopotamian captives as the precursor of the construction of Arjan, but he considers this event as belonging to the reign of the Sassanid Shapur I (272-241 B.C.). In addition, the famous Paul views Arjan as belonging to Shapur I that has been constructed by Roman captives (Salby, 2006: 251). Gaube confirms Salby's comments on the statue found in the surrounding of Arjan (Gaube, 1980: 31). As narrated by Tabari, Ardashir Sassanid I (241-224 B.C.) passed through Arjan during one of his expeditions to Ahwaz (Tabari, 1996, vol. 2: 583). Although Tabari has not mentioned whether Arjan has been the name of a desert or urban area, the mention of this point in that book shows the importance of this region. Etemadassltaneh has referred to Arjan as a historical city and region during Achaemenid dynasty that has been called Arkran by the Greeks. Alexander had passed from this area during an attack on Iran in order to reach the Persian state (Etemadassltaneh, 1985: 368). In addition, Masoudi has referred to a fire temple in Argan in the description of the ten Iranian fire temples which had been built at the time of Bhrasf. According to Masoudi, this fire temple was built before the advent of Zoroaster (Masoudi, 1981, vol. 1: 604). In terms of the foundation of the city and Arjan province, Moghadasi has pointed out a strange story that: "Arjan is the name of the son of Circesium Ibn Fars who has sulked with his father and has left Aghour (Assyria?) And has built that region (Moghadasi, 1982, Vol. 2: 631)."

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All of the above-mentioned references reinforce the issue that probably there has existed a city or region named Arjan before the Sassanid king, Qobad First and the name Arjan has gradually faded away after Qobad's victory in northern Mesopotamia and the migration of Roman prisoners to this land and Veh Amid Kavad has been used for it. Finally, it has been referred to as its old name, Arjan, in the early Islamic period (Gaube, 1980: 24-29).

Irrigation systems in Iran

Iranians have been seeking to devise a method by means of which they can direct existing underground water and river water to thirsty lands from long time ago due to living on dry lands with shortage of water. Indeed, they wanted to meet their human needs to water in addition to the use of water in agriculture. The result of this exploration is the compilation of such books as "*The Extraction of Hidden Waters*" by Karji and "Science keys" by Kharazmi which entail various fields, including water-related laws in Iran, familiarity with soil conditions, various methods of irrigation and water supply, important tools for the extraction of water, the presence of groundwater, the appearance of sources and measurement units. Iran's rulers and kings have started constructing dams, canals, and other facilities towards water control for agricultural lands and residential houses for a long time. In this regard, Sassanid kings have also paid attention to the region of Khuzestan and Mesopotamia more than other places and have built the largest irrigation facilities in these areas (Wulff, 1968: 94-105). Iranians have exploited four major sources for water usage.

1. Use of well water

In this method, water was pulled up from the wells with the help of leather pails and bulls after drilling the wells. Bulls pulled up the pails by means of a thick rope tied around a wheel mounted on top of the wells like a pulley and, thereby, water was reached to the adjacent pools and divided into the farms. For comfortable lift of water, the movement direction of the bulls had been arranged thirty degrees skewed and they moved on a diagonal level in a top-down fashion. That was a very simple and inexpensive tool for extracting water in different regions (Porafkari, 1979: 48).

2. Use of Kariz water

Iranians have been using Kariz or Qanat water for more than two thousand five hundred years. In this method, wells are visible at a distance from each other which are connected by a channel. The deepest well which is the first one, as well is called the mother of wells and the place where the Qanat water comes out and is run on the land is referred

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to as the manifestation of the Qanat (Beaumont, 1971, 39). Qanat construction requires specialized expertise in identifying water resources, how to dig the land and calculate the slope of the mother well to the manifestation of the Qanat. This technique has been commonly used in Iran since the Achaemenid dynasty (Stiros, 2006, 1058) and has reached its peak of prosperity and progress during Islamic era and Sassanid dynasty. In Iran, especially in arid and semiarid regions, some Qanats with over 50 kilometers were dug through which many farms were irrigated. Amongst them, one can refer to Gonabad Qanat located at Khorasan province, which is nearly 70 kilometers in length (Seyedsajadi, 1982, 77-110). Any styles and techniques being used in Qanat construction, two general objectives have been pursued as follows: (a) the flow of underground running waters to the ground surface and economy in manpower in pulling up water by pails, (b) prevention of evaporation and water loss. These two main objective have always been in the public mind in Iran (Fazelipour, 2001, 148). As Gooblou has claimed, there are more than 400,000 kilometers Qanat in Iran and % of the total of Iranians' water consumption has been via Qanat or Kariz until the seventies of the twentieth century (Gooblou, 2010, 16).

3. Use of spring and river waters

Springs have been considered as one of the other important sources of water for drinking and agriculture which has been used from long time ago in Iran. Although spring has not generally been responsive to the needs of agricultural lands, Iranians used this type of water for drinking and, if necessary, for agricultural use. Hosseini Fasayi has referred to more than thirty springs in Kohgiluyeh and Arjan, some of which have been used for agricultural purposed in addition to drinking purposes (Hosseini Fasayi, 1999). Table 1 shows the names of these springs.

Table 1. Some springs of Arjan as per *Farsnameh Naseri*

Row	Geographical position	Spring name
1	Mombi	Baba-Ahmad
2	Likak	Aosel
3	Boiyr-Ahmad	Babakan
4	Sisakht	Besho
5	Tnge-Servak	Tnge-Servak
6	Tange-Nali	Tange-Nali
7	Toliyan village	Toliyan
8	-----	Cheri spring
9	-----	Jen spring
10	Toll Cheqha village	Cheqha
11	-----	Chozak
12	Boiyr-Ahmad	Deli-Gerdoo
13	Gachsaran	Dogonbadan
14	Dilegan	Dilegan

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In areas of Iran where there existed permanent rivers, the construction of dams has been common for the use of river waters. Amongst them, one can refer to the existence of several dams on the river Kur in Fars province from Achaemenid dynasty and such measures have been taken for the proper use of water on Murghab River in Marv during Sassanid dynasty (Kuros & Labaf Khaneiki, 2007, 35). Most of the measures regarding the construction of dams, water channels, and streams derived from river waters were taken in Khuzestan and Mesopotamia. Therefore that region has been referred to as the heart of Iranshahr (Malayeri, 2000, Vol. 2, 48). Economic prosperity in Khuzestan and Savad area in Iraq during the Sassanid era has been spent on the constructions of facilities in agriculture due to the efforts of the kings of this dynasty. Thus, Savad area in Iraq and Khuzestan are divided into smaller parts in an aerial shot which cover irrigation canals in these areas (Fig. 1).

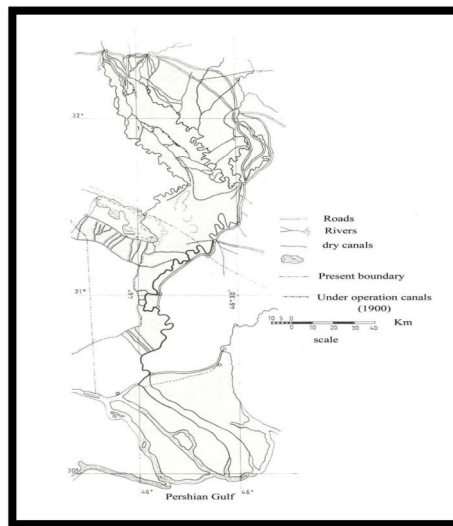


Figure 1. Irrigation canals in Savad area located at Mesopotamia (Source: Kuros & Labaf Khaneiki, 2007, 12)

Gorgor and Mizan dams, and mosreqan and Darian streams in Shushtar and Paypol dam in Dezful which are situated in Khuzestan Province were used to turn the mills in addition to drinking and agricultural usages (Kuros & Labaf Khaneiki, 2007, 11-31). After the construction of dams, the river water came upwards to the mouth of canals and streams and ran towards residential houses and farm lands. Using this technique along with other methods of water supply caused economic prosperity, the expansion of agriculture and, thereby, an

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increase in the population. These methods have still been common during the life of Iranian empires (Montkab, 2013, 1-8).

Water supply system of Arjan city based on historical texts

Arjan has lain on the way of trade caravans and military expeditions due to its natural geographical and administrative situation. This position caused many geographers and historians of the early to middle centuries of the Islamic era to pass through the city and describe its natural, economic, and climatic situation. From amidst the lines of these historical texts, valuable information is obtained from the occasional references to the agricultural economy that was based on artificial irrigation. Among the writers of such texts, one can name Ibn Houqal, Edrisi, Moghadasi, and Nasser Khosrow Qobadiany who have referred to this important issue in their works. Later writers and historians have also referred to the description of such an irrigation system and supply system which is probably the result of their objective observations or the quote from others. Among these writers, one can refer to Mohammad Mirak author of "Paradise Kindergarten of Khani" and Mirza Hassan Hosseini Fassayi the author of "Farsnameh Naseri". Influenced by historical texts, new researchers and scholars have also described such a situation. Almost all historical sources agree that drinking water and other water uses of Arjan were provided from Tab River (Moghadasi, Estakhri & Edrisi). Some of the new references referred to wells as a water supply in the village Bokan (which was formed at the gate of the ancient city of Arjan) (Hosseini Moneshi, 2006: 35-36). Edrisi has described Arjan water poor and non-potable (Edrisi, 2009: 46). It is interesting that he mentions the rivers of Fars Province such as Tab which pass through Arjan and enumerates them as having sweet and delicious water (ibid. 49). This dichotomy in one's description will lead to confusion. Some writers such as Moghadasi have referred to the well water of Arjan and described it as sweet water (Moghadasi, 1982, 634). Two possible states can account for this issue. It is possible that Arjan water has been provided from wells as, today, local people believe that the drinking water of Arjan has been provided from the wells drilled of *Takab* canyon (personal conversations with the natives of the region). The second possibility is that these wells have, indeed, played the role of Qanat rods in Arjan. According to the studies conducted by authors, no works were found as a result of well excavation in the northern part of Tab River towards providing drinking water in Arjan; however, the remains of some Qanats are observable in this region whose sources return to the mouth of

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Takab canyon (Stien, 1938, 75 -86). It is possible that these Qanats have provided drinking water of the city. Except Moghadasi, no other first-hand sources have directly referred to the water of wells. Moghadasi has described Arjan as follows: "*Argan: It is a town with diverse strong buildings and affluent people. It has both ice and dates! It has also lemon and grapes. It is the center of figs and olives. Good juice and soap are made there. It is the storehouse of Fras and Iraq and the dock of Khuzestan and Esfahan. A stream full of water passes through the city, there is a beautiful and prosperous mosque next to the market, with a long fire template (minaret). Its buildings are carved out of stones, its mercers' market is like Sajestan market whose doors are closed at night, and it has orders from four directions. I have not seen any better wheat market than its wheat market. It is hidden among groves and orchards its sweet wells, its bread, fish, ice, and dates are peerless! But, in the summer, it is like hell; from the time of its grape to its rain, the creek water is salty (Moghadasi, 1982, 634).*"

In this description, Moghadasi has referred to the sweet waters of Arjan's wells and, then, he has made a mention of a stream of water that passes through the city whose water gets salty in late spring and summer. In the following, he refers to snow in Arjan which is suggestive of the fact that he has meant Arjan state rather than Arjan city because it does not Snow in the latitude of Arjan; and even if it does, it will be of very slight-term durability. This description by Moghadasi has confused researchers.

However, almost all the historical texts view Tab River as the main source of drinking and agricultural water of Arjan. Among these texts, one can refer to Hamdollah Mostofi's book entitled "*The Delight of Hearts*" that is asserted that *Arjan's water is derived from Tab River* (Mostofi, 1983, 129). Hakim Naser Khosrow's travelogue is the most important text having remained from the prime days of Arjan. This Hakim visited Arjan during his trip and described it as follows:

"Arjan is a large city in which there were twenty thousand men. And on the east side of it, a river is derived from the mountains and sets off to the north. Four great curbs have been constructed and water passes through the city to the outside for which much has been spent. This water is transferred to the end of the city wherein gardens, palm trees, oranges, bergamots, and olives exist. In the city, houses have been built on the ground, it is so under the ground. Water goes everywhere in basements and cellars, and the residents live in comfort in the summer because of

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that water and those basements (Naser Khosrow Qobadiany, 2005, 164).
"

This description provided by Naser Khosrow has soundly covered many issues related to the provision of drinking and agricultural water, as well as the irrigation system and water facilities of the city. We know that Naser Khosrow visited Arjan at the prime time of the city; therefore, his description can be indicative of the living conditions of Arjan city which is known as the legacy of the Sassanid era. Four great curbs which have been derived from Maroon River (Tab) are the Qanat chains whose traces have remained today. The sentence "... and they have spent much..." shows the involvement of the governments of that time in the creation of such a system of irrigation and water supply. Moreover, Naser Khosrow has referred to the division method of water. Water entered houses, and then exited from the city and was directed to the gardens and groves. Later writers such as Hosseini Fassayi confirmed the existence of such Qanats and described them as follows:

"A Qanat has been dug as long as a milestone between the North and the East of Arjan and its internal walls have been built with stones, this Qanat has elongated to Kurdistan River, the water of the river has been directed into the Qanat, streets, and markets of Arjan (Hosseini Fassayi, 1999, vol. 2, 1466)."

Even newer writers such as Ahmad Eghtedari and Afshar Sistani have also described such an irrigation system and believe that these Sassanid and Islamic Qanats were then repaired in Safavid and Qajar eras and reuse of them led to the formation of a village, entitled Mansouriyeh (Eghtedari, 1996: 224; Afshar Sstani, 1994:392). In the confirmation of these points, Schwartz also asserted that the water situation of the city was not satisfactory despite the proximity of the city to Tab River (Schwartz, 2003: 151). Although some resources have claimed the existence of large jars in the streets to quench the residents' hunger and thirst, indoor and outdoor channels constituted the main source of water that has been derived from the river (Ibn Houqal, 1966: 153). Probably, Ibn Houqal has made a distinction between common water and drinking water, though such a statement has been made by him only about Samarkand region in the book entitled Photos of the earth (ibid., 196 and 231), because Ibn Houqal has described the water of Arjan City as: "... its water is not sweet and delicious (Ibid., 38)." Thus, the majority of historical texts confirm the presence of indoor and underground channels or river Qanats in the provision of drinking and agricultural water supply

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of Arjan. Although most of today's sources have remained silent in this regard, the few remaining texts can be useful in archeological studies. Gaube has studied many geographical sources and as he has proven, all the sources (except Naser Khosrow and *ʿUdūd al-ʿĀlam* written by an unknown author) have made a mistake and have been involved in confusion about water streams of Arjan and other rivers like sweet river or Kheirabad which lay at the distance of a one-day trip with Arjan (Yazdi, 2008, Vol. 1: 708). Gaube also proved that Moghadasi's statement this the water of Arjan is salty from the rise of the grapes until the start of rain and Moghadasi has meant Zohreh River rather than Tab River which has passed through Arjan city (Gaube, 1980, 259-260). Having conducted a survey study of Arjan region in late July (the warmest time of the year), the authors of the present study have used the water of Tab or Maroon River for drinking and perceived that it was fresh and sweet.

Water supply system of Arjan city based on archaeological evidence

Not extensive archaeological studies have been conducted on the debris remaining from the historic city of Arjan there. These activities archaeological are limited to a few seasons of excavation and scattered speculation, reports of classical archaeologists such as Herzfeld, Stein and Gaube, and also the unpublished systematic review carried out in 2006. These studies have shown that the streets of Arjan city have been placed in parallel with the two axes. Probably, the main streets of the city have exited the long side of the city in while two other streets were situated on the shallow side of the city.

Some of the houses in the city have had cool cellars (Gaube, 1980, 44-45). Modern archeological studies have only confirmed the writings of classical archaeologists, historians, and geographers of the early centuries until the middle Islamic era. Since no constant and systematic exploration has been done in this area, archaeological studies have also failed to present least one method of the entrance and exit of water to the houses as a model. However, historical sources in this field correctly acknowledged that water was entering houses through basements (Naserkhosro Qobadiany, 2005, 164 and Ibn Huqal, 1966, 153). As the sources pointed out, Arjan's water was provided from Tab River by a dam constructed on Tab River in the northern edge of the city near the gate. In this way, water was easily directed into underground channels and reached the city (Eghtedari, 1996, 260-261). The best evidence-based archaeological description of the irrigation system in Arjan was provided

Water supply system during the Sassanid dynasty (43)

by Gaube. He noted that seven Qanat loops transferred water from behind the dam (constructed along Arjan's big bridge) to the city and its farmlands. The installations pertaining to water division lay in the northern part of the dam (fig.2), which directed water to different parts of the city.



Figure 1. Remainder of Arjan bridge and dam along with the location of water entrance to Qanat in Islamic and Sassanid eras (Source: authors)

Thus, the water of Maroon or Tab River was gathered behind the dam and ran towards the city via underground channels (Gaube, 1980, 307-309). Of course, Gaube has not commented on the water division within the city, but water division facilities should have reasonably existed in the city. Today, such facilities are not observed because of the intensity of agricultural activities (Christensen, 1993, 174). In any case, water was running towards the city through two parallel channels (fig. 2 & 3), which was directed to the basement of the first house near the city and, thereby, there was no need to pull up the water.



Water supply system during the Sassanid dynasty (44)

Figure 2. The Qanats that transferred the accumulated water behind the dam to Arjan City (Source: authors)

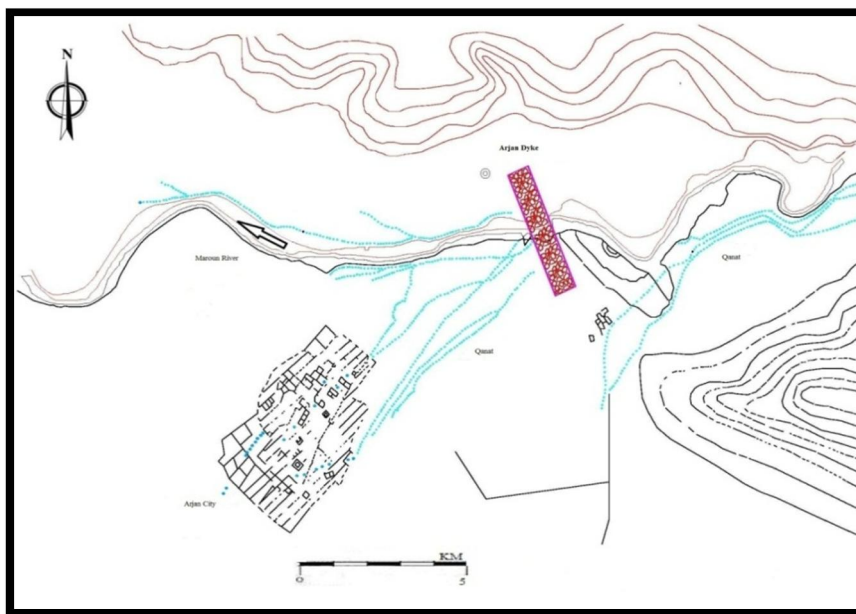


Figure 3. Situation of Arjan City along with Maroon River, Qanat paths, and the Dam location (Source: authors)

Although there is no information available on protection and security facilities, including a ditch, castle, and walls around the city, this system has been referred to as Mangol because channels did the function of Qanat system by subterranean underground water supply (Honari, 1977, 76). Certainly, it did not bring about any problem for the water entrance and Qanat excavation near the city. By this water supply system, water was provided for the upper class at first, then it reached the poor, and finally it entered agricultural lands. Such a system existed in Tehran and clean water was first provided for the upper class in abundance and, then, little contaminated water was offered to the lower class of the community (English, 1968, 179). In this method, the proximity of each house to the water source was determinant of water quality and quantity; therefore, this state reflected the socio-economic status of citizens (Ibid). Accordingly, Qanat irrigation system in cities led to the creation of a geography of class density. Although few archaeological studies have been conducted in Arjan, larger houses have been situated in higher parts and at entrance of Qanat channels. Then, this water supply system was

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indicative of governmental discipline and management on the method of providing water supply to homes and farms. It is noteworthy that not so many works have been left from such a system because of illegal excavations, the development of agricultural lands and indiscriminate plowing of them, and the presence of drilling rigs belonging to National Iranian Oil Company. Some room was needed to be considered at the entry point of Qanat loops to the city for water division which is gone today (fig. 5).

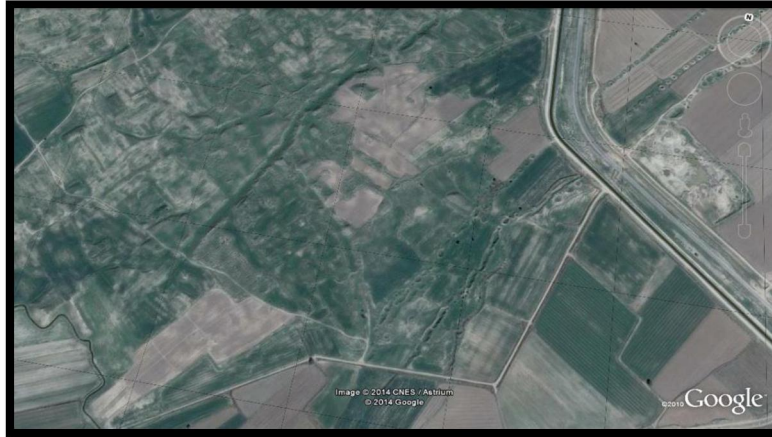


Figure 4. The situation of Arjan city and the Qanats entering the city (Source: Google Earth).

Then, water entered the basement of the first house with a slight slope after being divided and passing through the stilling pond. In this way, each house could direct the water towards its basement with the creation of a small deviation in the way of channel. To this end, brick and limestone were used. Water kept on running in the main channel until it reached the next building and, in this way, water entered the building as well. A separate channel was required to exist so that the additional water could exit, but no trace of such a channel was found and this point has not been referred to in the reports of historical and geographical sources. In any case, the water needed for each family's consumption has been dependent upon the proximity of that house to the main source of water. This means that clean and healthy water was first used by wealthy people and, finally, low-income families who lived in the lower sections used it. The contamination of the consuming water occurred because of the muddy river water during rainfall; however, the stilling ponds embedded in the path deposited the mud available in the water and cleaned it with

Water supply system during the Sassanid dynasty (46)

slow movements along the way. This became salty and bitter since it was combined with the salts in the direction of the river (Jihani, 1989, 117). The direction of the river water into the underground Qanat channels led to the cooling and purification of soluble salts in the water. In any case, this water supply system has been common at least from the early Islamic period, which can be attributed to the legacy of the Sassanid era according to the pottery discoveries and findings (Gaube, 1980, 303-305). Arjan's water supply system gradually faded away in the Islamic era because of repeated earthquakes and attacks and looting of the governments of that time by Ismailia castles. It resulted in the eventual destruction and abandonment of the city.

Conclusion

The provision of water supply of Arjan during Sassanid and Islamic eras is suggestive of an increased prosperity in water use techniques for quality and speed promotion and ease of access to fresh and healthy water as per historical texts and few archaeological studies. In agricultural section, this water led to the continuous and regular irrigation of gardens and farms in the vast plains around the city, which in turn resulted in the increase of the product. Historical and geographical sources in the early centuries to the Middle centuries of the Islamic era have fully described the state of this system and the technique of utilizing the water of a permanent rich river, that is, Tab or Maroon. Although they have made a mistake in some details, they have acted successfully in presenting an overview of the system. Arjan had been constructed in a natural and strategic spot in the Sassanid era where the construction of the city resulted in the construction of the famous dam of Arjan. This dam later played an important role in the economic prosperity of the city after the prosperity and development of Arjan. Today, some of the works of this vast water system, including Qanat loops show the extent of the areas under irrigation and the importance of Arjan City during Sassanid and Islamic eras. The remaining Qanat loops from the edge of the dam to the ruins of the city and the writings of Nasser Khosrow and Ibn Huqal directed us to finding information on the entrance method of water to the city. This city has been located at a tropical region with hot weather. Therefore, the use of cellar or basement equipped with water channels caused the coolness of basement space in hot seasons and provided the conditions for the optimal and complete use of water by Arjan's families. Many of these facilities are gone today, but the ruins can be retrieved with the help of new archaeological studies. After the thorough water

Water supply system during the Sassanid dynasty (47)

provision of the city, the mentioned Qanat loops had the responsibility of the irrigation of gardens. In this way, the excess water was spent for agricultural use which shows an intelligent design based on dynamic agricultural economy. The underground channels derived from the River which acted similar to Qanats promoted Arjan to the peak of its agricultural prosperity.

الملخص

جلبت الأجزاء الجنوبية الغربية من ولاية فارس اهتمام الحكومات المؤقتة في العصر الساساني و القرون الأولى إلى منتصف العصر الإسلامي نظرا لطقسها الحار والجاف تحت الاسم الإداري "ارگان" (ارجان) و لموقعها المتميز الطبيعي و الجغرافي. و كانت تسمى محافظة هذه المدخنة الشهير "ارگان" أو "ارجان". أهم عوامل ازدهار المدينة هي حالة الاتصال المناسبة و أيضا المواهب الطبيعية، منها نهر (طاب) الذي وقع في وسط الشهر جاريا. بُنيت المدينة استخدموا القنوات المغطاة و القنوات التي تجري تحت الأرض بغية استعمال ماء النهر للنفقات المنزلية و الزراعية. قد أشيرت في الكتب الجغرافية و التاريخية إلى نظام إمدادات المياه هذه و الري بكشل موجز. لم يتم إجراء دراسات أثرية خطيرة في هذا المجال. البحث المسحي لمستوي المدينة و المناطق المحيطة بها تشير إلى أن أهل المدينة استفادوا من ماء النهر من خلال السد و حاجز الماء "ارجان: الشهير و المياه اللازمة للمدينة و حدائق حولها من خلف السد و علي طريق المجاري العديدة الشبيهة بالقنوات جارية نحو المدينة. هذه الطريقة كانت سببا ازدهار و انتعاش الاقتصاد الزراعي و كذلك راحة المواطنين في المواسم الحارة من السنة. نظام إمدادات المياه و الري المشار- إليهما كانتا مستخدمتين حتي دمار المدينة نهائيا. بعد تدمير سد "ارجان" أصبحت القنوات المذكورة راكدة و أعطت مكانها عبر الزمن إلى الأنظمة الجديدة. الكلمات الرئيسية: "ارجان"، الري (إمدادات المياه)، القناة، الاقتصاد الزراعي.

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