

Article

Archaeology of a Rural *Qanāt*: Water Management and Social Relations in 17th Century Isfahān, Iran

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Abstract: This study investigates the water management structures and social relations that centred around a specific *qanāt* line in a rural setting in Iran during the Safavid period, specifically in the mid-17th c. CE. The setting is northwest of Isfahān, near Varkān, at a site called Mobārrak Ābād. The method combines analysis of documentary evidence and remote sensing of historical aerial photography. The documentary evidence provides administrative details of a *suyūrghāl* grant to Mohammad Beig E'temād-al-Dowleh by Shah 'Abbās II. In combining this with the physical characteristics of the *qanāt* of Mobārrak Ābād, as derived from the aerial photograph, I provide identification and analysis of the two canals providing water beyond the garden and the use of the water derived from the *qanāt* for agricultural irrigation and in Aranjon's village infrastructure. The conclusions discuss the material conditions in the periphery of the prosperous and fertile Isfahān region and provide a relative dating to the *qanāt* and associated infrastructure. The personal and social relations that can be derived from this evidence are relations of personal and economic dependency between Mohammad Beig E'temād-al-Dowleh and the Shah on the one hand, as well as the labour relations between the peasant population living with and from the *qanāt* who maintain this infrastructure and the administrative superstructure on the other. The article thus provides new insights into an under-investigated subject and region in the period.

Keywords: water infrastructure; peasant–state relations; Safavid Iran; Documentary Archaeology; Historical Archaeology; Landscape Archaeology; aquifer; ecology



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1. Introduction

In this article, I aim to investigate the historical material conditions surrounding a specific *qanāt* water structure in rural Iran. The question of how water structures, especially *qanāt* lines, are administered is difficult to answer. It depends on several aspects. What is the type of ownership? Who is put in charge of the structure? Where is it located? Additionally, which era is being discussed? I focus on the question of administration of one example in the Safavid era under the rulership of Shah 'Abbās II (r. 1642–1666 CE). Based on the combination of an archival source with early aerial imagery, I attempt a reconstruction of the ways in which the *qanāt* was used and ask what information can be derived about the social relations surrounding this *qanāt*. The materiality of rural Safavid Iran has so far been relatively little investigated, thus this article will provide insights into these matters.

The *qanāt* is a water structure used since ancient times that allows access to water year-round. At first, an underground aquifer is located as the water source to which a shaft is dug down. After establishing this connection, an underground tunnel is excavated with regular vertical shafts to the surface for air circulation. These shafts allow for the identification of a *qanāt* through remote sensing as they appear in lines on the surface. The tunnel conveys the water from the aquifer source towards the *mazhar*, an outflow facility, from which canals divert it further to wherever is necessary [1,2]. *Qanāt* water is often a necessity for allowing agriculture in semi-arid and arid areas, but is also used to supplement existing water networks. Primarily, water is used for agriculture, but it can

also provide a source for water infrastructures such as pools [1] (pp. 502–503). While the construction of a *qanāt* required large amounts of capital and, depending on its length, several years to be finished, their upkeep and maintenance was performed by the villagers living around it, or in more complex cases by expert builders.

Geographically (Figure 1), I am investigating an area on the central Iranian plateau. Specifically, I am analysing the site of Bāgh-e Mobārrak Ābād (Mobārrak Ābād garden) in Isfahān province, close to the modern border with Markazi province. The sites under investigation are the Bāgh-e Mobārrak Ābād, the *qanāt-e* Mobārrak Ābād, as well as a village slightly southeast of the garden whose modern name is Aranjon. The area under investigation lies ca. 80 km southwest of Kashan. While the climate conditions of the central plateau are generally arid (a comparative discussion of irrigation infrastructure in arid and semi-arid environments has been provided for example by Brunhes [3]), the site of Bāgh-e Mobārrak Ābād lies in a montane area, providing a gentler and milder climate.

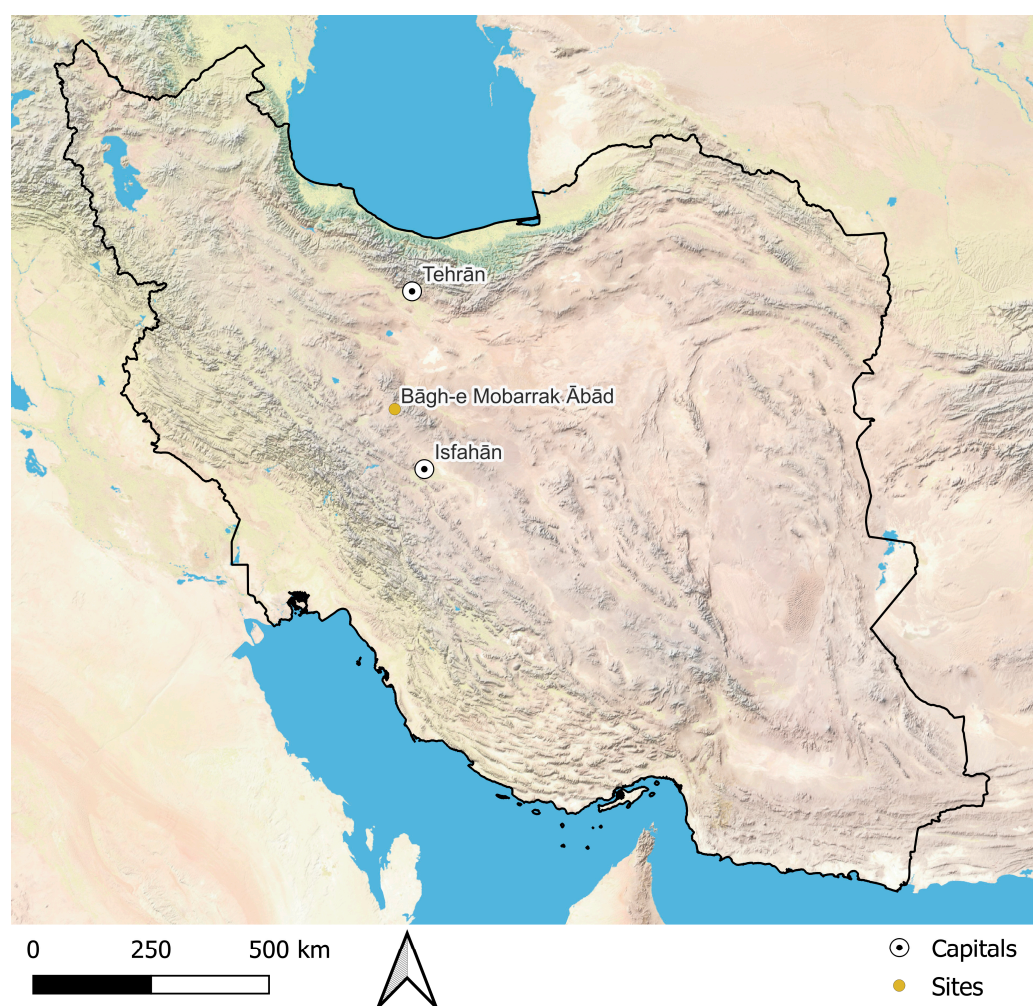


Figure 1. Showing the location of the investigated area. Isfahān is marked as the capital of the Safavid state during the time, Tehrān as the modern capital. National Boundary from DIVA-GIS, Basemap from ESRI.

Historically, this area was part of the province of Isfahān, which was part of the greater regional division of ‘Irāq-e Ajam. The area under investigation is only mentioned in historical sources with the larger settlement of Varkān, which lies further north of the garden. There is mention of Varkān in Seljuqid (11th/12th c. CE) sources, as well as a mention as Jarkan in the *Tarikh-e Qom*, a local history of Qom written sometime in the 10th c. CE/4th c. q [4]. Qajarid sources mention Varkān as being part of a region called Qora-e

Khamse (five villages), which included the villages Jo Shaqan, Kāmo, Meymeh, Azoran and Varkān [5] (p. 65).

In general, this research is situated in the era of Safavid dynastic rule. Following a period of several smaller dynastic states and short-lived empires, the Safavid dynasty managed to provide roughly 200 years of relative stability, ruling from 1501 to 1736 [6,7], [8] (pp. 31–146). The specific historical context I will discuss is the later Safavid era, during the rule of Shah ‘Abbās II in the mid-17th c. CE, after the reforms of Shah ‘Abbās I (r. 1571–1629 CE). The major aspect of these reforms that is usually discussed is the military turn away from the *qizilbash* forces towards the standing army composed of *ghulām* regiments. This deprived the formerly dominant *qizilbash* forces, who served as governors of many provinces, of their power base and allowed for increasing centralization following administrative reforms. However, Shah ‘Abbās I also made major improvements to infrastructural and agricultural projects. One such major project was to divert water from the Kuhrang river in the Zagros mountains towards the area of Isfahān, although this was never finished [9] (p. 115). In general, there was a major investment into water infrastructures and agricultural cultivation to increase production during this period [10], as well as a reform of market dynamics to allow for the redistribution of agricultural surplus, among other things [11]. Specifically, an improvement of road networks, the establishment of an irrigation administration and some state support for agricultural activity were provided [12] (pp. 43–44).

Beginning in 1642 CE, the reign of Shah ‘Abbās II continued the centralization efforts and was a largely peaceful one, with few exterior wars and no internal unrest [13] (pp. 143–145). In this time, the bureaucracy and social relations were more settled, with peaceful transitions of power. The organization of the state rested on the “diffusion of power among members of the Turk/Tajik military/political coalition” [14] (p. 54), which was also reflected in the distribution of state offices among different interest groups (including the *ghulām* and *‘ulamā*) [15] (pp. 435–447).

There were several types of land ownership common during this period: lands could be owned by individual landlords or by peasant proprietors. They could also be state-owned lands (*mamālek*) or directly owned by the Shah (*khāleseh/khāsseh*), the income of which was directly available to the *divān*. The administration of *mamālek* provinces could either be given to governors, who were usually drawn from the *qizilbash* elite or, especially from the time of Shah ‘Abbās I onwards, be administered by the crown/state directly and thus turned into *khāsseh*. Before the reforms of Shah ‘Abbās I, a province under a governor with most of the land as *mamālek* lands would provide most of its revenues to its governor, who was expected to use it to provide troops if necessary. The reforms turned many such *mamālek* provinces into *khāsseh* administered by an official appointed by the Shah, whose revenues flowed directly to the Crown’s treasury. These conversions of provinces into *khāsseh* were increased under Shahs Şafī and ‘Abbās II. These policies had long-reaching consequences but also diversified the state apparatus, allowing, among others, Georgians, Armenians and Circassians to advance to the highest state offices [6] (pp. 79–82). The main differentiation between *khāsseh* and *khāleseh* seemed to be primarily one of size: *khāsseh* was used to describe larger, province-size holdings and *khāleseh* to designate smaller holdings within these. When the taxes of such holdings were not needed by the Crown, they were often registered in tax records, but not collected and left for future use. With growing bureaucracy and court staff following the reforms of ‘Abbās I, the lands (and their taxes) were more regularly given as temporary holdings to certain individuals (such as bureaucrats or high officers) or groups of people (such as military troops) to reduce the administrative effort in paying all the Crown’s dependents [16] (pp. 131–135).

2. Materials and Methods

The research is based on two materials. The first is an archival document currently held in the *Österreichische Nationalbibliothek* (ÖNB) in Vienna, Austria. The second is a roll

of aerial photography shot by the United States Air Force in 1955, currently held in the National Archives and Records Administration (NARA) in College Park, MD, USA.

The archival document discussing the *qanāt* of Mobārrak Ābād is part of Cod. Mixt. 859. This is a compendium of treaties, letters and *farmāns* (royal orders) from the time of Shah ‘Abbās II and his successor Shah Soleiman I, thus dating from the second half of the 17th c. CE [17] (p. 119). It was bought in Istanbul between 1913 and 1914, together with 21 other manuscripts, by the Austrian consul in that city, Henri Ferté, for the *Hofbibliothek* (today the ÖNB) in Vienna. It was bought from Wilhelm Slawkowsky following some correspondence [18]. The part of the collection dealing with the *qanāt* of Mobārrak Ābād begins on p. 15 and ends on p. 19. The manuscript is in very good condition, containing headings in red ink and the main texts in black ink.

The aerial photograph is part of several rolls of photographs with the code AMS WWS 54 PROJ. 158. They were shot on 26 August 1955, around 11:48. This flight was part of several in 1955 to photograph large areas of Iran. AMS refers to the U.S. Army Map Service and the flights were undertaken in cooperation with the U.S. Air Force. Its archival categorization is Record Group 373, Records of the Defense Intelligence Agency. I am not certain if this was carried out with the agreement of Iranian authorities or as part of covert intelligence activities of US agencies, as there seems to be no information available which is directly related to these flights. Similar photographs were produced by AMS flights over Europe and West Asia, as well as over territories of the Soviet Union. following World War II. One example from Spain has been studied [19], as well as an overview produced for the intense aerial reconnaissance missions over West Asia and the Soviet Union [20]. This flight was certainly not part of the U2 flights, since those only began in 1956.

This article provides a combined description and analysis of these two materials. First, the manuscript contents are described and analysed. Then, the material evidence, as documented by the aerial photograph, are also described and analysed. In the end, these are combined to understand the social relations that can be understood through them. The analysis of the aerial photograph utilizes remote sensing methods common in Landscape Archaeology [21,22].

3. Results and Analysis

3.1. A Grant of a Qanāt and How to Use Its Waters

Pages 15 to 19 from Cod. Mixt. 859 contain the *farmān* under discussion. It is addressed to Mohammad Beig E ‘temād-al-Dowleh from Shah ‘Abbās II. Iraj Afshar [17] (p. 120) dates it between the 12th and 14th regnal year of ‘Abbās II, which would correspond to the time between 1654 CE/1064 q (the second date is based on the qamarieh Hijri calendar which was then in use in the Safavid realm) and 1656 CE/1066 q.

The *farmān* states that Mohammad Beig E ‘temād-al-Dowleh, Minister of the High Divān, is receiving the *qanāt* of Mobārrak Ābād, as well as the well of the citadel of Shahr-e Now, as a *suyūrghāl* grant. The Shah orders Mohammad Beig to extract water from the “determined lands from the *qanāt* and convey it to canals of Bāgh-e Mobārrak-e Hezārjarib”. ‘Abbās II also states that “there should be agriculture in the *mavāti* lands beyond the mentioned garden”. The Shah sets out that “water, which has been extracted and executed from the mentioned source, to a certain amount should stay in the mentioned canal”. He also takes special care to point out that it is “to be divided in a way that each of *mavāt* land can be irrigated”. The water should also be conveyed to the village, to be used for the welfare (*ābādāni*) of the village and its inhabitants. The branches of the water should be dedicated for *suyūrghāl-e ābādi*. The *farmān* ends with the order that this should be “written in all kinds of civil registers and accounts, very clearly and to the point, so it is preserved and protected from alteration”—evidence of concern for the future and a mindset of long-term management.

The identification of Bāgh-e Mobārrak Ābād near Varkān with the Bāgh-e Mobārrak-e Hezārjarib of the archival document discussed below is based on the clear connection of the grant of the *qanāt-e* Mobārrak Ābād and how it should be used to the garden in its

vicinity. While there is a Bāgh-e Hezārjarib in Isfahān, this is more often called ‘Abbās Ābād after Shah ‘Abbās I [9] (pp. 108–110). The name of Bāgh-e Mobārrak-e Hezārjarib is most likely an older name, as the more recent names for the garden are Bāgh-e Mobārrak Ābād-e Varkān. Jarib (or Jerib) is an area measurement which in the 17th c. was equivalent to approx. 958 m² [23] (p. 66) [24]. Hezārjarib (1000 Jarib) does not necessarily mean an actual area size, but rather a large area [25] (p. 47, FN 2). It is likely that Hezārjarib here only refers to the position of Mobārrak Ābād within a certain area called Hezārjarib. I suggest that in this case, it means the entirety of Isfahān and its productive areas.

Mohammad Beig, a member of an Armenian family of tailors, was first mentioned in 1643 CE in an administrative function of the Armenian community at Julfa, but rose through several positions to the highest level of the Safavid bureaucracy: *e’temād-al-dowleh* (lit. pillar of the state), the position of grand vizier [26]. Indeed, he was appointed to this position in the spring of 1654 CE/1064 q [26] (p. 21), so it is likely that this grant of the *qanāt* of Mobārrak Ābād and this order were given to him upon this occasion or shortly thereafter, especially considering the following. It is very interesting that even though he was Armenian his name was Mohammad—a Muslim name—and his noble title (Beig), which was most likely awarded by the Shah, was Turkish. Most of the Armenians of Isfahān were forcibly displaced from the Armenian regions of the northwestern Safavid realm [27] (pp. 443–445). It is interesting that only 50 years later an Armenian could reach the highest office of state.

The administrative function to assure both the grant of the *qanāt* to Mohammad Beig as well as to assure that it was used specifically for the welfare of the village was its nature as a *suyūrghāl* grant. Before the Safavid period, this type of grant was hereditary and exempted from tax, among other things. Under the Safavid Shahs, these grants were not hereditary anymore, and were either tied to a title—and thus passed from titleholder to titleholder—or given as a temporary holding to a person [28] (pp. 30–31). Not only was the *qanāt* given to Mohammad Beig as a *suyūrghāl* grant, but it was also explicit that part of the *qanāt* water was to be used for *suyūrghāl-e ābādi* of the village. This allowed the villagers to benefit from the water without having to pay taxes on it. It is, however, unclear whether this *suyūrghāl* grant for the village was also only temporary. I would suggest that it was likely renewed when the grant was awarded to the next *e’temād-al-dowleh* after Mohammad Beig’s dismissal in 1661 CE/1071 q.

Lands called *mavāti* were undeveloped lands [29] (pp. 1832–1834), so we must understand that the lands beyond the garden were not yet agriculturally worked. Thus, Shah ‘Abbās II here very explicitly gives Mohammad Beig the order to develop formerly undeveloped lands to increase agricultural production. Isfahān itself had been *khāsseh* since the time of Shah Tahmāsp I (r. 1524–1576 CE), and its surroundings since ‘Abbās I, which did not change until the end of Safavid rule in the region [16] (p. 120, 135).

The *qanāt* water should thus fulfill several functions:

- (1) provide water to the Mobārrak Ābād garden,
- (2) provide irrigation for agriculture in the *mavāti* lands “beyond the garden”,
- (3) support the welfare of the village.

In the following section, I will lay out how these functions were fulfilled through alterations or constructions in the environment of the garden and its surroundings.

3.2. Bāgh-e Mobārrak Ābād and Its Surroundings

The aerial photograph (Figure 2) shows that the garden of Mobārrak Ābād lies at the foot of a small mountain. To the southeast lies the village of Aranjon (modern name) with its agricultural fields. Based on the 1955 photograph, there seem to be less than 30 houses. When considering recent satellite imagery, this village has maybe doubled in size since 1955.

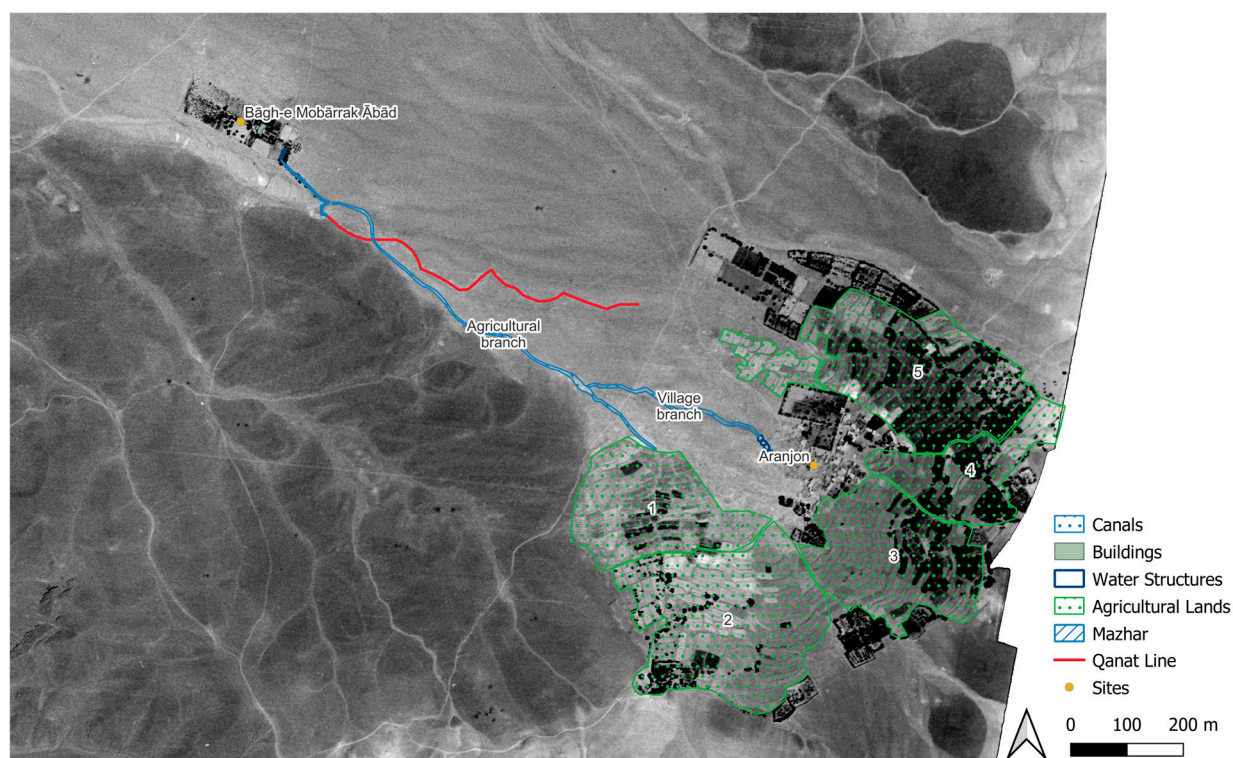


Figure 2. An overview of the features discussed above. Aerial photograph from 26 August 1955. AMS-WWS-Proj-158-54 Nr. R8866A. Published with permission from NARA. The cut-off on the right is due to damage to the original photograph. The Mazhar is visibly connecting Bāgh-e Mobārrak Ābād and the end of the *qanāt* line. The numbers 1 to 5 mark distinctively identifiable agricultural areas.

To the southwest of the garden within the mountain area, and to the south, partly within the mountain area and at its southern end lie more agricultural and garden areas as well as another small village, which is today named Pandās. To the further north-northwest of the garden lies a larger village by the name of Varkān.

The garden is of a *kushk*-mansion type. It consists of the mentioned mansion, rectangular walls, 4 small towers, water infrastructure (a well [*salkh*], canals) and service buildings. The entrance is from the west and the mansion lies slightly off-center to the east, with an octagonal pool in front of it. *Kushk*-mansions are described by Kiyāni [30] (p. 301) as a building with one central space surrounded by four Ayyvāns. This has four towers on the corners and is surrounded with roofed corridors. The garden has been described in an article before [5]. There, the *kushk* is dated to the Qajar era (1789–1925 CE) on the basis of surviving stucco ornamentation and a comparison with the Qajarid Khāne-ye Kāj in Kashan [5] (p. 68). However, the surviving stucco is, in my opinion, relatively small and general. The layout of the garden corresponds to some Safavid gardens, such as ‘Abbās Ābād north of Natanz [31], [32] (pp. 276–277). Kiyāni also mentions [30] (p. 303) that Safavid mansions and their gardens were sometimes destroyed by agricultural activity or in general completely refashioned by later Qajarid activity, which is likely to have happened in this case. It is not just the mansion that has been heavily altered, but also the service buildings. In the aerial photograph from 1955, it is clearly visible that there are four separate buildings, but the report from 2017 mentions one square building. This is the service building which has been heavily renovated since the 1970s [5] (p. 70). The small ruined remains of a wall slightly east from the *kushk* are mentioned by Noosh Abadi et al. [5] (pp. 69–70), which I think are the most likely surviving pieces from its Safavid period.

The *qanāt* of Mobārrak Ābād (marked red in Figure 2) is relatively short—below 1 km. Its beginning lies to the southeast of the garden, and it proceeds north-northwest. At its end, there is a short *mazhar* (outflow facility, see also Figure 3a) that provides water to

the garden, fulfilling the first function outlined in the *farmān*. Shortly after the beginning of the outflow facility, there is a canal branching off towards the southeast (marked as “Agricultural branch”) and the agricultural lands situated southwest of the village (1 and 2 in Figure 2), fulfilling the second function. Branching off from this canal is another one leading east towards the village (marked as “Village branch”), fulfilling the third function.

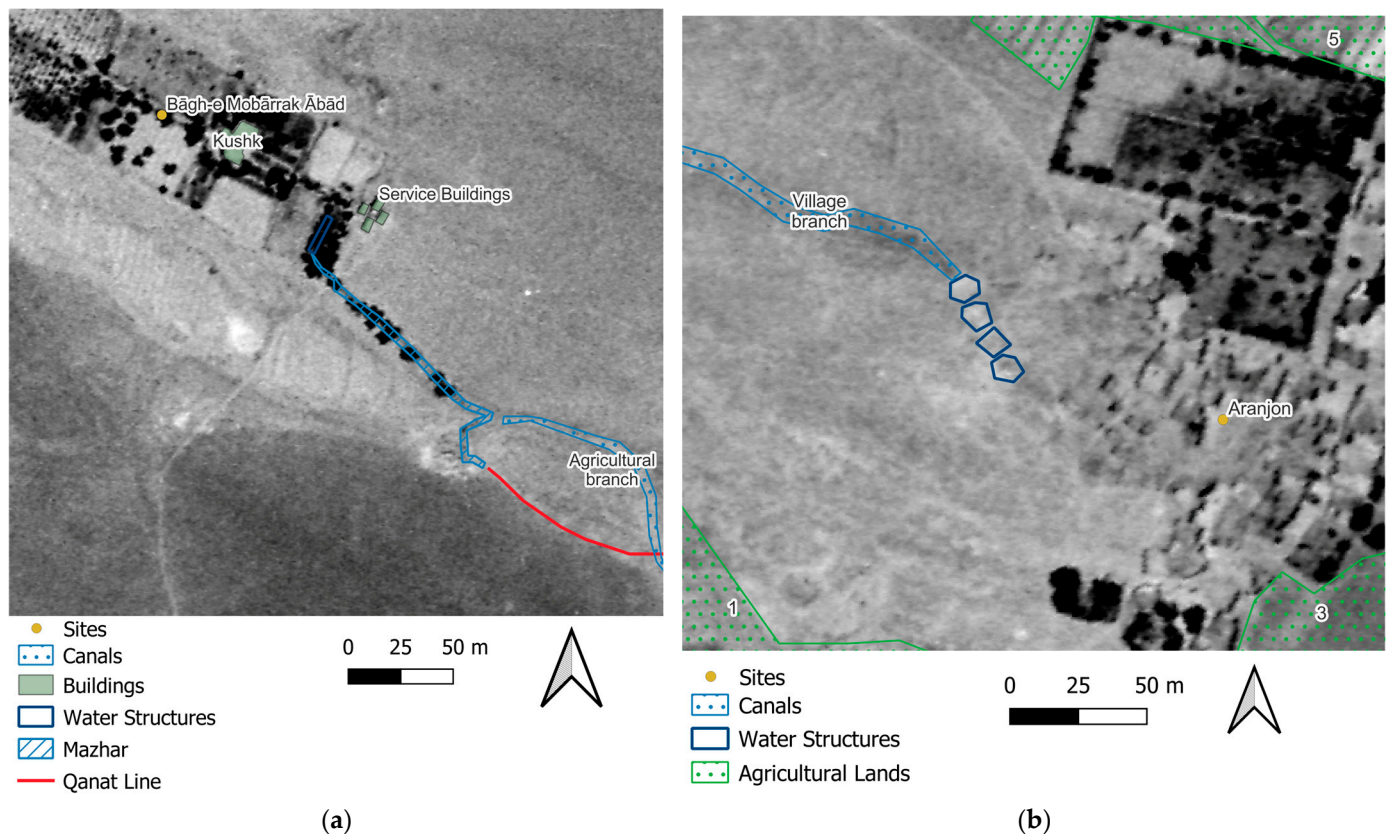


Figure 3. (a) Detailed view of the connection between *qanāt* and garden; (b) the water infrastructure west of the village. In (b), the numbers refer to the distinctly identifiable agricultural lands as shown in Figure 2.

The provision of water to the garden (Figure 3a) is achieved through a connecting canal excavated from the *mazhar* of the *qanāt* through the southeastern corner of the garden wall. There, it reaches a long rectangular pool in the garden which acts as a reservoir and from which several channels within the garden branch off, feeding water to the flora throughout the garden. The service buildings also likely draw water from this reservoir.

The canal termed “agricultural branch” was excavated from the original canal connecting the garden and the *mazhar* of the *qanāt*. Today, it runs towards the southeast across the *qanāt* itself to the agricultural lands southwest of the village (marked 1, Figure 2), providing irrigation water to these lands. Additionally, its water could also have been used for the agricultural lands marked 2 if they were already in existence at the time.

The canal termed “village branch” was excavated from the canal I have termed “agricultural branch”. Compared to the “agricultural branch” it is relatively short and runs east-southeast towards the western edge of the village. Comparing the aerial photograph and recent satellite imagery, there seem to be some remains of small possible pools (Figure 3b) which would have been filled up from this canal and would have been easily accessible to the villagers. However, the canal itself is destroyed today.

4. Discussion and Conclusions

The first conclusion that the documentary evidence provides is that the *qanāt-e* Mobārrak Ābād must be older than 1654 CE/1064 q for it to be mentioned in the *farmān* as an existing infrastructure.

In combining the information from the *farmān* with the construction and infrastructure visible in the aerial photograph, it becomes obvious that Mohammad Beig—or whoever he deputized the work to—followed the orders of Shah ‘Abbās II. The *qanāt* very directly provides its water to the garden and its irrigation. However, if we consider that the *qanāt* (and the garden) had existed before, it must be asked what the water was mainly used for. It is possible that the *farmān* merely makes it clear to Mohammad Beig that the water must be used in the first instance for the benefit of the garden and the irrigation infrastructure be maintained. If this is correct, then the irrigation infrastructures between *qanāt* and garden are also older than 1654 CE/1064 q.

Regarding the development of the *mavāti* lands the case is different, I would suggest that the *farmān* makes it explicit that these lands were undeveloped. This makes it clear that the construction of the “agricultural branch” canal happened under the instruction of the *farmān*. We can thus give a date of post-1654 CE/-1064 q for the construction of this canal. The layout of the canal and direction, as discussed above and marked in Figure 2, reveal that agricultural land nr. 1 must have been one (or both) of the *mavāti* lands, which after 1654 CE/1064 q were to be turned over to agricultural production. It is possible that agricultural land nr. 2 was also part of this as its position south of agricultural land nr. 1 would allow it to be irrigated from the same source.

The provision of water for the welfare of the village and its inhabitants was then achieved by constructing an additional canal (the “village branch”) and providing infrastructure for water catchment in the form of the pools discussed above and shown in Figure 3b. The water supply specifically for use by the villagers would have been ensured as long as the *qanāt* remained active.

To reiterate, I dated the *qanāt* and its water provision for the garden as follows:

- (1) Before 1654 CE/1064 q: *qanāt*, mazhar, garden water infrastructure,
- (2) After 1654 CE/1064 q: canals called “agricultural branch” and “village branch” as well as the water structures in the village.

The administrative actions of the water management provided by the Safavid administration in the form of orders addressed to Mohammad Beig as laid out in the *farmān* are evident in the materiality of the landscape they shaped. The canals, the garden, the agricultural activity all provide testament to that. What does this tell us about the social relations at the time, though?

First, we must consider that the *farmān*, as well as the persons involved in it, were at the highest bureaucratic–political level of the Safavid state: the Shah and his *e ‘temād-al-dowleh*. The fact that the domains of Isfahān and its surroundings had been *khāsseh*, as well as the position of Mohammad Beig as the closest and highest official of the Shah, meant that the grant of these holdings directly reified personal relations of dependence between these two elite men. This grant also gave Mohammad Beig a tax-exempt income (most likely among many other such holdings), but the fact of the direct relation of dependence to the person of the Shah remained.

Second of all, the social relations “on the ground” are hidden behind the elite context of the archival documents. I would suggest there are (at least) three layers to this text. In the visible layer, Mohammad Beig receives the grant and order from the Shah to develop it: a clear elite interaction between the two most powerful people in the Safavid realm. The second layer is semi-visible: Mohammad Beig, as the *e ‘temād-al-dowleh*, certainly did not concern himself directly with a relatively remote garden and its small-scale water infrastructure, but merely benefitted from any income that was derived after the fact and certainly delegated this task to his subordinates. The third layer is invisible in the document: the people who actually constructed (and maintained) this infrastructure remain invisible and

are not made explicit. Their historical trace is written into the landscape: the construction of the branching canals as well as the following increase in agricultural production.

There is also the matter of the village: the *farmān* does not grant the village to Mohammad Beig, it only tells him to provide water for its welfare. Since he should provide water from the *qanāt*, it is clear that there is no other owner of the village who would otherwise be responsible. Thus, the village itself and the agricultural lands to which water should be provided as well must be *khāleseh*. The villagers provide their production directly to the crown, and are most likely managed by another official of the Shah's personal bureaucracy. Living in such *khāleseh* properties could sometimes be beneficial for villagers. When the Shah/his court did not need the taxes or production of certain *khāleseh* properties, the inhabitants were allowed to use them for their own benefits [16] (p. 132), although they were still registered and could be called on to provide back-taxes if required. It would be an interesting point of further study to consider whether the inhabitants of the village were displaced Armenians.

Such investments as the expansion of the use of the *qanāt* waters ordered by 'Abbās II were certainly a result of the increased centralization begun by 'Abbās I. However, they were also certainly a result of the prosperity and fertility of the Isfahān region and the relative peace of 'Abbās II's reign. The specific instructions to increase agricultural production by developing the *mavāti* lands certainly reflect an interest in increasing agricultural production in the area of Isfahān.

While it was such top-down investment that allowed and created such expansions of water infrastructure, it was the ceaseless labour in maintenance provided by the people living around and benefiting from them that allowed these infrastructures, as in the case of Bāgh-e Mobārrak Ābād, its *qanāt* and the village itself, to survive for hundreds of years. Without this labour and management provided by the local population, this would not have been possible. The *qanāt* would have fallen into ruin and with it, the garden and possibly the village itself at some point. Today, the village does not benefit from the nearby *qanāt* anymore. A chicken farm has been built directly to the east of the garden that diverts and exploits the *qanāt* waters for its production. Some water still seems to flow to the garden, however, as attested by the greenery visible in recent satellite imagery.

Future studies might consider how the results presented in this article could be applied to the wider region of Varkān and the *khāsseh* province of Isfahān. With such an expansion of the investigation, the structures of Safavid administration and their material impacts could be discussed in detail. The *qanāt* in Mobārrak Ābād still exists—unlike many others throughout Iran—and its materiality could be investigated through on-the-ground archaeological fieldwork in a way that connects with the evidence presented and discussed here.

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