

QANAT; IRANIAN'S MOST REMARKABLE ANCIENT IRRIGATION SYSTEM

Omid Esfandiari¹

ABSTRACT

Modern civilization, as we knew it today, is not the product of the genius of one sole nation. In fact, to achieve what we have today, the legacies and contributions of many nations have played their part. We can, indeed, liken the present civilization to a pot into which almost every nation of the world, whether extinct or alive, has thrown its share.

Iran being situated in the middle of the old world before the discovery of the Americas and the growth of Europe was an active member of the world and had to take part in almost every historical and worldwide upheaval or disturbance. It had to shed its intolerance very early in its long history, which is full of glorious periods and disturbed episodes. In this position Iran contributed continuously to the enrichment of civilization, it not only placed its own inventive genius at the disposal of the pot, but gleaned what it could from the East and West, transformed and transmitted it.

In the sphere of agriculture, Iran has helped the development of agriculture in two ways; first by controlling the forces of nature and domesticating animals and plants existing in the wild state in the plateau, and secondly by inventing ways and means of procuring water from the places where it could be found and diverting it to the places where it was needed for irrigation; by inventing various agricultural implements, Qanats, water-mills and windmills and storing the wheat, by creating gardens and using manure to restore to the land what had been lost through uninterrupted cultivation.

Iranians have devised a number of ingenious methods for preserving and obtaining, where and when it is wanted, enough water to grow sufficient food. Irrigation was considered a good deed in the eyes of Ahura-Mazda in the Avesta, the sacred book of the ancient Persians. The Achaemenids Kings granted exemption from land tax for five generations to any man who made a tract of desert land cultivable through the construction of an irrigation system.

1- M.S., PhD, Society of Iranologists

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The Qanat system was invented by the people of the plateau of Iran. It is unique to Iran and a typical feature of Iranian scenery. It is used all over the plateau including Baluchistan and Afghanistan. In the Eastern parts of Iran where the Qanat is constructed, it is often called Kahriz which is a double word (Kah=straw and Riz=throw), because they used to through kah into the Qanats for purpose of seeing how rapid the movement of water in the wells is and for repair works, the straw used would fill some of the gaps in the side of the subterranean channel. From this derived the word Qah-riz . In Western parts of Iran, Kahriz is called Qanat.

The Qanat system was introduced by the Iranians to Transoxania, Fergana, Soghianna and still farther East to Qara Khoja and Turfan as far as the Chinese oasis settlements of East Turkistan. They bore in all these areas the Persian name Kah-riz. Westwards the Qanat system was adopted by the Assyrians. We know that the Assyria King Sargon II (722-705 B.C.) claims that he learned the secret of tapping underground water during his campaign against the old country of Urartu around Lake Urumieh in Northwest Iran.

Although the Persian Qanat system is of such venerable age, it is by far the most reliable source for obtaining water, Up to 20 years ago, the 75% of all water used in Iran came from Qanats. W. Benisson, an authority in this subject is convinced that Qanat system undoubtedly is the “most extraordinary method to develop ground water”. C.F. Tolman, in his book called “The Greatest Water Works of the Ancients”, calls Qanats “one of the greatest achievements for obtaining water in the ancient times.”

INTRODUCTION:

Modern civilization, as we knew it today, is not the product of the genius of one sole nation. In fact, to achieve what we have today, the legacies and contributions of many nations have played their part. We can, indeed, liken the present civilization to a pot into which almost every nation of the world, whether extinct or alive, has thrown its share.

These contributions, of course, are not equal. Some of these nations lived for a span of time, threw something into the pot and then died completely vanishing from the face of the earth. Others gave a share for a short period and then stopped making any new contributions, while yet others started very early and still continue to be fully alive and active in helping the pot to grow in size and content. Some of these nations live in the middle of the arena and some on the edge. While some have had to take an active part in the world's turbulent upheavals, others could stand apart and aloof, continuing their own way of like uninterrupted by these changes, each nation's outlook depends upon its geographical position and the inborn characteristics of its people. Some, especially those situated on the edge who could afford to remain aloof, became conservative and abhorring all innovations and change, and believing only in their own historical legacy,

tended to grow very intolerant. Such intolerance is also the result of ignorance or immaturity.

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“From the earliest and in all branched of art Persian has shown a combination of two capacities, apparently mutually contradictory but together productive of great achievements. On the one hand there is an undeniable creative genius, on the other, great facility in assimilating foreign cultural contributions.”

The Survey of Persian Art - Leo Bronstein

What Dr. Bronstein says about art is also true in the domain of ideas, whether religious, philosophic, scientific or administrative. In the opinion of quite a number of scholars who have either studied or taken part in the discoveries made in the last two or three decades, the plateau of Iran is indeed the cradle of our present civilization. According to Dr. Ernest Hertzfeld and Sir Arthur Keith, the mode of living which came to fruition on the banks of the Indus, the Euphrates and Tigris, was preceded by a phase first elaborated by upland peoples living in the valleys of the Caspian plateau. The two eminent scholars believe that the people of the plateau of Iran were the original agriculturists, and that the knowledge of agriculture spread from the plateau of Iran over the three adjoining alluvial plains of the Indus, the Amu and Syr-Darya, and the Tigris and Euphrates. This opinion has been corroborated by the finds of the last two decades in the plateau of Iran. It is also an accepted fact, now, that the smelting of minerals, irrigation systems, weaving, pottery bricks, the potter's wheel, wheeled vehicles and quite a number of other first rate inventions were originated by the people of this plateau. These discovering, pregnant with revolutionary consequences, were all made in the 5th and 4th millennium B.C. and by 3000 B.C. these achievements were being diffused at least as far as the Aegean Sea in the west and Turkistan and India in the East. After a further thousand years or so they had reached China and Britain.

According to some scholars, The Sumerians belonged to the same racial stock as the people of the plateau of Iran. The Sumerians were a non-Indo-European, non-Semitic people, whose presence in the alluvial province created by the lower Tigris and Euphrates is attested historically from the beginning of the 3rd millennium B.C. onwards.

The Iranian Plateau is indeed East of Mesopotamia, proving thereby the origin of the Sumerians and the origin of the civilization that, according to Sir Leonard Wooley, they already possessed when they arrived in Mesopotamia. In his words, "Sumerians believed

that before coming to the alluvial plains of Mesopotamia they had a civilization of their own and had knowledge about agriculture, architecture and metallurgy.”

According to Prof. A.U. Pope “Agriculture , Metallurgy and the initial religious and philosophical ideas as well as the art of writing and the science of numbers and astrology and mathematics originated in the lands that today we call Middle East, and the origin of many of these cultural elements is the plateau of Iran.”

As Dr. Ghirshman puts it: “Iran was a highway for the movement of people and for the transmission of ideas. From the pre-historic period onwards, and for 1,000 years more, it held this important position as an intermediary between East and West. In return for what it received it never ceased to give; its role was to receive, to recreate, and then to transmit.”

Iran is one of the few ancient civilizations that, owing to its genuineness, have survived the onslaught of time and circumstance. Many other countries have appeared in the orbit for varying lengths of time, eventually to disappear forever from the face of the earth. Iran, owing to its vitality, started earlier than many and yet still continues to survive and keep intact its traditions and legacy for future generations.

Iran, by right, should be properly introduced to the West, and its magnificent and prodigious contributions to the present world civilization should be recognized. It is the object of this short essay to show, a most remarkable system of bringing water from its sources in the mountains to the lower plains for irrigation and consumption by Iranians, in order to show the Iran’s proper share in the present civilization, for what Iran and Iranians actually were, rather than as they have been represented by 19th century scholars who were under complete tutelage of Greece and Rome or the Church.

AGRICULTURE AND IRRIGATION

In the sphere of agriculture, Iran has helped the development of agriculture in two ways; first by controlling the forces of nature and domesticating animals and plants existing in the wild state in the plateau, and secondly by inventing ways and means of procuring water from the places where it could be found and diverting it to the places where it was needed for irrigation; by inventing various agricultural implements, Qanats, water-mills and windmills and storing the wheat, by creating gardens and using manure to restore to the land what had been lost through uninterrupted cultivation.

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THE QANAT SYSTEM

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His son, King Sennakherrib (705-681 B.C.) undertook a great irrigation scheme around Nineveh which included underground conduits according to the commemoration plaque at the end. The same king built a real Qanat system for the water supply of Arbela. According to a stela recently translated is revealed that the Persian general Scylax by order of Darius I introduced the Persian method of irrigation by means of underground conduits fed by water from the strata of sandstone where it collected in faults. From then on the Egyptians were no longer hostile to the conquerors and built a temple of Ammon, and conferred the title of Pharaoh on Darius. Polbius gives some more details about the Qanat in his description of the war between Antiochus the Great and Parthian King Arsaces III (212-205 B.C.) as follows: "For in that tract of Media there is no water appearing on the surface, though there are many subterranean channels (hyponomani) which have shafts sunk in the, at spots in the desert unknown to persons unacquainted with the district. "

The Greek geographer Megasthens saw the system in operation in North India where government overseers inspected the conduits, ordered maintenance work and supervised water distribution. The first historian on technology, Vitruvius (90 B.C.) gives much technical detail in the Qanat system.

When Caliph Hisham in 795 A.D. built a garden palace some distance away from Baghdad, water for it was obtained through a Qanat. Abdullah B. Tahir (828-844 A.D.), governor of Khorasan, found that the traditions of Prophet did not refer to the Qanat system and the distribution of water, and so he asked the jurists of the province to write a book on the subject. Qanats were introduced by Iranians as we saw, into Iraq and Syria where they were known under the name Fugara. In Arabia and Yemen it is called

Shariz (from the Persian word Kariz). The system spread from the Near-East to North Africa, Spain and Sicily in Roman times, followed by a second wave of introduction after the Arab conquests. In Tunisia and Algeria a number of oasis settlements are still irrigated by these fugaras; in Sahara region of Taut alone 1,200 miles of them are in full working condition. The Qanats are known as “Persian work “to the Touares who live on the southern fringes of the Sahara.

QANAT CONSTRUCTION

The ancient Iranians were skillful in digging Qanats and many hand-books on the subject were available. They knew all about subterranean waters and the manner of extracting it. They give very exact and detailed instructions for digging Qanats and Mughanis (Qanat diggers) and water-founders follow the principles they had laid down. A technical treatise on the subject written by Mohammed Ibn-al-Hassan al Hasib Karaji in about 1000 A.D. has fortunately survived, Karaji who was born in Karaj near Tehran gives very food detail on the finding of water level instruments for surveying protection against decay and instructions for digging Qanats and ways of keeping the, in working order by clearing and maintaining the, Karaj mentions many books in existence in his time, which were written by the ancients, but unfortunately he does not give a detailed list of such books most of these are no longer available.

Qanats are underground channels dug into the alluvial fans raising from the valleys toward the slopes of the mountains. A head-well (Madar-Chah) or a gallery of them tap the aquifer (Ab-deh) at a depth between 5- and 300 feet and , by using less slope for the conduit tunnel (Pusteh) than that of the surface of the fan, water is eventually led to the open (the lengthy of such a Qanat from the head well to the outlet may be only a mile or two; often it is 10 miles and occasionally much more, e.g. the Qanat form Mahan to Kerman in South-West of Iran is 18.3 miles long. The diggers, who do this rather large job work with very simple tools- a pick, a shovel, a leather bucket, a wooden windlass, a plumb-bob on a long string and a little lamp. Also, they know by generations of experience, their duties in the dark and cold environment. It may take 20 to 30 years to dig a new Qanat. Qanats are expansive to dig, and expensive to maintain. But, until now they have been worth it, for they bring the water to places when it is needed in a way which no other means can equal.

The Qanats have been there for so long that it is said special forms of life have developed in them; Blind white fish, for example, and the Creature form the Qanat, which held a whole village in terror for several days only a few years ago. It was probably an otter. Legends and mysteries have grown up around the Qanats, and the diggers who make and look after them are the people set a little apart from the rest of the community. Qanats have owners ranging from one to many numbers of Qanats, to his responsibility is to balance the costs of maintaining and renewing the system against the profits that the produce will bring him.

Although the Persian Qanat system is of such venerable age, it is by far the most reliable source for obtaining water, Up to 20 years ago, the 75% of all water used in

Iran came from Qanats. W. Benisson, an authority in this subject is convinced that Qanat system undoubtedly is the “most extraordinary method to develop ground water”. C.F. Tolman, in his book called “The Greatest Water Works of the Ancients”, calls Qanats “one of the greatest achievements for obtaining water in the ancient times.”

For a detailed explanation about Qanats and their construction one can refer to various books in the subject.

NOTES:

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5. R.G. Forbes, Studies in Ancient Technology Vol. II
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7. Polybius, Historia
8. A.H. N-Nouri, Material Contribution of Iran
9. A. Smith, Blind White Fish in Persia
10. John Shearman, The Land and People of Iran
11. E.W. Bernison, Ground Water