

QANATS – TRADITIONAL WATER MANAGEMENT SYSTEM COMING FROM THE IRANIAN ANCIENT ARCHITECTURE

By Antonello Sacchetti

In March 2024, a traditional water system introduced in ancient times to Palermo (Italy) by the Arabs will save the citrus groves of Fondo Micciulla. The agreement was signed by the sole administrator of the waterworks company and the representative of the irrigation association "Zappa Paceco". The *Qanat* - this is the name of the ancient traditional system - has a flow rate of over ten liters of water per second. The water from the qanat will be used to supplement that normally coming from the Piana degli Albanesi basin. The farmers hope for the support of the Municipality; They are keeping alive a millenary agricultural system that is culture and a source of well-being for the citizens.

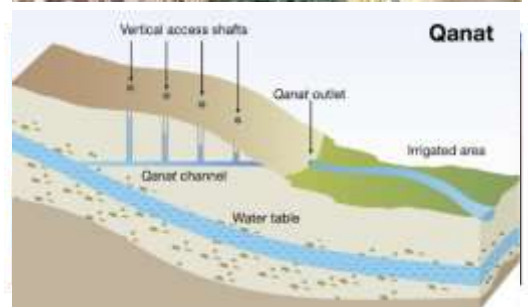


Qanats are a traditional water management system built in Persia (modern-day Iran) around 5,000 years ago, that has been used for centuries in many parts of the world, including the Middle East, North Africa, and Central Asia. Qanats are a type of underground tunnel that is used to tap into groundwater and transport it to the surface. They are typically constructed by digging a series of vertical shafts that are connected by a horizontal tunnel. The water from the groundwater table flows into the tunnel and is then gravity-fed to the surface.

Qanats have a number of advantages over other water management systems. They are very efficient, as they use very little water to transport a large amount of water. They are also very reliable, as they are not affected by drought or flooding. Additionally, qanats can be used to provide water for a variety of purposes, including irrigation, drinking water, and industrial water. Qanats also have a number of disadvantages. They are very expensive to construct and maintain. Additionally, they can be difficult to repair if they are damaged.

The history of qanats dates back to ancient times. The earliest known qanats were built in Persia (modern-day Iran) around 5,000 years ago. Qanats were later introduced to other parts of the Middle East, North Africa, and Central Asia.

Qanats were an important part of the agricultural systems of many ancient civilizations. They allowed farmers to irrigate their crops in areas that were otherwise too dry for agriculture. Qanats also provided water for drinking and industrial purposes. The use of qanats declined in the Middle Ages, as other water management



systems, such as wells and canals, became more widespread. However, qanats are still used in some parts of the world, particularly in Iran, Afghanistan, and Pakistan.

The construction of qanats is a complex and time-consuming process. The first step is to locate a source of groundwater. This is typically done by using a divining rod or by drilling exploratory wells. Once a source of groundwater has been located, the next step is to dig a series of vertical shafts. The shafts are typically dug about 30 meters apart and are about 10 meters deep. The shafts are then connected by a horizontal tunnel. The tunnel is typically dug about 2 meters wide and 2 meters high. The water from the groundwater table flows into the tunnel and is then gravity-fed to the surface.

Qanats can be still found in these countries: Afghanistan, Algeria, Armenia, Azerbaijan, Bahrain, China, Cyprus, Egypt, Eritrea, Georgia, India, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Spain, Sudan, Syria, Tunisia, Turkey, Turkmenistan, United Arab Emirates, Uzbekistan, Yemen.

The Moors, who ruled Spain, left behind qanats (galerías) in regions like Andalusia and cities like Granada. There used to be many qanats in Azerbaijan too, but modern wells made them less important. However, many qanats are still crucial for communities in Azerbaijan.

In Iran, thousands of underground water channels called qanats have been used for centuries. In the mid-20th century, there were about 50,000 qanats. Today 37,000 remain already operational. These channels tap into aquifers and transport water by gravity over long distances. One famous example is the 2,700-year-old qanat in Gonabad, which still supplies water to nearly 40,000 people. The [UNESCO recognized the importance of qanats and in 2016, in agreement with the Government of Iran, listed eleven of them as World Heritage Sites](#). There's even an international effort to establish a research center dedicated to these ingenious water systems.

[The UNESCO website highlights that](#) "Throughout the arid regions of Iran, agricultural and permanent settlements are supported by the ancient qanat system of tapping alluvial aquifers at the heads of valleys and conducting the water along underground tunnels by gravity, often over many kilometres. The eleven qanats representing this system include rest areas for workers, water reservoirs and watermills. The traditional communal management system still in place allows equitable and sustainable water sharing and distribution. The qanats provide exceptional testimony to cultural traditions and civilizations in desert areas with an arid climate".

In 2016 the Government of Iran agreed with UNESCO to declare four sites of the Gonabad area as [Qanat-based Saffron Farming System as Globally Important Agricultural Heritage System](#), in the framework of the GIAGIAHS Initiative managed by FAO. In this framework, proper use of water resources supplied by the Qanat irrigation system assures the production of high value added products, especially saffron, having created a unique opportunity for farmers and residents of the region to improve their livelihoods. In 2016 also the [Qanat Irrigated Agricultural Heritage Systems of Kashan](#) has been declared as Globally Important Agricultural Heritage System. In this area, the system has contributed to enrichment of the landscape in the Kashan region which otherwise should have been a desert. The most beautiful farms and gardens



were created and maintained through Qanat irrigation which could be threatened by over pumping in the deep aquifers. The initiative of declaring these territories as Globally Important Agricultural Heritage Systems highlights the interest of the Republic of Iran in preserving, protecting and improving these traditional water management systems.

International organizations are helping to rehabilitate these ancient water systems in many countries.

The genius of old Iranian architects is evident in the design of qanats, a testament to their ability to harness natural resources for the benefit of society. These remarkable underground water systems, alongside other nature-based solutions, for example the wind towers, are now being reevaluated for their potential to address contemporary challenges.

To know more

[Qanāt water-supply system in britannica.com](https://www.britannica.com/topic/qanat)

[The Qanat System in revolve media](https://www.revolve.com/qaqanatsystem)

[The Persian Qanat in UNESCO World Heritage List](https://whc.unesco.org/en/list/1074)

[Qanat Irrigated Agricultural Heritage System, Iran](https://www.iranicaonline.org/articles/qanat-irrigated-agricultural-heritage-system-iran)

[Qanat based Saffron Farming System in Gonobad, Iran](https://www.gonobad.com/qanat-based-saffron-farming-system)

[Qanats System inircwash.org](https://www.inircwash.org/qanats)

[Qanat System inwaterstory.org](https://www.inwaterstory.org/qanat)

[The Qanat System in link.springer.com](https://link.springer.com/article/10.1007/s11267-017-0888-1)

[Persian Qanat in irasafar.co](https://www.irasafar.co/persian-qanat)

[Community benefits of Irans traditional Qanat System in wedocs.unep.org](https://wedocs.unep.org/handle/document/11111)

[Persian Qanat in sufiran.com](https://www.sufiran.com/persian-qanat)

[Qanat an Ancient Invention for Water Management in researchgate.net](https://www.researchgate.net/publication/312111111)

[Qanats and wells in Palermo in researchgate.net](https://www.researchgate.net/publication/312111111)

[Qanats and historical irrigated landscapes in Palermo in academia.edu](https://www.academia.edu/11111111)

