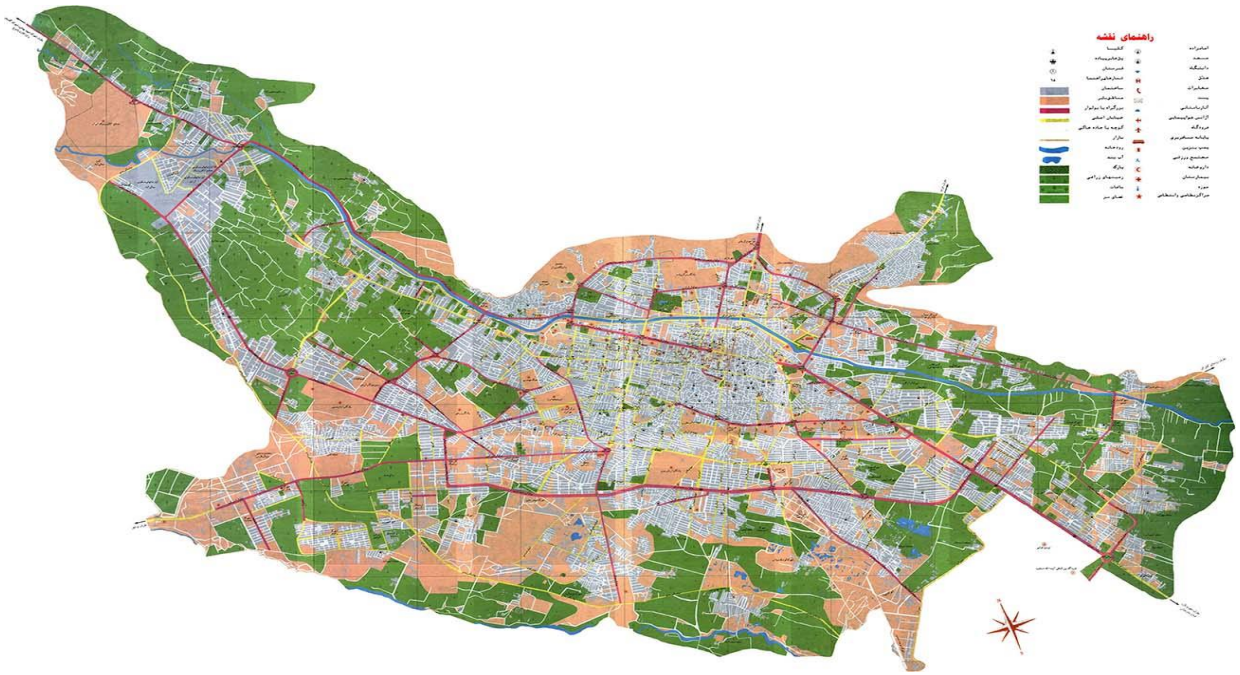
# Water Management in arid and semi-arid areas

**JUNE 2018**

# About Shiraz.Fars province.Iran

Shiraz, the cultural capital of Iran, has since old times been known as the city of flowers and nightingales. The city's beautiful gardens are renowned worldwide and visitors always leave this city with beautiful memories.



**Jahan Nama Garden**

This is one of the oldest gardens of Shiraz situated near the tomb of towering Iranian poet, Hafez.

**Nazar Garden**

Another historic garden of Shiraz is Nazar, where Zandieh Museum is located in its Kolah-Farangi Building. In the past, the building was used for hosting foreign ambassadors or official ceremonies.

**Eram Garden**

Eram Garden is especially famous for its citrus trees and a long street on the two sides of the garden is lined with cypress trees. While citrus trees perish during cold weather, cypress trees have stood the test of time in the past 50 years.

**Delgosha Garden**

This historic garden dates back to the Sassanid era. It is located in northeast Shiraz.


water supply in Shiraz was up to 150 meters in recent years, but today the well has been drilling up to 300 meters in order to consumption water, 77 percent of the total consumption water in Shiraz is provided by groundwater resources.

the average consumption water in the metropolitan area of Shiraz is 130 liters, which is lower than the average consumption of the country.

per capita water standard under water stress is about 105 liters, and people should lower their level of consumption to this level of standard .

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## Land subsidence in one million hectares of plains in Iran

negative balance of groundwater has caused the collapse of a million hectares of land in different parts of the country. The result of mismanagement of water resources and its adverse consequences, in particular the drilling of permissible and unauthorized wells, becomes more evident every day; when no criteria are met for deep and semi-deep wells to develop unsustainable agriculture, the aquifers are empty, the groundwater level goes down, resulting in 230 plains The country's fertile, country is in crisis.


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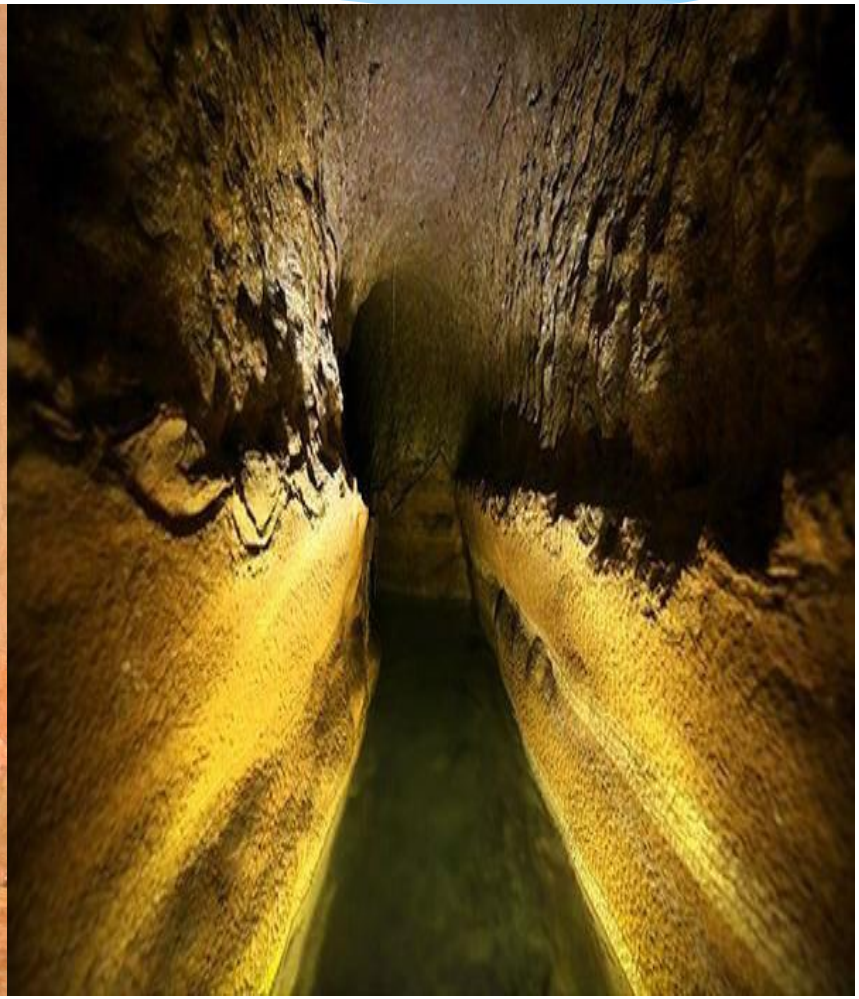
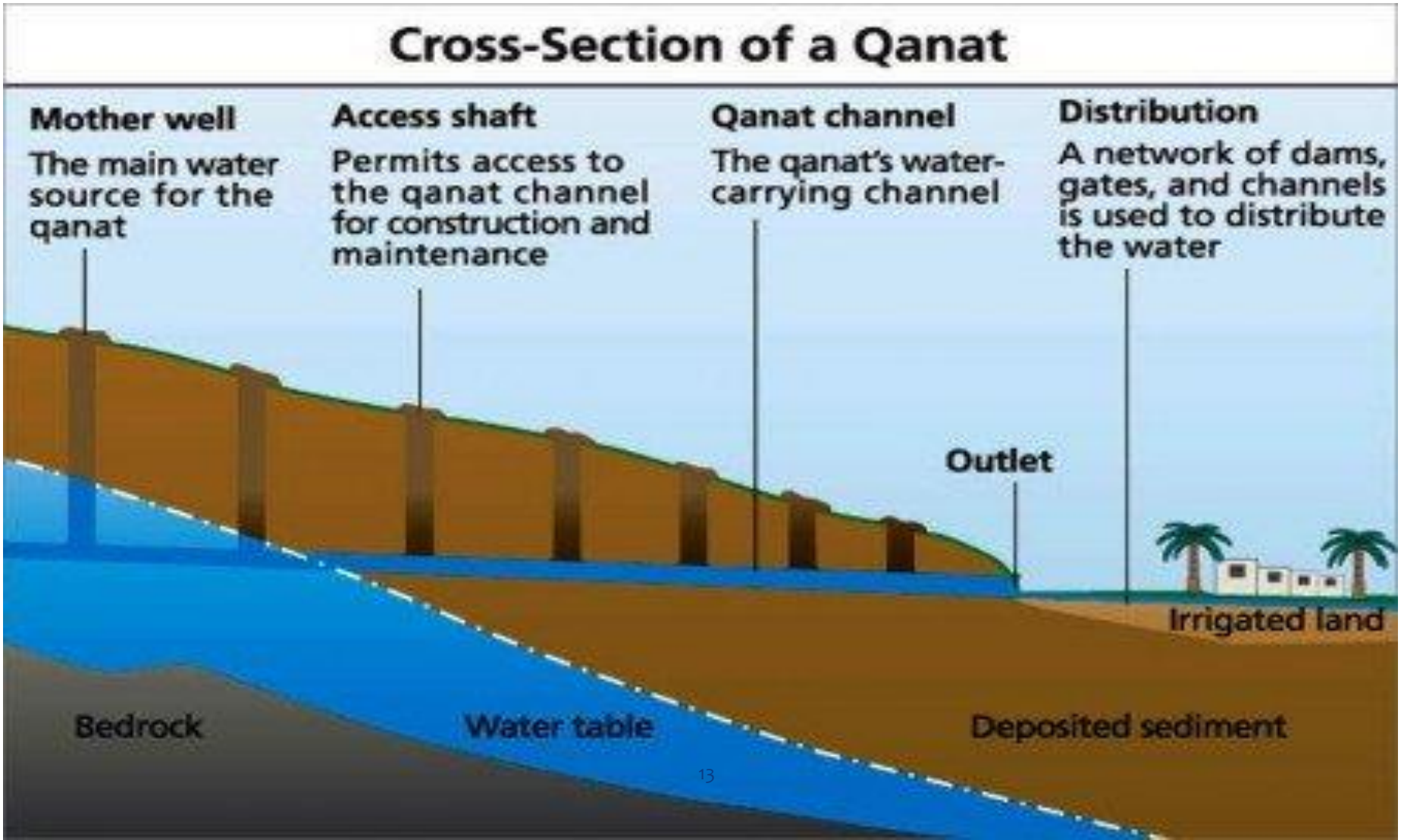
## Qanat ( aqueduct)

At a glance, Qanat may be a very simple technique for extracting groundwater. Apparently, the aqueduct is nothing but a horizontal tunnel with a number of vertical wells, a tunnel whose bottom ends on a groundwater drain and drains water to the surface of the earth. But this tunnel is excavated in various layers of the earth and faces a variety of conditions that require extensive knowledge. Qanat  may be considered as one of the most sophisticated indigenous techniques that requires the knowledge of the natural behavior of groundwater, geological structure, etc.




Cross-Section of a Qanat
Mother well
The main water source for the qanat
Access shaft
Permits access to the qanat channel for construction and maintenance
Qanat channel
The qanat's water-carrying channel
Distribution
A network of dams, gates, and channels is used to distribute the water
Outlet
Irrigated land
Bedrock
Water table
Deposited sediment

There are 37,000 active aqueducts in our country, and this amount consumes 7 billion cubic meters of underground water in our country. The water extracted by the aqueducts is mainly provided to the agricultural sector. Of course, a small portion of it is also used for drinking in the rural and urban areas.

# Advantages of Qanat

Qanat has many advantages compared to water supply systems such as wells. In this method, water extraction is carried out without the use of electrical energy or fossil fuels, while electricity or fuel should be used in the well. The aqueducts make water available in gravity and thus do not use electrical energy or fossil fuels. If 7 billion cubic meters were to be extracted and supplied to consumers through wells and pumps, a large 800 MW power plant would be needed.

Another advantage of the aqueduct is that it drains the overflow of groundwater because it is horizontally constructed on the ground, and no significant water table drainage occurs, and thus, unlike the well, it is a totally harmonious system of nature. In other words, if in the past 60 years, instead of using a well, Qanat has been used, none of the country's groundwater aquifers has not a negative balance and a drop in the water level.

## Aquifering, a modern solution for storing surface waters

"The flood is a blessing. It is our ignorance that we know the flood as troublesome. If there was no flood, there would be no life in most parts of the world. The floods should be watered into the basins of the water. The only important thing is that we can restrain the current floods and use God's blessing in a desirable manner. "This is part of the remarks by the old man of Shiraz who for many years has been dubbed the founder of the science of aquaculture in Iran.

Doctor Kośar, who has received numerous awards from the United Nations Human Settlements Program and UNESCO, has said to Iran: Drought and flood events are the usual routine of deserts, and it is not exceptional.

The Kosar Ahang, which succeeded in rebuilding the plain of Garabaygan Fasa, which had been abandoned in past decades, by flood dispersion on earth.

As the artificial feed of the aquifers provides the required water, the value of alluvial  is higher than the oil purchased from the sale of that currency for the purchase of food, and the artificial feeding of aquifers in the 140,000-square-kilometer zone, will increase Iran's ability to cope with droughts and mitigate the corresponding crises.

This researcher believes that abundant evaporation from surface waters, early sedimentation, subsidence of habitats and fields, drainage leaks, earthquakes and other environmental damage, and ultimately the astronomical and long-term costs required to build them.

It makes dams in most of cases inappropriate knowledge and technology. there are many plans for protecting water and soil in the country that flood spreading is one of the most successful ones, in fact, flood spreading at the aquifer level, the optimal management of natural resources and porous layers of underground reservoirs It provides sustained water storage conditions and can be exploited by drilling wells or draining qanats and springs.

# Thanks