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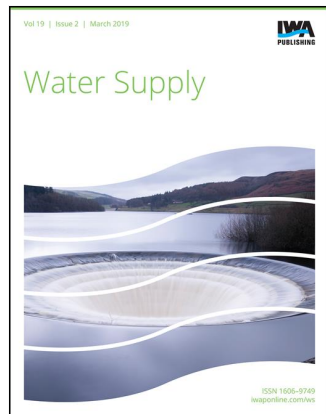
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RESEARCH ARTICLE | MAY 17 2018

Promoting a sustainable traditional technique of aquifer water acquisition common to arid lands: a case study of Ghassem Abad Qanat in Yazd Province (Iran)

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






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Abstract

Qanats are a traditional technique used for aquifer water acquisition and irrigation in dry lands, common to the Middle East. They provide fresh water to communities of users by draining groundwater from aquifers. In Iran, authorities are reporting about 37,000 active qanats contributing about 11% of the country's total groundwater supply. Yazd Province, located in the central part of Iran's plateau, is among the driest regions of the country with more than one million people. It counts 3,193 known qanats with an annual discharge estimated today at about 350 million m³. Ghassem Abad qanat irrigates the agricultural lands of Ghassem Abad village in the Province of Yazd. Its water is managed by an administration headed by a *mirab*. This paper describes the qanat's mechanism and provides an overview about qanats in Iran. It also promotes, through the study of Ghassem Abad qanat, the related water management system as an example of eco-friendly traditional knowledge leading to social equity and sustainability. It explains how water is distributed to stakeholders (through water shares and irrigation cycles). Nevertheless, and for its survival, the qanat of Ghassem Abad has to continuously deal with social and economic challenges. The farmlands are continuously menaced by urban expansion.

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Water from qanats is brought to the surface where the soil has been enriched by sediments from alluvial fans. Cultivated land and settlement sites are situated downwards from the point where the water surfaces. The immediate outlet, mazhar, is the point where people take water and it is generally located in the main square of a village. The water outlet point is very important; it is well kept and cemented and water use is monitored. The area has the oldest qanats of Iran and one of the greatest densities of qanats in the whole country. There are some 375 lines of old traditional qanats and 950 wells of different depths in various parts of the district, about 118 of which are in the Bam-Baravat region. A common misconception about aquifers is that they are underground rivers or lakes. While groundwater can seep into or out of aquifers due to their porous nature, it cannot move fast enough to flow like a river. The rate at which groundwater moves through an aquifer varies depending on the rock's permeability. Much of the water we use for domestic, industrial, or agricultural purposes is groundwater. Most groundwater, including a significant amount of our drinking water, comes from aquifers. In order to access this water, a well must be created by drilling a hole that reaches the aquifer. While Qanats are a traditional technique used for aquifer water acquisition and irrigation in dry lands, common to the Middle East. They provide fresh water to communities of users by draining groundwater from aquifers. In Iran, authorities are reporting about 37,000 active qanats contributing about 11% of the country's total groundwater supply. Yazd Province, located in the central part of Iran's plateau, is among the driest regions of the country with more than one million people. It counts 3,193 known qanats with an annual discharge estimated today at about 350 million m³. Ghassem Abad qanat irri