

THE KHETTARA WATER MANAGEMENT ANCIENT TECHNIQUES PROMOTED IN MOROCCO

By Lydia Peroni

The Pavilion of Morocco at Expo 2015 is promoting the Khettara water management traditional techniques, rescued in different Oasis of the country.

The Khettaras (or foggaras) are a succession of wells linked by underground canals going to the fields. The canals should provide enough water for upstream palm groves ensuring enough for those downstream, according to the tradition and the water rights prescribed by ancestral contracts. Artificial lakes are also created to store water for cattle and for years with water shortage.



[The khettara or foggara represents an ancient sophisticated technique](#) which enables underground water resources to be tapped for irrigation. Actually this method dates back thousands of years and has been adopted over a very large area stretching from China to Spain, throughout Persia and as far as Latin America. Water systems like these are known with different names: *khettara* or *foggara* of the Sahara desert *qanat* or *kariz* of Persia, *falaz* of Arabia, and the *madrijrat* of Andalusia. The first documented inscriptions of the qanat date back to the 7th century BC. In the Mediterranean, the qanat originating from the Persians (today's Iran), has spread over the Middle East and North semi-arid and arid regions, including Morocco.

The Khettara system taps the groundwater table by means of a nearly horizontal tunnel which is dug over a long distance (normally 4-8 km but can reach even 15 km in length!). At regular distances (10m apart), vertical shafts are dug which enable access and maintenance of the main tunnel. The function of the well-like shafts is not to get water out of them, but instead they are used for aeration and condensation of atmospheric water. As the Khettara's main tunnel is constructed to have a lower gradient than the terrain under which it lies, the tunnel becomes gradually shallower until it emerges above the ground at a distance of several km far from the first well, which in certain cases can reach a depth of 150 metres (considering the tunnel is cut under a hill or mountain)! The construction may start also from the settlement site inward, usually following an alluvial cone of a river or fossil wadi.

Khettaras are built by a small group of skilled workers by hand. With proper maintenance, the Khettara create a



self-sufficient agriculture based on palm trees and olive trees, which then allows the growing of wheat, barley, maize, alfalfa, fruits and vegetables in enclosed gardens (plots or jennas). However, the Khettara is more than an irrigation system: It embodies the traditional social structure of a qçar, enabling and regulating the social interactions that are based on the most precious element, freshwater.

The decreasing economic role of agriculture has contributed to a decline in the collective maintenance of the Khettaras. Another crucial factor contributing to the decline of the Khettaras in Morocco appears to be the installation of numerous motor pumps since the 70s, and the ensuing over-pumping that has caused a lowering of the water tables, therefore rendering the Khettaras useless.

However, the Government of Morocco has started in the last few years a recovery process of such ancient technologies for water management and many international organizations, specialized centers, NGOs and other actors are giving their support so as to reactivate in different oasis these traditional systems that really have a great impact on the preservation of an extremely valuable asset such as water.

To know more

http://www.hydraproject.net/en/cases/morocco/water_works.html

<http://www.hydraproject.net/en/cases/morocco/conclusion.html>

https://www.flickr.com/photos/peace-on-earth_org/4292443578

<http://www.terresacree.org/actualites/1643/actualite-les-reseaux-d-eau-anciens-ressuscitent-en-mediterranee-62529>

<http://www.panoramio.com/photo/92488538> Wim de Vries

<http://newsbox.unccd.int/4.1/>

<http://newsbox.unccd.int/4.1/#Anchor-PRACTICE-101010>

<http://www.zizvalley.com/Category/16.html>

<https://ciss.wordpress.com/2010/05/18/report-1%C2%B0-mese-a-tata-aprilemaggio-2010-marocco/>

<https://en.ird.fr/the-media-centre/scientific-newsheets/370-ancient-mediterranean-water-supply-networks-revived>

