



DISCUSSION

CAN WE GIVE BACK TO THE FOGGARA ITS SOUL?

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The paper entitled *Can we give back to the foggara its soul?* (Larhyss International Journal n°46, June 2021), is of great interest for historians as well as for professionals.

It does question and attempt to answer a critical issue with high interest for our country and community.

Historical information provided by the authors, Prof Remini and Ghachi, proves once more that the technology – including high technology- is neither the only nor the best solution to address extremes.

Actually, nature based solutions likely combined with soft technology are strongly recommended nowadays to deal with environmental constraints, natural hazards and associated risks resulting from mankind interventions on natural bodies and processes.

For instance, the paper focuses on the Foggara's system that would have been introduced about 2000 years ago in the oasis Touat, Gourara and Tidikelt located southern Algeria.

The Foggara has long been used to capture and drain groundwater horizontally based on gravity in order to supply the oasis with fresh water and irrigate palm-groves in all seasons.

It is the critical parameter in the oasis equation based on Water, palm-grove and Ksar.

As such, it does strongly depend on the local community knowledge and skills, effective material and financial participation in addition to the compliance with a holy ancestral law.

Within such an arid region, it is indeed of vital importance to adhere to a wise water jurisprudence governing the Foggara's building operation as well as sharing and distribution ritual of that rare and precious resource.

In that sense, the Foggara is a complex social-ecological-technical system and a common good shared between co-owners who contributed to its funding, digging and maintenance as detailed in the text.

In 2002, the Foggara system has been submitted to the UNESCO World heritage list nomination. Locally, that water system is rather implicitly incorporated into the national cultural heritage list as a part of the Ksar, the traditional human settlement associated to the oasis system.

However, when the sustainability of the Foggara has been quite proven, the authors report its continual degradation over last decades.

The question then is about the possible rehabilitation and reactivation of the Foggara as a soft technology addressing water scarcity in times of climate change and continual growing demand (i.e. urbanization, intensive agriculture, industry).

When some structural measures using mining technology are already implemented in order to capture fossil resources (the Albian nappe), tunneling technology could be experimented in digging the Foggara's underground canals.

Thus, digging new galleries would be technically possible though not enough to revive that complex dynamic system.

Indeed, as underlined by the authors, the Foggara is a complex system joining local communities to their natural and cultural environment, including ethics.

The main question would be then about the heritage conservation and the relevance ~~if~~ of its reuse nowadays.

That comes to the local community awareness of present environment and cultural issues as much as to the Government development strategy.

REPLY BY THE AUTHORS

I think that Doctor Aroua has summed up in a few lines the philosophy of a whole Foggara system. This proves that Doctor Aroua has a good command of the subject of Foggaras and all ancestral hydraulics. I come back to the subject itself. Water in dry areas is a complex but fascinating subject. With my little experience in dry environments and more particularly the Sahara, I learned that dry environments do not like too much water "**Les milieux secs n'aiment pas trop d'eau**" (Dry regions don't like too much water) (Remini, 2016). Let me explain that, in these fragile environments, you must not exceed a threshold (a limit of the water flow). Only the Ksourians know this limit well. The Foggara is the only hydraulic system that can ensure this threshold flow. To exceed such a value, one must expect ecological disaster. The case of the Souf valley is a good example. At the beginning of the nineties, the oases located on the outskirts of the Grand Erg Oriental were flooded by groundwater. The excess water from the fossil groundwater with significant flows caused the rise of the slick and the consequences are known to the scientific community. During the same period in the early nineties, on the west side on the outskirts of the Grand Erg, several palm groves were abandoned. Deep drilling for the exploitation of the Albian aquifer caused a drawdown of the aquifer. Hundreds of Foggaras have been drained and abandoned; another environmental disaster. I think Foggara still has its place in oasis agriculture. It could even play a very important role in irrigation in the near future, especially with global warming. But frankly I don't think it's going to play its role fully the way it used to. The Foggara is a living being. We can rehabilitate the body of the Foggara which is the technical side, but we can give it back its soul which is the social side.