

Weekend Observer

Astronomical observations and aflaj irrigation system

By Maryam Khalfan



THE ancient system of stargazing for timing the allocation of water from Oman's ancient aflaj system surprisingly persists to this day, despite the convenience afforded by modern wristwatches and clocks. The origins of this system of irrigation may date back to AD 500, but archaeological evidence suggests that irrigation systems existed in this extremely arid area as early as 2500 BC.

Only a handful of communities with access to operational aflaj continue to use the ancient system of stargazing for timing the allocation of water. The decline of this time-honoured tradition is attributed to a number of factors: air pollution, age and poor eyesight of people familiar with this primitive expertise, and a dearth of people willing to learn the skill.

In many places in the Sultanate, the traditional way for timing falaj water supply using the sundial by day still exists, but the use of stars to measure time persists only in eight villages among the 3,000 operational aflaj in the country. Such settlements include Qarya Bani Subh near Al Hamra, Al Fath, Al Zahib, Al Sudeira and Barzman near Al Mudhaibi, Halam in Wadi Bani Jaabar, Stall and Hageer in Wadi Bani Kharus.

Initially, farmers also used a water timer called tasa or sahlah to allocate water by placing a punch-holed bowl (tasa) on a bigger container of water to fill. They calculated the time taken to fill the tasa as a single unit of water share. Interestingly, even in the modern age people are still using the stargazing technique to time to share water.



Some styles are the same and others are different and even the names of the stars differ among different communities. This is evident from a recent study conducted by Harriet Nash from the Institute of Arab and Islamic Studies, University of Exeter, UK who has been studying the use of stars to time for distributing water. Adherence to this ancient practice survives to this day in some places, primarily due to the community's strong links with their heritage and culture, as well as the need to avoid disputes, says the researcher.

"For the last three years, I have been doing research on the use of stars for timing the sharing of water from aflaj systems in the Sultanate. Now that it's coming to an end, I have submitted my thesis for my PhD and this exhibition is a chance to show some of the results," Nash explains.

The study explores the relationships and the methods involving the use of stars to share water, reasons for using the stars for irrigation purposes, places where the practice still exists, ways of resolving disputes, available written records pertaining to this practice, and the reasons for its gradual decline.

Indeed, Nash's study is the first of its kind that provides an investigative and in-depth look at the tradition of stargazing for irrigation purposes using the aflaj system. It is also the first time that methods of using stars have been specifically identified and recorded, with the guidance of community elders, says Nash, who has particularly registered for a PhD to obtain official recognition for this project.

Her findings indicate that whatever timing method is employed, the principle is the same: when it is time for a person's share, farmers rearrange the sluices on the falaj channel so that the water flows to their fields. "A major achievement of this work is the identification of the majority of stars used in the villages covered by the study.

The stars are similar to those used in agricultural folklore, but it is not clear how the stars were selected apart from the fact that they generally rise from the east and set in the west. Stars may be identified by their position relative to other stars, location in the sky and their brightness, variability and colour."

Studies also show that apart from Al Sudeira, where the traditional methods of falaj management have broken down, none of the study villages admitted to having any disputes that could not be resolved by the wakil or arif (falaj administrators) or village elders. Records are usually kept of financial transactions in regard to funds raised for management of the falaj and transactions on falaj maintenance, repairs and the wages of falaj officials.

Results also indicate that ownership of water shares is not usually recorded, apart from individual documents of transfer resulting from sale or inheritance, possibly because the ownership is well known and not disputed. "While the study has succeeded in answering some of the research requirements, it is equally crucial to disseminate the findings of this research through workshops in the study villages to obtain feedback on the results," says Nash.

It is also important to raise awareness of the cause for continuance of stargazing for agricultural reasons that appears to be a unique form of practice among Omanis. The closest country with similar irrigation system, where the water clock was used is Iran, but there are no detailed facts available, she points out.

Traditionally, farmers use stars to schedule the duration of irrigation using specific sets of stars that are well recognised by the falaj administrators. Even now, farmers use the time between the rise of a particular star(s) to rise of the next star(s) from a distinctive set of stars. The scheme is categorised into principal stars and dividers. Normally, the time-share allowed between any of the principal stars is between 1 to 3 athars (the amount of time for sharing water), and divider stars partition the time between two principals. The total number of principal stars used in Oman is between 21 and 24, says Nash.

Her initiative to study the link between the use of stars and water shares originated from one of her field projects when she visited a famous place for stargazing in Al Zaheeb while working on an archaeological project in 2005. Astonished by the custom, Nash felt it was important that somebody had to document this unique practice before it perishes altogether.

"So, unless I record it now the practice would be forgotten. I would expect in about 20 years, the use of stars will have stopped all together, because except in one place, the young people are not learning the system in details. They are learning enough to do their own irrigation, but there are very few people who are prepared to learn the details thoroughly to be able to teach the next generation, simply because most people find it easier to use their watches than the stars.

"But for the older generation, a lot of people don't trust their watches. They feel that when they switch to the wristwatch, maybe somebody will lose some water and another person will have more than a fair share of their water. Likewise, because these divisions for timing water are very well known and accepted, some people don't want to change to avoid disputes about whose water is set at what time," says Nash.

Nash further plans to present the findings of the study for the International Union of astronomers in Paris in January 2009. She also plans to write a book from the study material and to raise further awareness through exhibitions similar to the one held recently at Bait al Baranda to showcase the history of aflaj systems with emphasis on the findings of her research in the Sultanate. The exhibition drew attention to the environmental threats affecting the aflaj systems, and aimed to encourage schoolchildren and college students in particular to explore the cultural aspects of aflaj and the role of stargazing in irrigation in the Sultanate.

The researcher, who was supported by the Ministry of Regional Municipalities and Water Resources (MRMWR), also received assistance from Dr Abdullah bin Saif al Ghafri, Assistant Professor and Instructor on the aflaj system at Nizwa University. Dr Al Ghafri is also an expert on the study of aflaj systems, and its structure and function.

"The study about aflaj has been part of my thesis. I feel it is my responsibility to spread awareness about the aflaj systems and to address the risks involved in protecting aflaj systems. Such threats include loss of knowledge from the older generations, pollution, water and land management, and the rapid urbanisation of agricultural land, to name a few. I will continue with my mission for sustainability of these riches through education and whatever other means possible," said Dr Al Ghafri.

The ministry's role in the project was to sanction, guide and to link the researcher with community elders familiar with the stargazing expertise. It also facilitated the provision of technical, logistic and communications support, besides making available literature about aflaj, and to sketch and measure the star movements, said Engineer Hamad bin Khamis al Hatmi, Assistant Director-General for Water Resources Management, MRMWR. In July 2007, five Omani aflaj were selected as part of Unesco's World Heritage Sites in a reflection of the great heritage value associated with the ancient aflaj systems in the Sultanate.