

THE ROLE OF ANTHROPOGENIC AND NATURAL FACTORS IN SHAPING THE DROUGHT OF FALAJ MAZRA, BIDBID, NORTHERN OMAN

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ABSTRACT

Falaj (plural: aflaj) is an ancient irrigation system that means water channel and relies on groundwater. For centuries, aflaj system in Oman is an important source of water that has played a significant role in the establishment of agricultural communities. Falaj Mazra in Bidbid, Northern Oman, receives its water from Wadi Samail running surface water and the baseflow when the wadi will be dry. Four pipelines were buried in the wadi channel, parallel to its course. In 2013, Mazra villagers sued the oil company stating that their falaj dries up regularly because of the pipelines. So, it was important to understand the role of natural versus human factors in shaping the drought of this falaj system and the impact of the pipelines.

This study uses historical data of rainfall, falaj flow, wadi flow, water-table elevation and population along with Landsat data, resistivity imaging and three ditches excavated across the wadi. The excavated ditches and resistivity imaging show that the groundwater is presence across the width of the wadi from east to west within 50 cm from the surface. Additionally, it was found that the gabion protection of the pipelines, if exist, create preferential flow paths because of its high permeability. This is well demonstrated by the abundant plant growth along their paths. The pipelines also work as dams when they cross the wadi channel due to the shallow depth of the alluvium that hosts the groundwater. However, the effect of the pipelines on groundwater flow to the falaj is not visible as the wadi channel is made of highly porous and permeable sediments and the pipeline here is not protected by gabion.

The Samail catchment is located within 4 towns (Izki, Samail, Bidbid and Seeb) where the population increased by 155 thousands between 2003 and 2013. Landsat images of years 1990, 2005 and 2014 were also used to explore the change of vegetation, as an indicator of water usage, which increased in the last decade. In March 2013, the water-table in the wadi aquifer was (13.5 cm) below the bottom of the falaj channel. This explains why Falaj Mazra was dry and it is normal that aflaj in Oman dry out during extended dry periods. So, population growth, urbanization, human activities and consequently domestic uses of water increased over the last decades that highly impact the falaj flow, particularly during droughts.

Keywords: drought, falaj, , oil pipeline, Oman, rainfall