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Water Cooperation and Ideology in Local Communities

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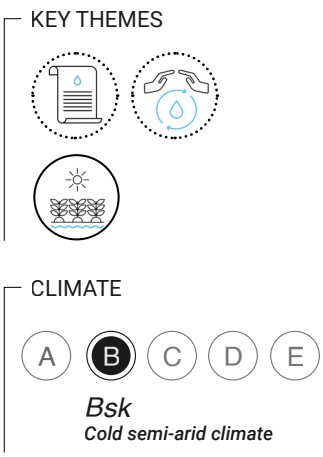
This article addresses how ideology affects local water governance, focusing on a groundwater basin in central Iran. It offers a case study of a symbiotic relationship between upstream and downstream communities, allowing a sustainable form of water governance. The cooler weather, better pastures and greater amount of precipitation of the basin upstream drew nomadic communities, whose economy was not dependent on irrigation. Downstream, fertile soil and warm weather favored agriculture with a high demand for water that was supplied by the groundwater transferred from the basin upstream. The exchange of livestock products and agricultural goods between the basin's upstream and downstream areas systematically tied their economic systems. However, Iran's 1979 revolution brought a hybrid leftist-Islamist ideology that unbalanced this traditional relationship through the reorganization of geographical space. The upstream communities were encouraged to cultivate their pastures, which led to a boom in the number of irrigation wells. The downstream villages were persuaded to adopt a new cropping pattern that turned most of their water-efficient vineyards into apricot orchards with high water demands. Therefore, an abrupt increase in water demand in the basin upstream and downstream thwarted the cooperation between the two areas and drove the basin into "the tragedy of the unmanaged commons."



< Fig. 1 Tube wells compete within the Abarkooh basin resulting in an annual drop of 80 cm in groundwater level (Source: Majid Labbaf Khaneiki and Abdullah Saif Al-Ghafri, 2018).

Introduction

In the arid Middle East, inclusive, safe, resilient and sustainable human settlements – as stipulated by SDG 11 – are far beyond reach without integrated water governance. Managerial, hydrological and socio-economic measures constitute the three fundamental dimensions of integrated water governance, which should be considered in any attempt to integrate monitoring and preservation systems, hydraulic technologies and infrastructures and economic incentives for water resources management (Lin 2012). As a case study, this paper examines the Abarkooh basin in central Iran (fig. 2), which exemplifies the conditions conducive to integrated water governance in the case of shared groundwater resources. This article is mostly based on data gathered firsthand through a Delphi study and nine unstructured interviews with local practitioners and experts during a field visit to the region in 2018.

Abarkooh is located in Yazd Province, some 150 kilometers southwest of the city of Yazd, and bordering Fars Province. Abarkooh has an arid and warm climate with an average annual precipitation of 146 millimeters (Kiani et al. 2016, 22). Given the topographical, geological and hydrological situation of the basin, the aqui fer of Abarkooh is replenished by rainfall that takes place mostly in the basin upslope in Fars Province; both regions share the same aquifer.

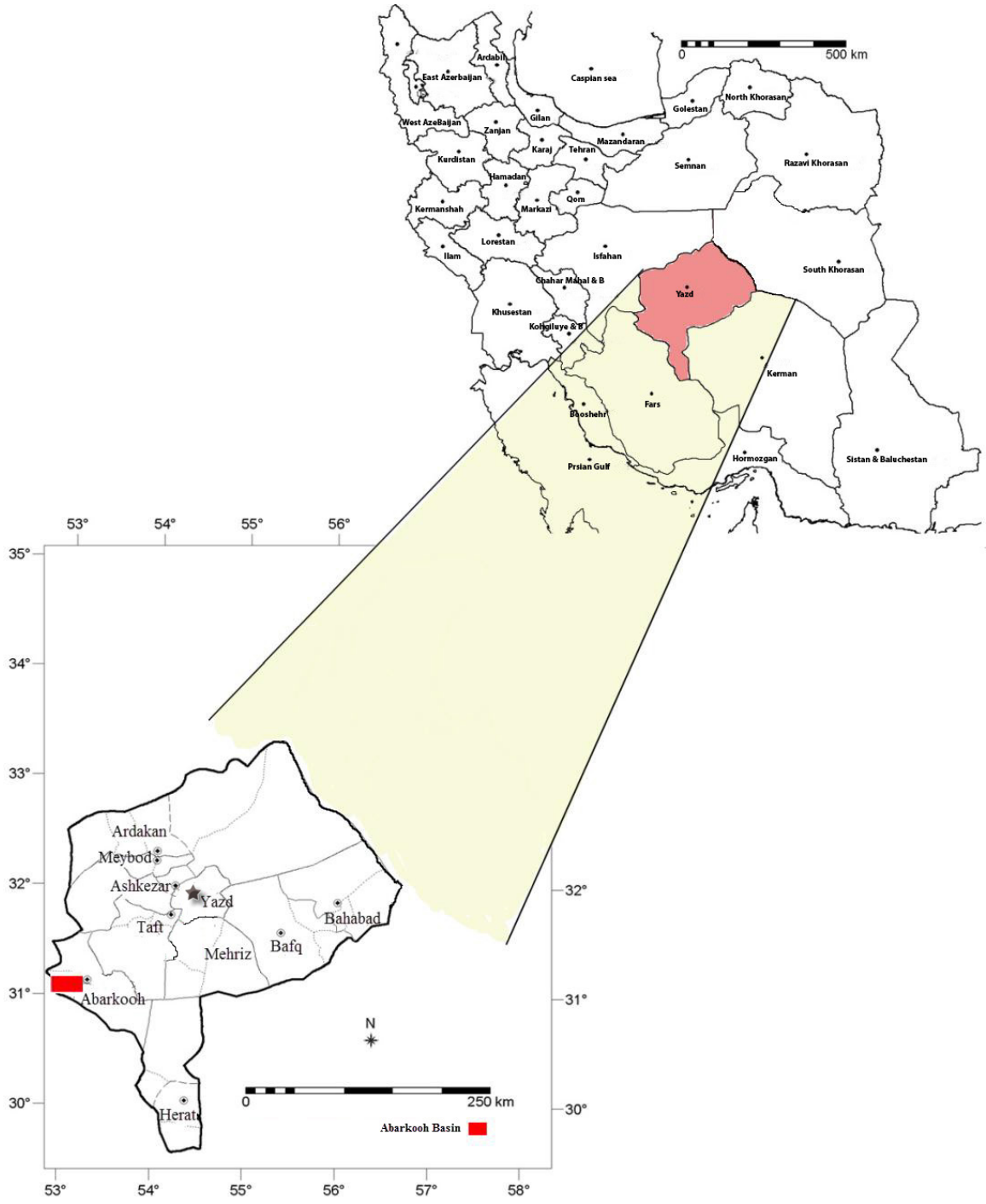
This article examines a traditional socio-economic mechanism that once regulated the utilization of the shared aquifer by various communities across the basin. This mechanism kept a balance between groundwater as a common pool resource and the demand of beneficiary communities, a balance that ensured sustainability in the basin for centuries (Ostrom 1990). The article also explores what happened to that historical balance between the local communities and their shared aquifer after Iran's 1979 revolution ushered in a new dominant ideology.

Geographical Diversity and the Distribution of Livelihoods

Geological and climatologic evidence suggests that the Abarkooh basin enjoyed a moister climate during the early Holocene, latest phase of the Quaternary (Kiani et al. 2016, 23), and its soil and water resources were favorable enough to draw some human populations. However, historical climate changes led to water scarcity and an uneven distribution of water resources across the basin (Labbaf Khaneiki et al. 2022).

Arable soil was abundant in the basin downstream where water was at a premium, and by contrast, the upstream was rich in water but short of arable soil. Over the course of history, the basin upstream drew various groups of nomadic communities with a pastoral economy. Some communities, such as the Gorji and Parandi tribes, were displaced and forced to migrate to this basin for political and military reasons (Kheyr Andish 2016, 125), while others like the Qashqayi, Arab, Marandi and Baseri tribes voluntarily chose this basin as their summer resort (Labbaf Khaneiki et al. 2022, 141).

Those involved in animal husbandry preferred the basin upstream where relatively high precipitation gave rise to green pastures, whereas the farming communities settled in the basin downstream whose fertile soil and warm climate favored agriculture, albeit with the help of irrigation. Downstream communities could solve the problem of water shortage by transferring water from the upstream, where the economy did not require much water. There were many qanats – a traditional water-mining technique that



^ Fig. 2 Abarkooh basin in the province of Yazd (Source: Majid Labbaf Khaneiki and Abdullah Saif Al-Ghafri 2022).

^ Fig. 3 The ruins of a grape syrup workshop in the basin downstream (Source: Majid Labbaf Khaneiki and Abdullah Saif Al-Ghafri 2018).

consists of a number of wells and a subterranean tunnel to drain groundwater out – stretching from the basin upstream to downstream to irrigate the farmlands. Different levels of water demand in the basin upstream and downstream were complementary.

In the basin upstream and downstream, two different economic systems divided geographical space such that a sustainable current of goods and capital circulated among all communities. Neither the upstream nor downstream communities were self-sufficient, since environmental limitations ruled out the possibility of producing all required products within one territory. The upstream livestock breeders mostly produced dairy products, shoes, carpet, wool, fur and fleece, with surplus exported to the downstream villages. In return, the downstream farmers provided the upstream with agricultural products. The mechanism of the upstream economy left most of the shared water for the downstream farmers who metabolized it into agricultural products. Thus, a considerable portion of the upstream water share was returned in the form of agricultural products. This economic interdependence ensured hydro-social justice and minimized the possibility of competition and tension between the two communities over their shared water resources.

Modes of Production and the Revolution

In the basin downstream, soil was suitable for vineyards where grapes were produced that could be turned into storable products like raisins and syrup. At a time when modern trans-

portation was not accessible in the region, raisins and syrup were among the foodstuffs that could be exported to other regions. More than 80 per cent of the grapes were used to produce a thick honey-like syrup that could bring the farmers a considerable income. Moreover, the syrup production process entailed a high level of cooperation, which contributed to the social cohesion of local communities.

Every five or six vineyards made up a cultivation unit that enjoyed a shared syrup workshop (fig. 3). At harvest time, the farmers rushed to pick the grapes as quickly as possible, before they rotted on branches. At the same time, they had to gather a great deal of firewood to be used in the production process, and all those laborious tasks needed to be completed in a short period of time. Therefore, all the farmers sharing the same syrup workshop collectively carried out the stages of the production process, regardless of the vineyards' ownership. They cooperated in gathering the harvest, crushing the grapes and then boiling the liquid down into a durable syrup called "shire." The resultant syrup was not only exported to the basin upstream, but also to other regions as far as Yazd, Isfahan and Shiraz.

In the basin downstream, the most widely planted variety of grapes was locally called *mesqālī* and mostly used for syrup production as mentioned, but after 1961, it gave way to another variety named *shāhānī*. The latter soon became popular in the basin downstream where water was in short supply, since its water demand was even lower. Unlike *mesqālī* grapes, the *shāhānī* variety did not lend itself to syrup production, and accordingly the farmers had to sell their harvest as fresh grapes. This disadvantage did not detract from the growing popularity of the *shāhānī* category, because the advent of modern transportation and road networks had changed socio-economic conditions to the extent that the farmers had access to the markets of remote provinces and could send their fresh products there. Given that the *shāhānī* variety enjoyed a lower water demand compared to *mesqālī*, farmers managed to expand the area of their vineyards without requiring more water, which brought them advantages. *Shāhānī* grapes were ideal for winemaking, which took place in several factories across Iran. Most of the harvest was transported to the provinces of Fars and Isfahan where wine factories were always thirsty for this variety of grapes.

In the wake of the Islamic revolution in 1979, a legal ban was placed on the production, transaction and consumption of alcoholic drinks including wine, and the farmers lost that lucrative market for their fresh grapes. It was almost impossible for the farmers to return to their traditional syrup production, due to a fundamental change in people's tastes and market trends during the preceding years. Also, in the formative years of the Islamic Republic of Iran, farmers were encouraged to change their cropping pattern in the basin, both downstream and upstream. In 1981 Javad Hesami introduced apricot saplings to the basin, leading to most of the vineyards becoming apricot orchards, which demand about four times more water than *shāhānī* grapes. The vineyards were irrigated once every thirty days, whereas the apricot orchards had to be watered once every eight days. The Islamic government tended to sedentarize the upstream nomads and encouraged them to turn their pastures into orchards by giving them free rein to dig tube wells and pump up the shared groundwater. However, the porous soil with its low water-holding capacity proved to be a limitation that made the basin upstream unsuitable for agriculture. Therefore, the government facilitated the use of motorized vehicles and machineries to modify the upstream soil, by transferring a huge amount of fertile soil

^ Fig. 4 The qanat of Cheshme Chāhak in the basin downstream, which dried up after groundwater overexploitation in the basin upstream (Source: Majid Labbaf Khaneiki and Abdullah Saif Al-Ghafri 2018).

from the basin downstream. In 2016, K. Roshan, an upstream farmer, transported 30,400 tons of soil from the basin downstream to improve only 20 hectares of his orchards.

The expansion of orchards in the basin upstream unbalanced the organic equation in which the upstream nomadic livelihood had permitted the release of groundwater toward the agrarian areas downstream. Cooperation gave way to competition reflected in a large number of tube wells mushrooming across the basin (fig. 1). As a result, the groundwater level annually falls an average of 80 cm, and the shared aquifer loses 36 million cubic meters of its water storage each year (Mortazavizadeh et al. 2013). A new study shows that the Abarkooh basin is plunging into "the tragedy of the commons" (in which incentives for individuals — when unmanaged — will ultimately be harmful to the collective [Hardin 1968]), where even the ground is sinking between 30 to 70 cm per year (Sherafat et al. 2020). This dramatic land subsidence is attributable to groundwater over-pumping, which has emptied the porous sediments of their water content (fig. 4) (Fallahpoor and Barzegari 2022).

Conclusion

This case study shows how ideology can affect

traditional water cooperation between a basin's upstream and downstream areas. After 1979, the new revolutionary government treated the Abarkooh upstream communities as the less advantaged deprived of their equal right to the shared groundwater. Thus, their pastures were turned into orchards dotted with hundreds of tube wells that greedily sucked up the shared aquifer. On the other hand, the downstream farmers were encouraged to change their cropping pattern, since winemaking was outlawed, and grape cultivation as their primary activity fell by the wayside. Apricot cultivation was introduced to the basin downstream, and apricots required much more water than grapes. Therefore, the basin upstream and downstream vied for a large share of the limited groundwater, and what had been cooperative communities became fierce competitors. As a result, the shared aquifer dramatically depleted, hundreds of qanats ran dry (fig. 4), the ground subsided and social tension continues to mount.

Ideological metanarratives do not always take into account geographical diversity that underlies inter-territorial cooperation among local communities. In the Abarkooh example, a religious ideology managed to homogenize different livelihoods whose sustainable consumption and production were anchored in their difference. Although it would be impossible for Abarkooh to return to the same traditional modes of production, SDGs 12 and 16 can still be achieved by diversifying economic activities based on different geographical capacities in the basin upstream and downstream. Competition over water will end only when interdependent production systems with different levels of water demand are re-introduced to the basin. In the basin upstream, production that demands little water and that uses raw materials from the downstream agricultural units can revive a sustainable pattern similar to the same traditional setting where water was fairly divided among different livelihoods.

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