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COMMUNITY-MANAGED TRADITIONAL MEANS OF IRRIGATION IN THE SEMI-ARID ARAVALI LANDSCAPE

By Sayanangshu Modak

Earthen channels winding like serpents across a hilly landscape are not a common sight everywhere. They appear quite misplaced in a terrain that is highly undulating and rugged, covered with dry deciduous forests and dotted with rocky outcrops. Such a terrain is hardly conducive for agriculture, and irrigation seems unfeasible in villages located in the back of beyond. Yet the sheer will and determination of humans to challenge the impossible and put forth remarkable and ingenious works should never be underestimated.

Children washing fruit in a dhora. Image courtesy of the author.

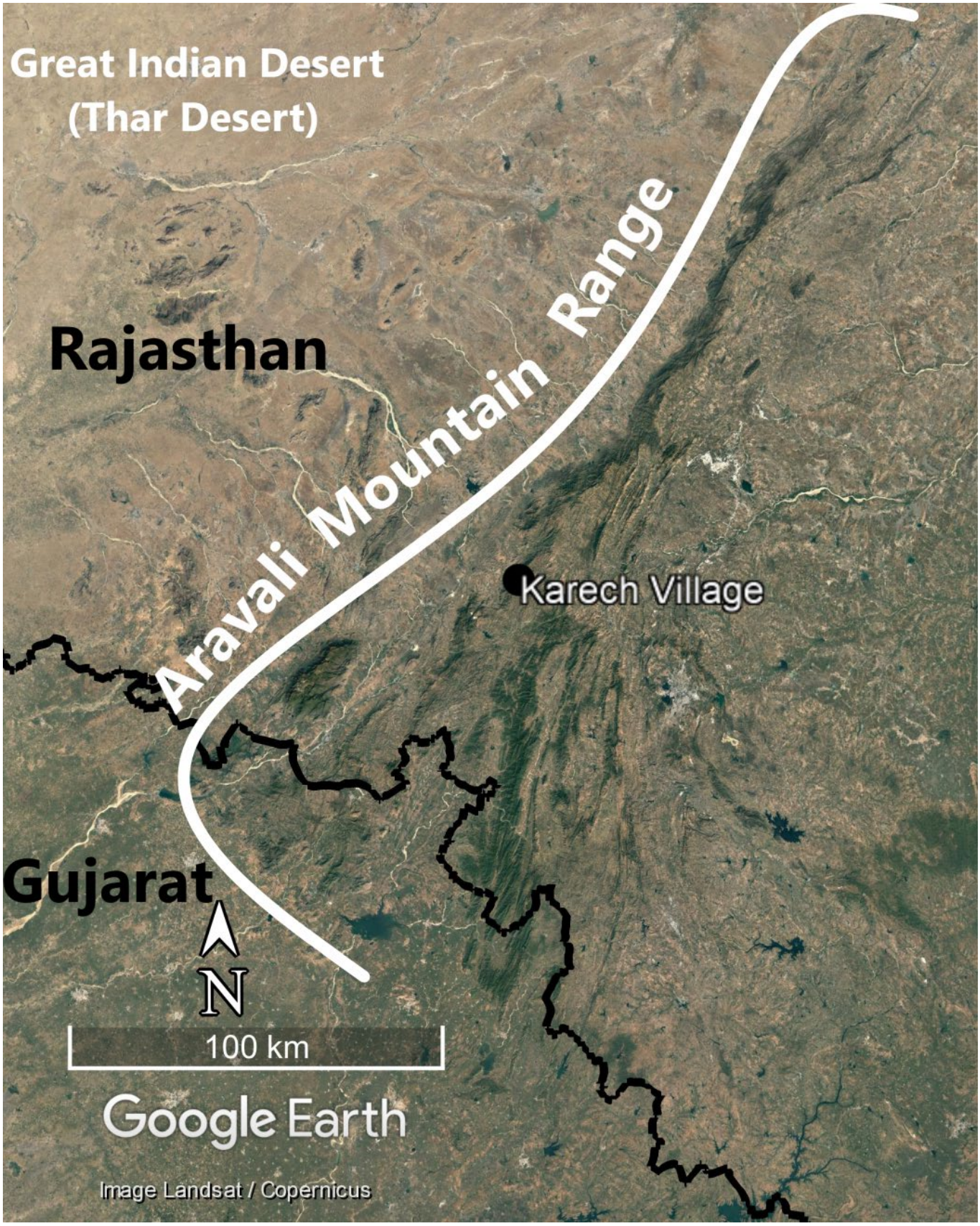
The collective action over water commons is equally impressive, helping transform a hostile landscape into one where agriculture becomes foundational to rural livelihoods. This could be achieved by diverting water from the river through earthen channels. Locally known as *dhoras* in the Aravali landscape of northwestern India, these channels are a living memoir of acts of innovation, facilitating the transport of water across this difficult terrain with the help of gravity. Therefore, it should not be an exaggeration when one connotes the possibility of them resembling the veins and arteries of agricultural productivity in this region, providing a bountiful harvest despite the difficult conditions. The case studies that follow are provided to demonstrate and emphasize the utility of collective, community efforts to build and manage *dhoras* and identify them as a cornerstone of decentralised governance of water resources.

Spotlight on *Dhoras*

Using a range of Participatory Rural Appraisal (PRA) tools including resource and social mapping, focus group discussions, and semi-structured interviews, I carried out a field-based research study to understand the use of *dhoras* and the management practices associated with it. As a part of my professional involvement in Foundation for Ecological Security (FES)—an Indian nongovernmental organization (NGO) committed to strengthening collective rights over common pool resources in diverse social, economic, and ecological setting (FES 2015, 2017), I had the opportunity to stay with the local community and observe their way of life from close quarters. This study was conducted between 2016 and 2018 as part of a larger study to understand the role of local communities as water stewards and to carry out a scoping exercise for advancing the Alliance for Water Stewardship (AWS) Standard in Karech where FES has been engaged for the past two decades. This data and evidence demonstrates that the earthen channels are not just physical infrastructures that have been fueling the productivity of small-scale farming, but are also social infrastructures providing affordance for social connections and collective action.

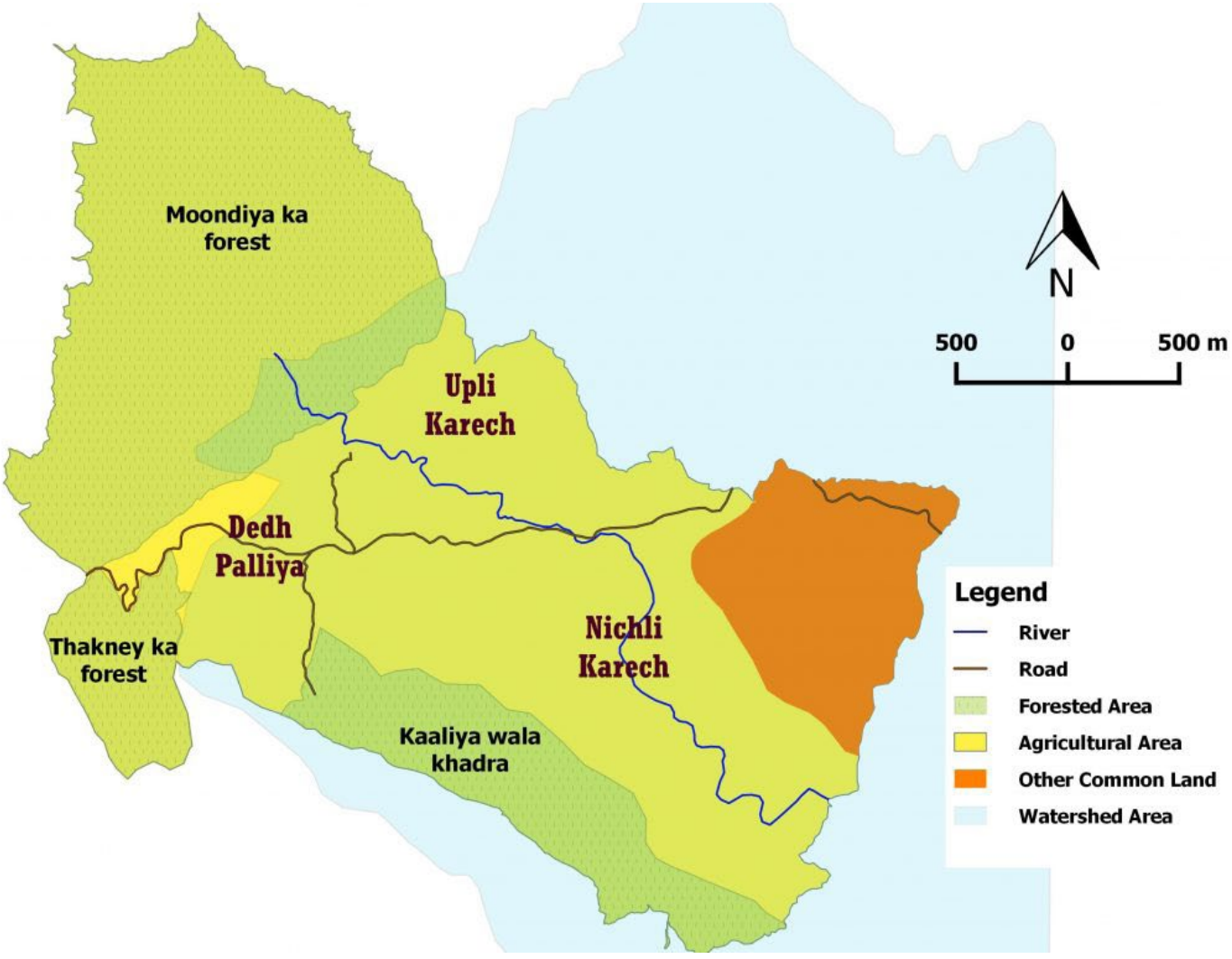
Karech, a far-flung and rather nondescript village, presents one such opportunity to witness this traditional means of irrigation and acknowledge the community's contribution in managing and maintaining the time-tested arrangements of water sharing and distribution. Nestled in the old fold Aravali mountain range of northwestern India and located at the periphery of the Great Indian Desert (Thar Desert), Karech has a rich legacy of collective action for restoring the degraded commons in the village. Consisting of three hamlets—Upli Karech, Nichli Karech and Dedh Paliya—the Indigenous, tribal community organized itself by forming a *samiti* in 2002, a village-level institution and has since initiated a process for conserving the commons that includes the three forest patches (Rathore 2019).

All the *dhoras* in Karech are located within the hamlet Nichli Karech. There are five *dhoras* in the hamlet and one Diversion Based Irrigation system (DBI). A pre-existing *dhora* was converted into a DBI network in 2013 with aid from FES. Even though this is a concrete channel and allows for more efficient conveyance of water, it still follows the same pathway as that of the earthen *dhora* which had existed for many years. The importance of these structures can be adequately established by documenting the sheer number of farmers using them within the village for fulfilling their subsistence needs. The total area irrigated through these structures was 39.54 hectares in 2017, which was about 80 percent of the total irrigated area in Nichli Karech at that time, with as many as 72 farmers benefiting from them. Some of these *dhoras* are quite long and



Location of Karech Village with respect to the Aravali Mountain Range, Gujarat, and Rajasthan. Map prepared by the author.

traverse large tracts of land, dissecting rivulets and undulations all along. Others can be short with lesser irrigation coverage, owned and maintained by a single household. The arrangements needed to maintain these *dhoras* and regulate the water use and distribution are also quite varied. Having evolved over time, they are molded and structured according to the needs of the users and reflect their experiences and aspirations.



Watershed map of Karech. Prepared by the author.

A dhora cuts across a natural drainage in Karech. Torrential rains and consequent high flow in the channels often destroy these structures and they have to be constructed again. Image courtesy of the author.

The evolution of rules

Mahadev Ka Dhora of Nichli Karech hamlet is a case in point; it has the most elaborate and well-structured rules needed to maintain its two-kilometer long earthen channel. All the rules are unwritten and have developed based on need; they remain amenable to change as per the requirement of the time. It is the longest *dhora* cutting across forested areas and streams. There are some stretches where it flows on a raised platform made with stones and boulders. These stretches are prone to disruption as flowing water or rolling stones regularly disturb the structure and break it down. Therefore, meticulous care is needed to construct it and to carry out the repair work. All the users assemble to carry out the repair work at the beginning of the *Rabi* cropping season (October–March) and a penalty of 250 Indian rupees (INR) is imposed when a member fails to show up to contribute. The process of repair and restoration begins with all the members assembling at the site of origin. They keep walking until they reach the first few farms, at which point the individual owners of those farms leave the group and the rest of the group continue with the repair work. This way, the group progressively diminishes with only those farmers owning land at the last leg of the channel continuing to the very end.

Mahadev Ka Dhora also exemplifies the spirit of equity in sharing the limited supply of water. This was made evident through my in-depth interaction through semi-structured interviews with water users and elaborate mapping of farming and irrigation practices. This entailed creating a detailed map to locate each parcel of farmland drawing water from the *dhora* and identify their ownership. This map was further used as an aid while conducting the semi-structured interview with member(s) of the family that owned the irrigated farmlands. On the whole, the scarcity of water in the village and its cruciality during

A representative diagram of irrigation practices. Image courtesy of the author.

the *Rabi* cropping season dictates the irrigation practice among users of *Mahadev Ka Dhora*. As a well-accepted principle, the irrigation cycle during the *Rabi* cropping season begins with the tail-end users getting the first share of water. Irrigation cycles per season are the number of times water must be provided to the crop. Irrigation cycles differ based on the type of crops and their variety. For example, the two main *Rabi* crops in Karech—wheat and chick-pea—require five to six and two to three irrigation cycles respectively.

The tail-to-head arrangement came into existence from a shared understanding of being more considerate toward the tail-end users who had their fields at a disadvantageous location. The system has continued for many years. This mutual feeling of sharing and caring also extends to the way the irrigation cycles are arranged. Along the *Mahadev Ka Dhora*, there are five primary parcels of land and each parcel comprises smaller patches which may be owned by a single household or by different households. The duration of one rotation cycle is decided on the basis of both the size of the primary parcel and its relative position with respect to the others along the *dhora*. For example, the first parcel of 1 hectare is jointly owned by three farmers who can avail themselves of water for only 3 days. However, the second patch, despite being only marginally greater than the first one—consisting of 1.3 hectares—gets water for 6 days owing to its relatively disadvantageous location as compared to the first one. Similarly, by virtue of both the size and the location along the *dhora*, 12 days of irrigation are permitted to the owners of the fourth patch for irrigating 5.5 hectares of agricultural land. Furthermore, within these primary patches, the duration of irrigation for each patch is decided based on need and through mutual consent of all the owners. This rule is also quite fluid, and an extra day of irrigation can be taken whenever a farmer feels the need for it. However, the farmer must seek the permission of all the other users.

An emphasis on collective action

Other *dhoras* also exhibit certain unique traits of governance based on the need of the users. However, often the absence of a collective feeling and the heterogeneous social composition of users make matters complicated. *Panchayat Ka Nala* of *Nichli Karech* provides a good example for highlighting this case. This *dhora* is collectively owned by 17 users who irrigate a little over 7 hectares of land. One of the users belongs to the *Gameti* tribe, while the other users are *Garasiyas*. The rules for rotation are not strictly adhered to and the *Garasiyas* often allege that the *Gameti* user takes water out of turn. This hinders the development of a collective for managing the structure. Moreover, it is only after the third or fourth rotation, when the water availability dwindles, that the users begin paying attention to the three-day rotation period and strictly enforce it. All this leads to an unequal apportionment of the resource, and some of the tail-end users are left with no water after the third or fourth cycles of irrigation when they are expecting five or six cycles for the health of their crops.

It is a common practice by all the users of *dhoras* to come together and assess the water availability at the beginning of the season for deciding the choice of crops. The users of *Anganwadi Ka Dhora* also decide the choice of the crop, as well as the duration of each irrigation cycle, by taking stock of water availability. For example, during a year of surplus rainfall, each irrigation cycle can comprise two days whereas, during a year of low rainfall, this increases to four days because there is very little residual moisture in the field following the season of rain-fed agriculture or *Kharif*. The choice of crop is also quite homogeneous, and all the farmers collectively decide it before the beginning of the *Rabi* season. This collective

initiative paves the way for removing the need to maintain an irrigation cycle that is bound by a fixed number of days. An important aspect of this form of governance is that the feeling of collective engagement is quite strong, and it often overrides the individualistic need to maintain a fixed irrigation cycle. The fulfilment of irrigational requirement is the only limiting factor in such a case and if tail-end farmers continue to get water, which is most often the case, harmony is maintained. Further interaction with water users of *Anganwadi Ka Dhora* through semi-structured interviews revealed that the next person up the *dhora* stays vigilant and watchful while the one before uses water, to ensure that no water is wasted.

Irrigation is often done during the night-time to eliminate the possibility of evaporation losses. In some cases, it is also done as a prerequisite for fulfilling the water needs during a fixed cycle of irrigation. In contrast, users of *School Wala Dhora*, which is the first *dhora* to emerge out of the stream, prefer not doing night-time irrigation until the third or fourth cycle of irrigation. This norm has emerged from the prolonged experience of facing a water surplus, and night-time irrigation would lead to waterlogging in the fields.

Community members participating in the construction of a boribund in Karech. Image courtesy of the author.

Improvisations

There are opportunities for increasing the irrigation coverage through innovations and improvisations over traditional systems like *Haran Bandhana*. In this traditional system, the water is obstructed within a stream by constructing a *Haran*. The water that gets collected is then diverted for irrigation through *dhoras*. Haran is a structure made of soil and stones mixed with Palash (Buteamonosperma) leaves to check the shallow water flow. This traditional structure is made of loose materials so there is always a lot of water seepage and the structure is also prone to breaking down due to the impact of high-water flows.

This problem had a very simple and cost-effective strategy. FES suggested and promoted the construction of *boribunds* to check the water seepage. *Boribunds* are structures that are made of *boris* (plastic bags filled with sand and soil) piled on top of one another. The benefits of constructing a *boribund* are immediate and have been strongly felt by all water users. By 2017, the third year of this intervention in Karech, most of the users attributed an extra cycle of irrigation to the construction of *boribunds*. Moreover, a lot of time and effort that was previously devoted to repairing the *Haran* and keeping it standing could now be saved. The pocket of water that gets collected within the stream also acts as a steady source of water for livestock, thereby effectively expanding the reach of benefits.

Conclusion

Irrigation through *dhoras* is integral to the indigenous agricultural systems in the hilly tracts of South Rajasthan. This age-old and time-tested form of irrigation needs to be given its due share of acknowledgement for not just being resilient, but also cost-effective. The continued use and management of *dhoras* are a testimony to decentralized governance of water commons in far-flung villages and build a strong case for the adoption in the larger policy framework. Research on the contemporary use of *dhoras* and practices of community-engaged management in the village of Karech provide supporting data to suggest that communities dependent on shared water resources can evolve codes of behavior that are agreeable to all users, frame rules to check individualistic behavior, and promote mutual cooperation for using the scarce resource equitably. Such roles played by local communities are often undermined in the dominant discourses of water governance, which are tilted toward greater centralization and operate within the binaries of state and individual property regimes.

Certainly, it cannot be claimed that the system of governance is infallible and does not require improvements. In fact, perhaps, the biggest strength of such a decentralized system at local levels is that it is dynamic and adaptive, responding quickly to emerging situations and enabling a mutually agreeable outcome for all users. Instances like those in Karech can be found throughout the semi-arid regions of South Asia where local institutions have played an enabling role in fostering cooperation over conflict. Such forms of water tradition and cultures need to be used as evidence and pushed up the policy ladder to strengthen these systems and allow for experiential learning at the local levels. It is imperative that we support such arrangements as we move into uncertain times with the onset of climate change. The accumulated wisdom of the community needs to be harnessed and adopted for establishing good water stewardship for a better tomorrow.

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