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The Desolate Rann and Its Innovative Water Harvesters

G. Vijayalakshmi

Research Scholar, Indira Gandhi National Open University (IGNOU), New Delhi, India

Abstract:

The district of Kutch in the state of Gujarat is one of the most arid regions of India. The difficulties in procuring fresh water is even more pronounced in the Rann, i.e. the salty, marsh land that borders the northern, north western and north eastern Kutch. This paper highlights the observations made by certain historians of the pre British and the British period about the extreme hostile, arid terrain of the Rann and the resourcefulness of the marginalized nomadic communities dwelling in the arid grasslands that lie on its southern fringes, in harvesting potable water through ingenious mechanisms. History has remained a witness to their amazing technique and the paper attempts to document and highlight the same hoping to bring their efforts to the forefront of water management.

Keywords: Kutch, Rann, arid, saline, water, water harvest, banni grasslands, maldhari, virdas, beys

1. Rann – A Challenging Terrain

Year 1365: ShamsiSirajAfif in 'Tarikh I FirozShahi' writes of Delhi Sultan Firoz Shah Tughlaq's travails in the Rann of Kutch when he and his soldiers sojourned across it from Sind to Gujarat. They had travelled to Sind to restore the Delhi imperial authority. Subsequently deciding to retire to Gujarat, they made the mistake of venturing into the Rann. The guides employed to conduct them, maliciously misled them into the salt stretches of the Rann.

'In this place all land is impregnated with salt to a degree impossible to describe and if the water was held upon the tongue, it crystallized... after endless labors and hardships the wretched men found fresh water they rushed into the middle of it. So excessive was the prevalence of salt that if a pot of fresh water was placed upon the ground, the fresh water became salt.' He continues that in the Kutchi desert 'no bird laid an egg or flapped its wing, where no tree was to be seen, and where no blade of grass grew. If even a lethal weed had been wanted, it could not have been found.'¹

This was the first recorded occasion where a large contingent had almost perished in the Rann; it was by no means the last. The perils presented to intruders in the vast expanses of the Rann undoubtedly helped in amplifying its reputation of remoteness. The Rann terrain's bleak landscape was a deterrent to human habitation. Possessing a strong geographical personality it is indeed without a counterpart in the entire globe.

The Imperial Gazetteer of India records that the Rann was a navigable lake in Alexander's time. The area was a vast shallow arm of the Arabian Sea until continuing geological uplift closed off the connection with the sea, creating a vast lake over which ships could sail during the time of Alexander the Great (325 B.C.) Perhaps the word Rann is derived from Rig Vedic Irinameaning salt and Ptolemy's reference to Eirino, a salt marsh. The Indus drained into the Rann ultimately finding its way into the Arabian Sea through the Gulfs of Kutch and Khambat.²

There is an elaborate description of the Rann of Kutch in the Periplus of the Erythraean Sea (3rd century A.D), composed by Greek writers which states "Beyond the river Sinthus there is another gulf, not navigable, running in towards the north; it is called Eirino; its parts are called separately, the small gulf and the great; in both parts the water is shallow, with shifting sandbanks occurring continually and a great way from shore; so that very often when the shore is not even in sight, ships run aground, and if they attempt to hold their course they are wrecked."³

¹Sir Henry Miers Elliot, The History of India: As Told by Its Own Historians. The Muhammadan Period, Volume 3,(India:Trübner and Company, 1871), 324-325.

² William Stevenson Meyer (Ed.),The Imperial Gazetteer of India, Vol.1, (Oxford: The Clarendon Press 1909), 84.

³W.H. Schoff, (Trans), ThePeriplus of the Erythraean Sea: Travel and Trade in the Indian Ocean by a Merchant of the 1st Century, (New York: Longmans Greens and Co, 1912).

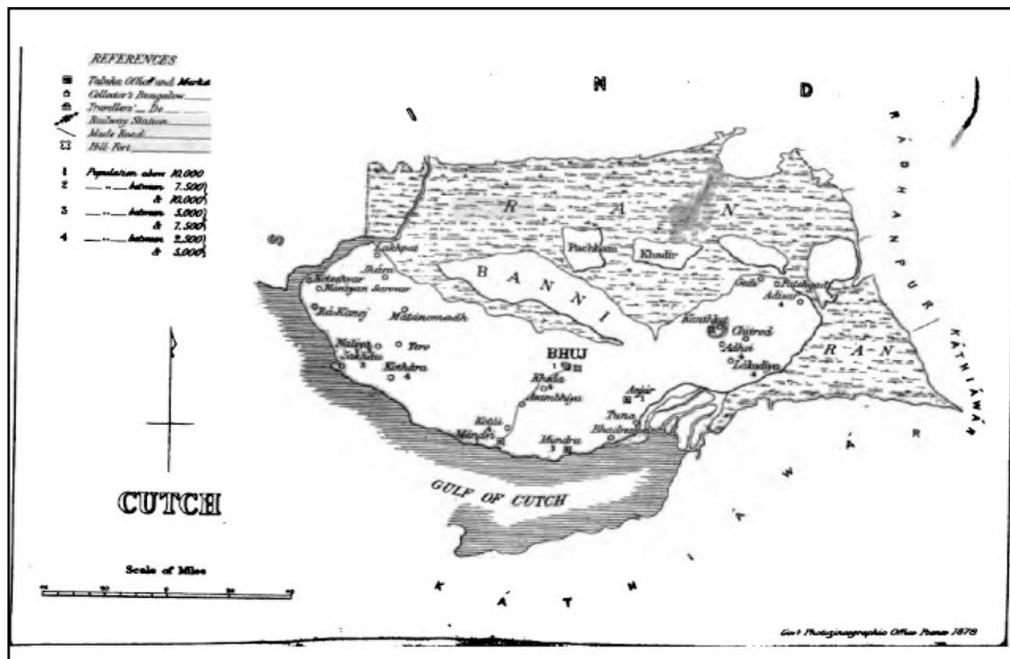


Figure 1: An 1878 geographical map of Cutch (Kutch)⁴: The map shows the Rann in the north with the four islands-like outcrops. The Banni grasslands form a part of its southern fringe

AbulFazl describes the Rann thus, “Between Aḥmadábád and Paṭṭan and Sórath is a low-lying tract, 90 kos⁵ in length by 7 to 30 in breadth, called the Ran (the Runn). Before the rainy season, the sea rises and covers this area and falls as the rains cease. A considerable part dries up and is covered with salt, the duties of which are collected.”⁶

In James Tod’s opinion, the Runn or Rin is a corruption of Aranya or waste, and nothing in nature could be more dreary in the dry weather than this parched desert of salt and mud.⁷

In the Memoirs of Geological survey of India the Rann has been described as a flat surface of dark silt, baked by the sun and blistered by saline encrustations with extensive but shallow flashes of concentrated brine. It was impossible to conceive of cultivation in this salt stretch by the Kutchis. Even the nomadic herders who traversed the different terrains of Kutch chose to stay away from this oppressive desolate place.⁸

According to Alexander Burnes, “The Rann is not saturated with water except at certain periods that it has no weeds or grasses except on the islands, that it has a bed, which instead of being slimy, is hard, dry and sandy, of such a consistency as never to become clayey....”⁹

He continues, “It is a vast expanse of flat, hardened, sand, encrusted with salt sometimes an inch deep (the water having been evaporated by the sun), and at others, beautifully crystallized in large lumps. So much is the whole surrounding country corrupted by this exuberance of salt, that all the wells dug on a level with the Run become salt.” The whole tract in his words may truly be said to be a “terra hospitibusferox; freshwater is never to be had anywhere but on islands and there it is scarce; it has no herbage and vegetable life is only discernible in the shape of a stunted tamarisk bush, which thrives by its suction of the rain water that falls near it. It differs as widely from what is termed the sandy desert, as it differs from the cultivated plain; neither does it resemble the steppes of Russia; but may be justly considered of a nature peculiar to itself. It has no counterpart in the globe.”¹⁰

One of the earlier European travelers, Captain G. L. Jacob, wrote in 1844 in the Transactions of the Bombay Geographical Society as follows: “I do not know any English word exactly corresponding to Rann. It is neither exclusively a swamp, nor a fen, nor a desert, nor a salt marsh, but a compound of all.”¹¹

⁴ James Campbell (Ed.), The Gazetteer of Bombay Presidency; Vol. V, Kutch, Palanpur & Mahikantha, (Bombay: The Govt. Central Press, 1880)

⁵ A medieval measurement of distance referring to approximately 3 kilometers

⁶ Abu al Fazl Allami, Ain I Akbari, Book 3, Volume II, Translated by Henry Sulivan Jarrett, (Calcutta: The Asiatic Society of Bengal, 1873), 240.

⁷ Col. James, Tod, The annals and antiquities of Rajasthan or The Central and Western States of India, Vol. III, (London: Oxford university press, 1920), 1265.

⁸ A B. Wynne, Memoir on the geology of Kutch in Memoirs of the Geological Survey of India, Vol. IX, (London: Trubner and Co., 1872), 15.

⁹ Alexander Burnes, Travels to Bokhara-Also a narrative of a voyage on the Indus, Vol. 1 (London: John Murray, 1839), 308.

¹⁰ Alexander Burnes, Travels to Bokhara, Vol. 1, 320.

¹¹ Reports of International Arbitral Awards, The Indo-Pakistan western boundary case tribunal, Vol. XVII, (United Nations, 2006), 24.

In the Rann of Kutch on some raised plots of hilly, rocky land, water could be found and only near such water would there be some vegetation. These Beyts or raised lands are formed by alluvial silt and sand deposits. The Rann is devoid of any vegetation except on the raised lands – the beyts and the Banni belt. These micro-habitats consist of grassland, scrub land, barren wasteland, agricultural land, village ponds, streams etc.¹²

Banni, with about 3,847 sq km happens to be a large grassland, and has been supporting a wide range of well-adapted wildlife. The perimeter of Banni is about 367 km. This grassland has evolved, from perhaps a swampy land, when it received fresh water in the past. The Banni is known for its buffalo and butter production.¹³

In the words of Col. Mac Murdo, the British Resident of Kutch in the early nineteenth century, “The Bhunni... is the receptacle of the water from the monsoon torrents and the water of the Lukputriver for three months in the year; but this being carried off... leaves a marsh, which at one time forms an extensive meadow. The waters of the Indus are said in ancient times to have spread themselves over this tract, and to have formed the Lake of Narrain, or the Narrain-Sirawur... worshipped by Hindoos. Much later than the time now spoken of, however, and not a century ago, the water in this tract was quite fresh; and towards the westward, where the Indus is contiguous, rice was successfully cultivated. The water in this branch of that great river has, however, been failing for many years.”¹⁴

The inherently saline lands called Banni are naturally suited for nutritious grasses. More than 20 grass species and 20 other herb and shrub species grow in Banni. Banni comes from word banai, meaning made. Banni forms the largest single stretch of grasslands in the country.¹⁵

Sediments deposited by the Indus and other rivers over thousands of years resulted in a variety of perennial grasses covering the land. Water conservation in the Rann essentially implies the conservation activities undertaken in the Beyts and on the Banni grasslands that are a part of the Rann and that overlook the Rann. The beyts depended on the villages outside Rann; It is assumed they derived supplies from the Banni grasslands and also utilized them for grazing or for cutting grass.

Owing to good grasslands, several Maldhari communities¹⁶ have migrated here in various periods of history from Sindh, Marwar and Baluchistan. These pastoral groups have been known for their excellent cattle breeding skills.

Due to inherent soil salinity, potable water for humans and livestock was always scarce. Pastoralists of the region had evolved a corresponding lifestyle around its fragile ecology. In the monsoon, they would move to relatively higher lands within Banni or to the beyts in the northern parts of Great Rann of Kutch.

In his surveys, A.B. Wynne the nineteenth century British Geologist had observed that when floods were high upon the Rann, the Banni was also covered and those who were able resorted to some more elevated spots. No means were used to raise the habitations of these people above the ground, and when the inundations rose rapidly, much loss of human life and of cattle was stated occasionally to take place. He noticed some shallow wells on the Banni at which the cattle were watered every second or third day; but when these were sunk to any depth, the water became too brackish for use. These wells were called naess. They did not appear to be numerous and as resources they were supplemented by the construction of shallow tanks, which soon dried up.¹⁷

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Cattle formed the predominant livestock. Besides its grasses, Banni has been better known for its sturdy bullocks, milk and ghee. Due to their drought resistance quality, Banni's bullocks are famous not only among Kutchi farmers, North Gujarat and Saurashtra.

2. Innovative Water Harvesting System

An intricate water harvesting system reflecting the reservoir of traditional knowledge and resourcefulness of the Maldhari community roaming and inhabiting the Banni grasslands is showcased in the form of Virdas. The Virdas are shallow wells dug in low depressions called jheels (tanks) to harvest rainwater. By analyzing and studying the flow of water during the monsoons the Maldharis learned to locate and identify those depressions or water accumulating zones ideally suited for creating Virdas. Jheels were built in these depression areas. At the bottom of each jheel were small shallow, often hand-dug wells called Virdas. The structures also displayed a technology that helped the Maldharis separate potable water from unpotable saline water. This is the way it worked: After rainwater infiltrated the soil, it got stored at a level above the salty groundwater because of the difference in their density. A structure used to be built to reach down about one metre to this upper layer of accumulated rainwater. Between these two layers of sweet and saline water,

¹² Ibid, 15.

¹³ Reports of International Arbitral Awards, 24.

¹⁴ James, Mac Murdo, An Account of the Province of Cutch and the Countries lying between Guzerat and the river Indus with cursory remarks on the inhabitants, their History, Manners and State of Society in Transactions of the Literary Society of Bombay, Vol. II, (Bombay: Education Society's Press, 1876), 221.

¹⁵ The name suggests that this area is “made up” by the sedimentation of the rivers that flowed into this area in the recent geological past from the north and the east.

¹⁶ ‘Maldhari’ is a generic term and represents all the pastoral castes of Gujarat irrespective of their location and religion. It is not a caste. It comes from ‘mal’ meaning livestock as asset or wealth and ‘dhari’ the one who owns the livestock

¹⁷ A.B. Wynne, Memoirs of the geological survey of India, Vol. IX, (Calcutta: Printed for the Government of India, 1872), 16.

there existed a zone of brackish water. As freshwater was removed, the brackish water moved and accumulated towards the bottom of the Virda. Bushes and trees, planted on the bunds, protected the Virdas.¹⁸

The reason for the Virda to yield fresh water in the saline desert condition is that the long-standing water in the tanks actually leach away salts in the soils in and around in the tank bed while infiltrating below. The topography of the grasslands being undulating, with depressions on the ground, conservation of water in this simple and yet innovative manner was made possible. During the monsoon period, these soils become free of salts and consequently, the water stored in these layers remains fresh. The fresh water in these layers feeds the Virdas through horizontal recharge. Then over a period of two to three months, the continuous draining of water from layers around and below the Virdas creates a temporary negative pressure.

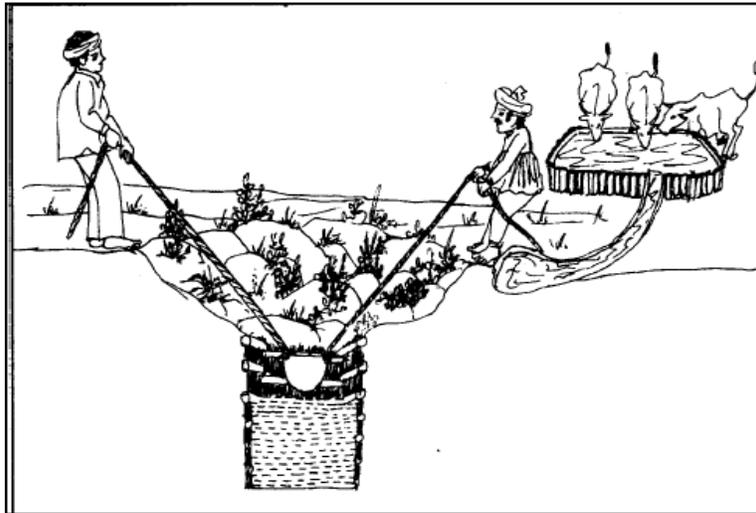


Figure 2: A Virda¹⁹

Consequently, the saline groundwater below rises and the Virda becomes saline. The Virda thus prepared can provide enough water to a small settlement along with its cattle for three months. In case the water dries up in the Virda or turns saline, another Virda is dug up in the same lake basin. Thus the number of Virdas may be such that in the eventuality of rains arriving late after the next summer, at least till the second month of the rainy season, the water is available for the users. However, if the rains fail to be inadequate or are absent, the water becomes scarce by the end of rainy season. At such times, the people begin to migrate to the areas having natural pits and ponds. Thus the natural sources of water, managed prudentially by the local population in keeping with the cycles of seasons in the area and used wisely, were able to contain the adverse effects of a famine to a big extent.

Over the centuries, the Maldharis gradually managed to determine the optimum locations, depths, spacing, pumping rates and pumping sequences of the Virdas to ensure production of more quantity of freshwater and minimize mixing with the saline groundwater. Virdas have been an integral aspect of the ethos of the Maldharis. Usually two-three families would collectively dig three to four Virdas and connect them to a trough through a channel. For centuries the Virdas have been a unique way to get potable water in a salt infested, water deprived region like Kutch. As per local traditions, the construction of a big Virda would be initiated with the village chief creating the first mark on the ground using a spade as the priest chanted hymns. The people then commenced digging under the supervision of experts. Villagers could use the water in the Virda for a stretch of 20 days to 4 months depending on the use of the water accumulated in it.²⁰

The success of this 'well in the tank' complex rainwater harvesting technique depended on the smooth functioning of the delicate ecosystem of the area. Significant grass cover became necessary to allow free infiltration of fresh water. Also maintenance of natural vegetation and an optimum number of animals kept the ecological balance intact. LyesFerrokhi who studied Virdas writes, "Even though these systems look precarious and casual in the eyes of modern technologists, they have been perfectly sustainable for centuries. The reason for this is that they are compatible with local lifestyles...Traditional rainwater harvesting methods...represent a fund of solid experience gained through generations of observations, trials and errors concerning soils, plants, animals, groundwater movements, run off patterns and climate."²¹

¹⁸ Anil Agarwal and Sunita Narain, (Ed.), *Dying Wisdom Rise, fall and potential of India's traditional water harvesting systems*, (Centre For Science and Environment, 2005), 146.

¹⁹ Honey Bee, Vol.5 (2), April-June 1994. This is a quarterly newsletter published by Prof. Anil Gupta for Sristi Innovations, Ahmedabad.

²⁰ Anil Agarwal and Sunita Narain, *Dying Wisdom*, 147-148.

²¹ LyesFerrokhi, *An Ecologically-Sound Water Harvesting Under Threat: A Case Study of the Banni Pastoralists' Knowledge in the Grasslands of Kachchh District, Gujarat State, India*. (Uppasala: Swedish University of Agricultural Science, International Rural Development Centre, 1994), 4.

3. Need for Restoration

In the recesses of the saline land called Rann are revelations of a water history that has no equivalent in any other region. The searing heat, the scanty rainfall, the sparse vegetation and the salt marsh not withstanding people learnt to procure potable water. The Virdas are undoubtedly the most unique and innovative water harvesting system of the Banni grasslands in the Rann. Through centuries of harmonious living with nature, comprehending her different rhythms, discerning the locales where water could be retrieved, the inhabitants literally broke ground with this ingenious technology. The knowledge to locate, construct and maintain the Virdas was passed from one generation to another thus enabling the technique to survive. Yet today, shrinking grasslands, Maldharis' migration to cities, soil erosion, increasing salinity have placed the fragile ecosystem of the area at peril. If this situation is unchecked, then the intricate water harvesting mechanism which is a reflection of the immense reservoir of the conventional knowledge of the indigenous people about their ecosystem may vanish before long.

Recording her observations, sociologist Lyla Mehta notes, "The Virda symbolizes the resilience of people in a semiarid area, but it is time and labour intensive. The men dig... But it is the women who have to spend at least half an hour over each pot they fill at the water hole and wait patiently as the earth releases water."²² She goes on to add that intercessions by the government like the planting of *Prosopis Juliflora*²³ "have reduced the availability of water in the riverbeds and thus significantly reduced the life of the Virdas."²⁴

It is apparent that genuine intentions of the government at the district level to restore the grasslands to its former condition at least in some measure must be inclusive of the views and knowledge of the Maldharis at the micro level after making a thorough assessment of their fresh water needs and ways to curb the growth of *Prosopis Juliflora*. Then not only will the grasslands gradually increase and salinity ingress checked, it will also successfully preserve the nomadic communities' ancient patterns of livelihood and encourage similar sustainable initiatives in other fragile eco-regions. In Banni, rejuvenating the Virdas signifies the rejuvenation of the Maldhari community. For, both are inextricably interwoven. In this context, it is interesting to note that while other water harvesting methods like wells and tanks have been widely used by Maldharis in other areas of Gujarat, the Virda model of the Banni grassland has not been replicated elsewhere. Linked to the topography and geology of the area, Virda therefore is inimitable. This makes it even more imperative to take immediate steps to help the Maldharis of Banni to preserve their water harvesting system.

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²²Lyla Mehta, The Politics and Poetics of Water: The Naturalisation of Scarcity in Western India, (New Delhi: Orient Blackswan, 2005), 156.

²³ An invasive thorny plant species introduced in late 19th century by the British and subsequently by the Indian authorities to check salinity in Banni, but which has substantially reduced grasslands and fodder availability for cattle.

²⁴ Ibid, 157