

# Consequence of Housing and Infrastructure Development in Rann of Kutch

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**Abstract:** - The Rann of Kutch is a seasonally marshy saline clay desert, a shallow wet-land which submerges in water during the rainy season and becomes dry during other seasons. The dry season is extreme as it dries out the marshland leaving isolated salt islands on a vast plain. The monsoon is no different in extremity, as it floods the marshland and the whole area is transformed into a vast inland sea. Formation of the Settlements and Architecture in Rann of Kutch has developed through time which is a consequence of the climatic conditions and life style of the people. This study accumulates Planning, Design and Settlement Pattern in Rann of Kutch, Housing Morphology in terms of Built form, Structure, Construction, Materials and Technologies of Present Housing and Infrastructure Scenario. Study concludes with suggestions of issues of Housing and Infrastructure Development in Rann of Kutch.

**Index Terms**— Built Form, Housing Morphology, Settlement pattern, Architecture in Rann of Kutch.

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## 1. INTRODUCTION

Rann of Kutch is a place with diversity of its people, history, traditions, colourful arts and crafts, hostile geography, commerce, the enterprising people and distinctive character of architecture collectively its culture.

The people of Rann who migrated to various parts of India and mainly to Bombay for business and employment are away for two to three generations and migration continues to date. So the elder generation knows few aspects and the young are almost unaware of the richness of their own homeland. Although the elder generation carried traditional customs to new places, the long period of seclusion kept them away and they picture Rann to be only barren desert.

The architecture or structures in Rann of Kutch has evolved across time and is a result of the climatic conditions and living patterns of the people. Its layout and built form are in a harmonious balance with surroundings. Our planning and housing design continued to preserve this balance of existing surroundings. It transformed the farm to a garden with the new circular houses merging with the green surroundings and comfortable to stay in the hot and dry climate of Rann.

The site layout is a group of clusters and each cluster is designed with individual house on landscaped platform around a central open community green space. These clusters would incrementally form a small settlement recalling the composition of circular houses around a community space as observed in Banni – a settlement of Rann, This polycentric typology has the crucial advantage of cross ventilating every house and the entire cluster. Houses are designed with no boundary walls, to feel in midst of a garden. They face street in the front and have large green open space to function as

shared community space on the rear side. Houses being circular, they are placed in several different ways, their profile along the street varying so that the central ventilation shaft can take advantage of the direction of the prevailing breeze.

Each cluster is divided into plots of about 300 sq.mt. and the houses are designed with no boundary walls, to create a feeling of being in an open garden. The streets for movement of vehicles through the complex are treated as garden pathways. The meeting of various streets form small chowks (squares) to serve as active interaction spaces and services like shops recalling the chowks. These street junctions are also formed as response to the shape of the site.

Water being scarce, water conservation methods are employed for housing and horticulture as part of the landscape design e.g. pool water is reused for gardening. Kutch is host to many migratory birds and peacocks among other birds are seen on the farm site. The landscape follows the architectural concept of an open garden. The vegetation, flora and fauna are selected to attract birds for food-and shelter to truly create a living garden.

## 2. SETTLEMENTS PATTERN IN RANN OF KUTCH

There are no urban settlements in the Rann of Kutch. There are, however, over forty beautiful semi-nomadic hamlets. Most of the hamlets lie along the edges of Rann. There are major two settlements in Rann, one is in the Great Rann and another is in the Little Rann, having numbers of hamlets in it. The larger settlement is known as Banni Settlement and the smaller one is known as Tunda Settlement. These two settlements consist the 90% of total population in the whole

Rann of Kutch. Very less numbers of hamlets (like Dholavira, Bidada etc.) are out of these two main settlements.

The size of the hamlets in the Rann of Kutch depends on the local availability of water and grass land. Most of the hamlets show a very thematic and typical pattern of organization and clustering, with localized differences in the plan types of the clusters.

It is difficult to divide the Rann region into distinct zones and to group the house form in each zone within specific generic classifications. This is partly because nothing is constant or absolutely identical. One can observe a persistent, yet gradually changing character in these forms. While the circular enclosed space is found almost everywhere, it occurs more frequently as one move down from Khavda in the north to Bidada in the south.

Conversely, the frequency of occurrence of courtyards increases as one move northwards. Rectangular spaces predominate in the northern parts of the Rann. It is thus more convenient to follow administrative boundaries. Consequently, districts have been retained as the subdivisions within the Rann.

According to the conditions prevalent in each region and the size of the settlements there in Rann acquired certain form concepts in their settlement patterns. Evolving out of the socio-physical context and due to local acceptance of its validity over a period of time, they have become the traditional type of habitat of the people. As long as the main features of the context remain unchanged, the settlement pattern also retains its validity.

The major contextual forces shaping these settlements can be enumerated as climate, available materials, technology and culture. These forces not only contribute to the form of the habitat, but at times to the development of the life-style of the people as well.

A particular region generally conceived certain consistent concepts of form, which produced similar streets, spaces, dwellings, and other elements in the various human settlements located within that region. Often, there are obvious similarities. These characteristic elements within a region, demonstrating similar and consistent forms, are termed as generic, depending upon the degree of similarity or variation within a theme.

### 3. PLANNING AND DESIGN OF SETTLEMENTS

On a cursory glance the plan of Dhordo, a hamlet in Banni, shows two distinct clusters. A large one in the north and a small one 'G' in the south-west corner. The smaller cluster is set fairly apart from the main one and is occupied by Harijans.

However, in its functioning the major cluster can be divided into three to four units depending on the nature of the relationship between the people. Cluster 'A', including the headman's house 'H', is one of the oldest clusters. The headman, his brother and close relatives live in this cluster. In many other hamlets, like in Ludia and Gorewali, the cluster selected from each group is complete and fairly distant from the others.

Centrally located, the most elaborate house belongs to the head of the hamlet. He is richer and more exposed to the outside world than the rest of the community. He is able to speak several languages including a few words of English. The southern portion of the house has a large rectangular room and an external platform attached to it. This is used as a visitors' room along with a 'sitting out' platform. The space 'S' in front of this platform is the arrival point and the meeting place of the hamlet. Any visitor to the hamlet is first brought to this place and his credentials are checked before he is allowed to go into the interior of the clusters.

The arrival point and the space are reached by a path from the south. This is the most public space in the whole settlement. Privacy for the western areas of this space is achieved by the construction of a wall about two and a half meters high. The meeting room in the north and the Bhungas behind, in the east, sufficiently seclude this area from the other spaces and houses. The mosque opens towards this space expressing the public character of this building.

The spatial organization of the Banni dwellings does not conform to any predetermined geometry or consciously laid out street pattern. In small hamlets with a few dwellings which are often round in shape, it would be difficult to think in terms of streets. It is more an act of spontaneous and organic growth and depends upon the needs of the community. However, in spite of its apparent randomness, there is a clear understanding of territorial claims and rights of way. The meandering paths are not erratic but are defined by the edges of the platforms which indicate dwelling spaces, both internal as well as external. The paths, or the narrow spaces between such platforms, form the main movement arteries of a settlement.

In Ludia, which is on the northeastern edge of Banni and forms part of the area called Pachcham, there are two larger clusters of two different communities comprising the hamlet. As one enters the hamlet from the Bhuj-Khavda road, it is the Muslim community which one encounters first. Either passing through this cluster or skirting it one arrives at another distinct group of dwellings fenced off with thorny bushes. Inhabited by Hurijan Hindus, who are engaged in house -building activities, besides wood and clay crafts, this part of Ludia has a unique composition in form, material, colour and decoration. Wall decorations make this cluster

visually distinct and beautiful.

Socially the house of the headman forms the nucleus of this Harijan cluster. It is also the most elaborate and well-constructed house. While the major part of the village surrounds it on three sides, the fourth side has been used for growth and extension. Since all the households in this section are related to one another it is possible to perceive the process through which a gradual split took place in families and the nature of the incremental growth of the village.

#### 4. HOUSING MORPHOLOGY

Form, Structure and Present Housing Scenario

The stark initial impression of conical thatched roofs standing low against the sky is dramatically reversed upon looking closely at a cluster of houses which is uniquely indigenous. The clustering pattern of the dwellings is not characteristic of other such areas where, typically, introverted houses with courtyards are grouped compactly with shared walls. Here, independent spaces predominantly circular in plan are juxtaposed on a connecting platform. Since this area is not affected by strong winds and sandstorms this fairly open layout is justified.

An analysis of the clusters from the hamlets of Banni shows that a round hut used as the main dwelling space raised on a platform is the most generic element in this area. This round hut, locally called a bunga, varies from 3 meters to 6 meters in diameter. Fairly consistent with this is the rectangular hut known as a choki.

Generally limited in area, the rectangular unit has some smaller variations. The larger ones are used for living and the smaller ones for cooking. Still smaller units, about one and a half meters in height, not so definite in shape and without a roof, are often attached to a bhunga. These are used as washing, bathing and storage spaces. The use of bathing and washing areas is limited due to the scarcity of water.

A typical circular bhunga has a door and four windows symmetrically placed. Directly opposite the door is the raised platform or the pedlo on which are placed the rectangular storage bins - the sanjeero and the chausar, placed symmetrically on either side of the two windows in the line of vision. A low wooden cot or manji bearing a pile of quilted dhadkis, finished in fine patchwork patterns occupies the central space between the bins.

In Ludia, apart from platforms, which are used extensively for outdoor living, fences and screens made of sticks and twigs are used to demarcate some of the houses although notions of privacy are not as strong in the Harijan community as in the adjacent Muslim community. Comparing the present village plan with an earlier one, prepared twelve years before, the major factor of change is the trend towards the

construction of more rectangular spaces as compared to circular ones.

Subtle divisions in a house define its private and semiprivate areas. Of course, the interior space of a bhunga or a choki is the most private space. The raised platform in front is the private open space with restricted movement allowed on it. Privacy is important even within a family yet the doors to the bhunga or a choki of the same family can face one another. Another significant thing is that there are separate enclosed spaces for women in families which can afford more than one bhunga or a choki. But, there are no separate spaces for different wives as polygamy is uncommon, though permissible in Islam. There is no concept of public storage of food grains, and therefore no public granaries. This is essentially due to the use of clay.

Construction, Materials and Technologies

Earth materials like mud and stone are perhaps the most commonly used building materials throughout the world, particularly in ancient traditional communities. Their universal acceptance is clear and the architecture is enriched by the multiplicity of expressions, due to the use of various indigenous techniques. Compatibility of these materials with the surroundings in which they are found, along with local social and cultural overtones have made them distinct from each other.

Building materials had much to do, both with the organization of architectural spaces and with the aesthetic treatment of facades, elements and surfaces. Stone and mud have been important building materials in the Rann due to local availability. Construction materials are limited to clay, wooden sticks and thatch which has resulted in a uniform character throughout the settlements in the region. Roots are made of wood, twigs, reeds and mud though at least one room has a thatched roof which is a better insulator.

The walls of the bhungas are usually constructed in two ways depending upon location. In places which are not likely to face inundation during the rains, no matter how meager these rains may be, the walls are made of sun-dried clay blocks and finished with mud plaster. These walls cannot carry the load of the roof, nor are they rigid enough to hold it. The roof load is cleverly transferred above head level. A wooden prop, placed in the centre of the beam, supports the conical roof and helps transfer the load to the posts through the beam. The two posts carrying the beam are either placed outside the circular wall and left exposed or are embedded in the mud wall.

Since sun-dried clay blocks are the major component of construction, a round shape has met with greater success due to its response to compressive forces particularly in the event of an earthquake. Kutch forms part of a seismic zone, an important fact to bear in mind. Longer walls, in rectangular

form, are not as strong and often develop cracks.

Alternatively, in the areas which face water logging Bhungas are built with wooden sticks covered with mud plaster. In the event of inundation the wall would not give way as it is well reinforced by the wooden sticks and is really a kind of adobe construction. These reinforced walls have a far greater load-bearing capacity, thereby eliminating the need for additional posts and also the horizontal beam. For the roof a wooden frame is made of sticks which rises from the wall and is tied at the crown to create the cone. The cone is surfaced externally with thatch. The interior of all spaces is finished with white clay, often of good quality. Climatically a Bhunga works well both during the summer as well as in winter. Intense heat is countered by its thick mud walls and thick thatched roof. Both these materials are very good insulators.

### 5. INFRASTRUCTURE SCENARIO

**Roads:** The settlements have majorly expanded along the transportation network which is connecting the settlement to other settlements. There are no roads which directly connecting the Rann. But as the land is very flat and dry in the surroundings, it is easily negotiable by car. Major approach roads are well defined. But the roads inside the settlement are undefined. The roads inside the hamlets recognized by the shape of bhungas and clusters, which are 'Kutcha' and only natural land is there to move on.

**Water supply:** Major source of water is tube wells. Water from the tube wells is stored in the over head tank of 5,000 ltrs. But there is no tapped water supply as such. Women have to carry water from the bottom of these over head tanks to their houses. The average distance traveled every day is around 500 mts. Water contains large amount of salinity due to proximity to the sea and type of soil.

**Sewerage:** Every house has individual septic tanks to take care of sewerage. There is no sewerage treatment plant for any hamlets.

**Drainage:** Clusters developed by the villagers do not disturb the topography of the site and form of each house is such (circular in plan) that water is not logged anywhere. Because of very low rainfall problem of drainage comes in very few occasions. There is no drainage facility provided.

**Social Infrastructure:** In each Ghams of Banni Settlement (the hamlets of Khavda, Ludia, Dhordo, Gorewali, Hodka and Bhirandiara) as well as in Tunda Settlement (the helmets of Baladia, Jesda and Piprala) have one Primary school and one small dispensary. The other small hamlets (Nana Ghamdas) and medium hamlets (Mota Ghamdas) have no such facilities for education or health. The people have to move out of the Rann for more treatment of health and for further studies.

### 6. ISSUES

Rann of Kutch is a region of harsh environs in context of climatic conditions. Due to this the ecology of the region is fragile.

The new constructed houses are built as per bye laws but they contradict the built style of the vernacular architecture of the region.

The new constructed houses have erased the concept of open courtyard. There are more of closed houses

Desert being almost waterless region needs more attention over here. The water sources are few and the quality is poor.

Whatever the sources of water are present, maximum are away from the premises thus making the water issue more critical to be dealt.

Also on the same hand sanitation and waste water drainage are a problem as very little emphasis is paid on them uptill now by the government.

**The region lacks in transportation system.**

The construction now-a-days are completely modern in technology and materials. People have adopted the present conventional building materials like brick, cement, and concrete for construction purpose instead of stones and mud. The vernacular architecture of the region is vanishing slowly. Thus, there are drastic changes after earthquake in housing morphology in the Rann.

### CONCLUSION AND SUGGESTIONS

All the hamlets and settlements must be well connected with the urban areas at least by means of bus transportation. The bus corporation the Gujarat State is having should come up with special bus services for the rural areas.

It is good that new houses are being constructed but they should comply with the climatic conditions of the region.

Since the building materials used now-a-days do not coordinate with the climatic condition of the region, so these should be reduced up to the extent possible and the local materials available should be used which makes the living comfortable.

The Government should come up with the various schemes to provide infrastructure and livelihood.

Water being a critical issue, rain water harvesting and recycling of water should be done more in number in order to increase the quantity and quality of water for usage.

More number of houses should be provided with tapped water supply. For this the public should take initiative and the problem has to be dealt by the Government.

The same procedure has to be carried out for the sanitation and the drainage system.

**REFERENCES**

- [1] Udmale, Sanjay, 'Architecture for Kutch', PTE, Singapore, 2003
- [2] Jain, Minakshi, Kulbhushan, 'Architecture of the Indian Desert', Aadi Centre, Ahemdabad, 2000
- [3] Golany Gideon, Desert Planning, The Architectural Press, London
- [4] Kaul, R.N. (1970), Afforestation in Arid Zones (edited): Dr. W. Junk N.V. Publishers The Hague.
- [5] Tewari J.C., Plantation Forestry and Success of Various Tree Species in Arid Tropics: Indian Experience, Central Arid Zone Research Institute
- [6] Crooke Ron, Waren Andrew, Goudie Andrew, Desert Geomorphology, UCL Press Limited, University College, London, 1993
- [7] Sharma, R.C., 'Thar : The Great Indian Desert', 1998
- [8] Baschmann, K.H., 'Settlements and Habitation in India – Geographical review of India', 1954
- [9] [en.wikipedia.org/wiki/Kachchh\\_District](http://en.wikipedia.org/wiki/Kachchh_District)
- [10] [en.wikipedia.org/wiki/Rann\\_of\\_Kutch](http://en.wikipedia.org/wiki/Rann_of_Kutch)
- [11] [www.gujaratplus.com](http://www.gujaratplus.com)
- [12] [www.Kutch.gujarat.gov.in](http://www.Kutch.gujarat.gov.in)
- [13] [www.indiasite.com/land/Kutch.html](http://www.indiasite.com/land/Kutch.html)
- [14] [www.mapsofindia.com](http://www.mapsofindia.com)
- [15] [www.magnificentKutch.com](http://www.magnificentKutch.com)
- [16] [http://en.wikipedia.org/wiki/Sea\\_salt](http://en.wikipedia.org/wiki/Sea_salt)
- [17] [http://www.wunrn.com/news/2008/08\\_08/08\\_11\\_08/081108\\_india2.htm](http://www.wunrn.com/news/2008/08_08/08_11_08/081108_india2.htm)
- [18] [http://commons.wikimedia.org/wiki/File:Salt\\_works\\_in\\_Rann\\_of\\_Kutch.jpg](http://commons.wikimedia.org/wiki/File:Salt_works_in_Rann_of_Kutch.jpg)
- [19] <http://www.shunya.net/Pictures/Highlights/People-India-WesternIndia.htm>
- [20] [http://www.gbfc.ch/Session\\_Administration/upload/Zafar\\_UL\\_Islam.pdf#search=humanimpact on thar desert](http://www.gbfc.ch/Session_Administration/upload/Zafar_UL_Islam.pdf#search=humanimpact%20on%20thar%20desert)
- [21] <http://www.gypsyfeet.com/indiatravelguide/gujarat/geography>
- [22] <http://www.indiasite.com/land/thardesert.html>
- [23] [http://images.google.co.in/imgres?imgurl=http://www.img.uni-karlsruhe.de/download/sedl03\\_01.jpg](http://images.google.co.in/imgres?imgurl=http://www.img.uni-karlsruhe.de/download/sedl03_01.jpg)
- [24] <http://images.google.co.in/imgres?imgurl=http://www.birding.in/images/Maps/BirdMap.jpg>
- [25] [www.mapsofindia.org/maps-pics/gujrat3.jpg](http://www.mapsofindia.org/maps-pics/gujrat3.jpg)
- [26] <http://www.discoveryhospitality.com/images/gujrat%20map.jpg>