

Understanding Indigenous Knowledge Systems of Bhunga Architecture:

A Literature Review

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Biography-

Shreyasha Hadawale¹

Shreyasha Hadawale an Undergraduate Architecture student studying in Fourth year, B.Arch who is passionate to explore this field. Along with architecture, Literature and research is my point of interest, where I got attracted to the Bhunga evolution of traditional architecture and was eager to study the deal between the deteriorating climate and buildings of Kutch. She participated in the NASA HUDCO (Housing and Urban Development Corporation Limited) Competition -2021.

Research and Documentation were here part of the work.

Ar. Nupur Chichkhede²

Nupur Chichkhede graduated from the Kavikulguru Institutes of Technology and Science (KITS), Ramtek, Nagpur District, Maharashtra India in 2011 and completed her Masters in Urban Planning from Vishweshwarya National Institute of Technology (VNIT), Nagpur, India in 2014.

She is currently perusing her Ph.D. from Savitribai Phule Pune University (SPPU), in Architecture. She has previously worked with KITS Ramtek, as an Assistant Professor 2014-15, and is currently working as an Assistant Professor in Dr. D Y Patil College of Architecture, Akurdi, Pune, India, since 2016. Her subject specialization and research interest include, Urban Planning, Environmental Planning, Ecosystem Services & Landscape Services. Along with her colleagues & Students, she has published several research papers and has presented at National and International Conferences. She has coordinated and participated in several collegiate and Intercollegiate, Curricular, Co-Curricular, and Extra Curricular Activities. She is an Executive Committee Member of AESA (Architects Engineers & Surveyors Association), Pune. She is a member of the Institute of Indian Interior Designers (IIID) Pune Regional Chapter. Recently Awarded with Young Professor Award 2022

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Abstract:

Kutch traces the social, regional, and cultural background of the region and its people. A vast expanse of continuous yellow sands stretches to the horizon; seldom a view of huts or settlements where the traditional architecture of Kutch is the outcome of prevailing topography, extremes of climate, and other natural forces. Deserts and the arid climate form the backbone of traditional vernacular buildings concerning natural calamities. The positivity is brought by the locally available materials through the natural resource of the structure. A variety of housing patterns and interiors flourishes the architecture in Kutch.

Kutch enjoys summer throughout the year except for the month of January which is the coldest month. The daylight, summer winds, water, construction, and technology are important factors while designing traditional houses. Mechanical ventilation cannot be made available in rural regions. Bhunga is a traditional construction type in Kutch which are cylindrically shaped plans, thatched roofs, mud walls, and timber frameworks within it. The interior forms an analogy between their lifestyle and culture. Various paintings, carvings, and craftworks are displayed which form the identity of the Kutch. As a barrier to natural calamities, in construction, the plinth of the foundations is raised by stones to avoid damage to the houses. The soils found here are shallow black and sandy clay soils which are suitable for construction. Apart from being attractive visually and possessing earthquake resistivity, these houses are also extremely heat resistant to adapt to the severe large desert temperature. In traditional architecture, buildings were designed to achieve human comfort by using natural materials and construction techniques that were more responsive to their climatic and geographic conditions.

The architecture of Kutch has encouraged presently for sustainable development and is found lesser in the modern context. This research paper refers to the understandings and philosophies developed by societies with long histories of mutual contact with their natural surroundings and it is also reflecting the study of various research papers, and case studies through a literature review that gives insights into Bhunga Architecture.

Keywords: Vernacular architecture, Eco-architecture, Traditional architecture, Human comfort.

Introduction:

The development of vernacular architecture began when people began to build their own homes out of materials found nearby and adapted to their needs. Even before the architects, man was able to build climate-responsive structures as a simple response to societal necessities. North-western Gujarat has an architecture that is developed throughout the ages and has been inhabited by locally available materials, the traditional buildings are time-tested, sustainable, and sensitive to the microclimate condition and natural calamities, including earthquakes which the region is prone to. Kutch district is divided into two major parts Rann of Kutch – It is a wet and dry region without any settlements. Salt flatlands are prevalent in summer and flooded in the rainy season. Kutch – The area is dry with settlements both traditional and modern. Bhunga architecture is a unique aspect of the traditional desert architecture of Kutch in which the size, location, and orientation of the bhunga are planned for very good structural and functional results. Bangs are mainly set up in desert islands (fertile land in the middle of the desert) in the northern parts of the Kutch region of Gujarat specially Banni and Pachham. Banni is a flat plain area with a silty clay soil type. There are no stones or aggregates available for construction. Hence mud and thatch are the most used locally available construction materials. Two hill ranges, Kalo Dungar and Goro Dungar, are part of Pachham Island and the larger Rann of Kutch. It is an undulating and cultivable land where limestone is amply available. Most Bhungas in Pachham use limestone in uncoursed rubble masonry for the construction of foundations and the superstructures may vary.

The factors influencing Bhunga design are:

- Climate: The thick walls, made of mud, keep the interior cool when the temperature rises to 40+ degrees Celsius in summer and warm when it drops below 5 degrees in winter.
- Culture: From painting on the exterior walls to glass design on the internal walls, culture is evident in the Bhunga's interior and exterior decoration.
- Topography: The Kutch Region has flat, grassy terrain with little other flora.
- Disasters: It behaved admirably in the 2001 M7.6 Bhuj earthquake. Very few Bhungas experienced significant damage in the epicenter region and the damage that did occur can be mainly attributed to poor quality of the construction materials or improper maintenance of the structure. It has also been observed that the failure of
 - Bangs in the last earthquake caused very few injuries to the occupants due to the type of collapse.

The circular mud house is an integration of exact geometry and property of materials for the climatic conditions to evolve a perfect architectural form of the house. Due to the circular shape of the wall in the plan, inertial forces developed in the wall are resisted through shell action providing excellent resistance to lateral forces. The thick walls necessary for thermal insulation also have a high in-plane stiffness, which offers exceptional performance under lateral loads. In addition to resisting the lateral stresses of an earthquake and limiting exposure to heat, the circular shape of these homes serves to insulate against the outside environment. It also makes the building earthquake resistant. Since the traditional Bhunga dwelling requires regular maintenance i.e., a regular application of lime plaster to the walls and floor and replacement dried grass on the roof more and more houses nowadays are shifting towards Mangalore tiles as an alternative to the thatched roof

Background:

After the devastating 1819 earthquake, Kutch residents developed the innovative circular design of the Bunga to minimize damage to life and property. This Bhungas revised design, which is nearly 200 years old, stood very firmly during his 2001 earthquake, which was very close to the epicenter. A Bhunga is a traditional house, a distinctive circular mud hut found in the Kutch desert region of Gujarat. The houses are circular and surrounded by thatched roofs.

These beautiful homes are built with adobe and locally available materials such as mud, bamboo, and wood. These simple huts are decorated with various ornaments depicting the life and culture of the Kutch people. These houses are commonly referred to as "architect-less architecture" due to the excellent architectural knowledge that the locals have acquired over the years. These are considered architectural and structural marvels because they are not only earthquake resistant (their circular shape also resists the lateral forces of earthquakes well), but also protect the interior environment of the house. increase. The design of the house is designed to keep the interior cool in the summer and warm in the winter and is very sturdy and able to withstand natural disasters such as desert storms and earthquakes. Bangs require regular maintenance, including the regular application of lime plaster to the walls and floors and the replacement of dry grass on the roof. As you pass the mud huts, you will be fascinated by the beautiful paintings that adorn the walls, the finely crafted mud and mirror work inside, the lifestyle and heritage, and the rich colors, textures, and creativity that are an integral part of social dynamics Increase of Kutch people. This seamless integration of climate, social life, craft, and architecture is evident in the aesthetically designed circular mud and straw huts, and such aesthetics are discussed in the works.

Methodology:

These Research paper Aims to explain the traditional vernacular architecture and Approaches towards the Climate oriented buildings, their typology, concept, evolution, and tradition, and maintaining earthquake resistivity. The overall study was carried out on the vernacular architecture all over India in different parts. Kutch region is been studied with focusing on the Hodka village of Bhuj. Bhunga architecture is the main study. Various Research papers were preferred to get the exact data of bhunga architecture and the changing climate of Kutch. Through images, different traditions, cultures, and activities were identified. Further Case study was undertaken to understand the application of bhungas in different designs and structures. Also, to get an idea regarding the survival of people living. Further analysis is made based on the comparison of case studies which gives a brief description of the climate, accommodation, style, sustainability, construction, exterior, and bhunga

Literature review

Culture:



Figure 1. Decorated Wall Painting

In introducing Kutch and its climate, we need to understand its people and their history, origin, living patterns, and housing pattern. It has been a fascinating tour of its culture and tradition. There are many different forms of vernacular buildings all over India according to the climate of the region.

The term 'Vernacular' is derived from the Latin word vernacular which means domestic. Vernacular Architecture is a building style of local or regional construction, using traditional materials such as resources from the areas where buildings are located. For Example, in Deserts mud houses, caves, temples boat houses, and timber houses consist of the Buddhist era, Hindu temples and also the Mughals forts and large Havelis from Rajasthan, floating houseboats in Kashmir, bamboo construction in Bengal, Assam, and Chettinad houses in Tamil Nādu. North-east states have a distinct architectural style, influenced by climate and deeply rooted traditions. These houses get adapted to the existing environments, with the locally available materials and the constraints imported by the climate. These buildings enrich sustainability and uphold the tradition of the region. To get known to a particular place and its people we need to understand its history, origin, living style, geography, topography, visual expressions, and the built environment. The traditional architecture of Kutch is all about the prevailing outcome of the extremes of the climate and its topography and other natural forces. Also, the traditional architecture forms a backbone of the social and cultural setup of the region so the vernacular

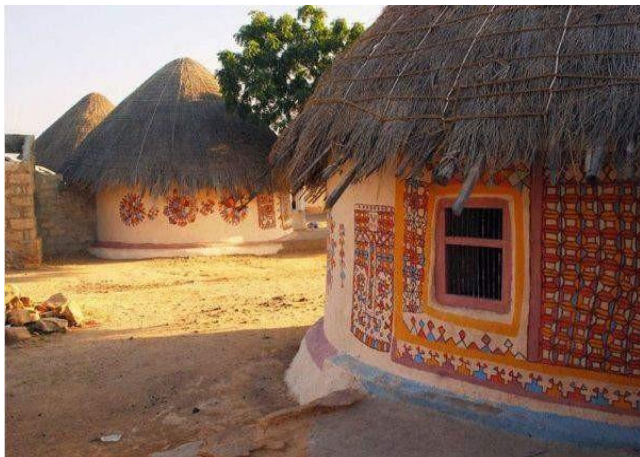


Figure 2. Detailed Bhunga Painting

architecture merges well with deserts and climate. Vernacular buildings form a good example to explain the climatic condition of a particular region giving a proper outcome. These buildings are designed to achieve human comfort by using cheap materials which are more responsive to their climatic and geographic conditions. This paper aims to study the natural design principles of the houses and more emphasis is on the architecture of the region. The paper deals with the study of the Kutch region and the architecture of housing that evolved from

the generations and study.

There are various building forms in vernacular architecture including domestic buildings, agricultural buildings, industrial buildings, and other buildings related to commercial establishments, and lastly all religious buildings like temples, churches, and mosques. Further vernacular buildings are divided into 3 categories:

1. pucca structure: stone, timber, bricks
2. kutch structure: grass, mud, bamboo, thatch
3. Semi-pucca structure: a combination of pucca and Kucha style
4. The concept is discussed on the micro and macro levels where the micro-level is about art and architectural detailing and the macro-level describes architectural aspects. In the traditional style, there are three main types of shapes found in plans i.e., circular plan, rectangular plan, and linear plan. Elements like water, light, ventilation, local materials, and technology are important factors when designing vernacular buildings. Most ancient historical buildings are based on principles of vernacular style ensuring proper ventilation with large windows providing natural light and water bodies implemented in the form of canals, pools, and fountains in the center.

Climate:

Apart from its unique and rich cultural heritage, it is the survival of people in extreme climatic conditions that fascinates all scholars of architecture and residential studies. Northwest India has its vernacular architecture which has developed throughout the ages.



Figure 3. Cloudy weather of Kutch

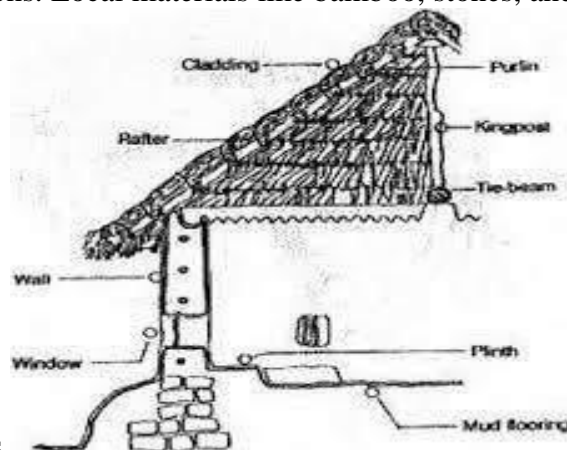
Built by the inhabitants themselves with locally available materials, these buildings are time-tested and climate oriented, sustainable, and sensitive to microclimate conditions and natural calamities like earthquakes, storms, and winds to which northwest India is prone.

Every region in India is identified by its climatic responsive building design in the form of vernacular architecture. In every direction of India, there is a variety of people and their living, housing patterns,

traditions, etc. Therefore, the climate is divided into 3 zones:

1. Hot and dry climate zone: All the regions from the northwestern part of India comes under the dry-arid zone. Cities like Rajasthan, Gujrat, Kutch, etc. Further, there are distinct divisions between the kutchha and pucca vernacular architecture whereas semi-pucca is a combination of both. Houses here are mainly single-story with circular plans made of local materials like thatch, mud, water
2. Warm and humid climate zone: Western part of India enjoys a warm and humid climate. Cities like Mumbai, Chennai, and Kolkata come under this region. Heavy rainfall and extreme humidity encourage vegetation in most such regions. Heavy rainfall throughout the year convenience slopy roofs of houses in the south. The houses are generally single-storied and are planned according to the Vaastu shastra with rooms all around the courtyard and a centrally placed Tulsi plant in the again.
3. Cold climate zone: Hills station in the north experiences a cold climate. Regions like Kashmir, Sikkim, Shimla, and Uttarakhand have become tourist attractions due to their favorable climate. Generally, dwelling units consists of livestock area that lives on the ground floor and the upper floor for living. These houses are two or three stories.

With large rooms without partitions. Local materials like bamboo, stones, and timber are used



to make vernacular-styled houses.

Figure 5.A typical sectional view

Materials and building techniques:

Buildings in the north are constructed with such materials which can get adapted to the climate and respond to natural calamities. Bamboo, bricks, stones, rocks, chips, and surkhi are used in recent times. According to the material used and construction type, the buildings are further classified as:

1. Kutch houses: usually made from organic renewable resources like bamboo, mud, grass, straw, cane leaves, etc.
2. Semi-pucca houses: These are a combination of both organic and inorganic materials such as wood, bamboo, corrugated GI sheets, etc. They are called Assam types houses and modified kutch houses.

What is Bhunga?



Bhunga is one of the traditional construction types in Kutch. the bhunga houses consist of cylindrical shaped rooms this type of house is quite durable and appropriate for prevalent desert conditions and they have a high risk for earthquake resistance analogy between the paintings on the walls and furniture, different decorative patterns are seen on the wall ornamentation. Also, the doors and windows are decorated with wall paintings. The walls of the houses are circular with thatched

Figure 6. Construction stage of bhunga

roofs according to the limitation of material and construction techniques. The making of these houses requires essential organic renewable resources such as mud, grass, cow dung, cane, etc. The plinth and foundation are raised by Stone and bamboo posts. The walls are made up of mud and the flooring done of cow dung paste. The roofs are made up of thatch or of wheat or maize straws which give a greater response to the climate and try to hold the temperature by keeping the rooms cool and fresh. The formworks are done by timber wooden columns holding the mud walls upright nailed by the wooden nuts. These walls are load-bearing though made up of mud. They are generally single-stored buildings without terraces and balconies.

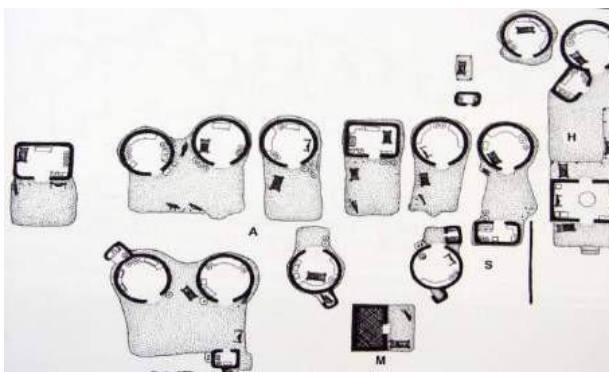


Figure 7.Village Cluster Plan

The architecture of Kutch has been encouraged presently for sustainable development and

such is found lesser in the modern context. The architecture of the Kutch region relates to the socioeconomic setup cultural identities and good climatic responsiveness. A good number of climate-responsive design features are revealed during the study of traditional architecture including temperature controls and enhancing the natural

ventilation

protection

from

natural

calamities such as floods, earthquakes, storms, etc. learning from the traditional wisdom of previous generations through the lessons of traditional buildings can be very powerful for improving the buildings of the future. it commands deep interest and respect as it represents and reveals the many-faced realities of the people living there. A mixture of cow dung and local mud, locally called Gobar Lipan for the plastering layer. Water is added to improve its workability. A first layer is applied and smoothed using hands on the outer surface of the wall. It requires about a day to complete and then another layer is applied on the inner surface. These inner and outer layers are applied alternatively, up to seven layers on both the surface of the wall. Earth sourced from Banni, is used for layering the last layer. The roofing in the wall is resisted through shell action providing excellent resistance to lateral forces.

Materials are generally very lightweight and develop low inertia forces.

Thermal comfort and resistivity to the earthquake:



Figure 8. Small Openings

The architecture here merges well with the deserts and climate. This architecture needs to retain its integrity. It has a hot and dry climate and it is one of the hottest places in Gujarat as the summers are extremely hot and the temperature exceeds more than 49-degree Celsius in the mornings and the nights in Kutch are pretty cool which means in winter days are shiny and the nights are very much cold. The summer exceeds

almost the 8 months of the year and in the winter the month of January is the coldest and the temperature falls to 2 degrees Celsius. The soil found in Kutch is broadly classified as shallow black soil or sandy clay soil. Instead of mixing drylands with green farms occasionally, we can see, coconut orchids which will make it vivid that the Kutch has a diverse landscape. The central belt is covered with banni grasslands and an arid table with thorny trees, grass babul, and a semi desert stretching east to west as low rocky hill scattered by the river beds and streams which are dry. In the southern part where there is good availability of water khajoor and neem trees are seen in large numbers. Relation believes in religion, social structures, climate materials, economy, and the shape of the people that live in that place. The living pattern and the habitat conversely the habitat and lifestyle reflect the behavior social setup, economy as also deep-rooted traditions and aspirations of the people. It has no housing patterns like public buildings houses, palaces, temples, mosques, memorable chhatris, and stepped well which are built with local materials like stone, displaying its craft skills as graceful as woodworks. Generally, we can say that vernacular architecture is a building style, constructed with local materials which we get from natural resources easily and with local technology while ensuring comfort concerning climate crises and prone to

earthquake resistance.

However, every year these earthquake resistant building must be finished with mud plaster on the walls and floors and needs a lot of maintenance.

Case studies

1. Nani Dadhar Housing

Location: Bhuj, India

Architect: Abhiyan - SISC / Sandeep Virmani, Kiran Vaghela

Client: Kutch Mahila Vikas Sangathan

Design: 2001

Completed: 2002



Figure 9. Nani Dadhar Housing

Introduction:

Nani Dadar is a showcase for a holistic approach to managing disaster-affected communities, establishing best practices for relief and temporary shelter followed by permanent shelter.

Devised after the January 2001 Gujarat earthquake, this approach was extended by NGO Abyan to other areas affected by the 2004 Asian Tsunami and the 2005 Kashmir earthquakes. This case study describes a post-disaster emergency shelter program in Nani Dadar, a village in Kutch, Gujarat, India. The success of the project can be attributed to the community's active participation in the entire recovery process, from decision-making to construction implementation, and technical and administrative support and coordination by NGOs. The project ignited confidence and pride in traditional Bunga typology. The Gujarat government has also endorsed the use of earth technology adopted for this reconstruction by publishing it as an official policy document.

Description:

A. Project data:

B.

- In Nani Dadhar the village is spread over 22.35 hectares.
- Each bhuna is 20 square meters.
- Number of bhungas – 110
- Total built-up area of bhungas – 2,200 square meters
- Total built-up area of plinths for family compounds – 10,500 square meters.

C. Evolution of design concepts:

There are no regulations in these villages. A pedestal (vandh) covers land belonging to a large family. Bunga's placement on the pedestal is determined by internal family dynamics. There is a common bathing area (Naini) in one corner of the base, generally at the back. The kitchen or rosado is on one side and can be open plan or covered.

There are no toilets - a vacant lot is used for defecation. Different rooms in Bunga have specific purposes. Directly opposite the door is a raised storage platform with three elements:

Coslos (clay cabinets) for storing cereals, central men for storing women's handicrafts, sangelo for storing milk and dairy products - the traditional version of the refrigerator. More around the walls. The upper level has a shelf where you can hang your tools. The rest of the floor space is free to use for multiple purposes. Some bhungas now also have beds.

D. Structure, materials, technology:

A new bhunga is placed on a stone or cement block foundation, the cracks are filled with sand and compacted with water. The main structure consists of two circular RCC bands (one at the base level and the other at the lintel) held together by vertical rods. Steel formwork is set halfway up the wall, filled with an earthen mixture (prepared by the woman), and the formwork is hammered down. Then lift the formwork to a higher level and repeat the process. Finally, the wooden frame of the roof is assembled and the Mangalore tiles are spread over it. Construction was actively carried out by men and women under the general supervision of SISC Engineers/Master Masons. At the time of reconstruction, there was no electricity in the village, so no wiring was done. However, his NGO in the Abhiyan network is working on solar technology and some households are now buying solar lamps. Water is pumped from government-provided community tanks. The same water is used for bathing and cooking. A separate area with water troughs is reserved for buffalo/cows.

E. Historical background:

Nani Dadar is one of several villages accessible by road from Bhuj, the capital of the Kutch district. With an area of 45,612 square kilometers, Kutch is the largest district in Gujarat and he is the second-largest district in all of India. The district has five major towns, Gandhi Dham, Bhuj, Anjar, Mandavi, and Mundra, and about 960 smaller villages. Kutch was once an independent state founded by a Samma Rajput named Jada in the late 13th century. The Jadeja dynasty ruled not only Kutch but much of the neighboring Katya war for several centuries. In 1815, Kutch became a Britishneighboring Katya war for several centuries. In 1815, Kutch became a

British protectorate and eventually a monarchy, with the ruler recognizing British sovereignty in exchange for local autonomy. Nani Dadhar belongs to the Banni region of Kutch, which is predominantly nomadic or semi-nomadic. 90% of the population is Muslim.

F. Local architectural character:

A traditional Bunga house has a circular mud wall and a thatched roof. The wooden-framed windows are placed low, allowing a cool breeze to enter when the residents go to bed. Hindus decorate their homes with stucco patterns and mirrors, creating a very bright environment. Muslims do it without elaborate decorations. A traditional bhuna requires regular maintenance, which is done by women, who regularly apply repair (lime plaster) to the walls and floors and replace the dry grass on the roof. Bunga's design is said to have been developed after her 1819 earthquake. However, under the influence of the city, locals gradually abandoned Bunga in favor of houses with cement block walls and reinforced concrete roofs.

The bhunga is characterized by its round shape and pyramidal roof. Rooftops are often covered with inverted water-filled pots. The interior is generally heavily decorated. For women, decoration is a way of expressing their creativity and craftsmanship with plaster, mirrors, and paint.

G. Construction Schedule and Costs:

A. History of project design

Design and advocacy: April – June 2001

Construction: June 2001 – May 2002

From discussions with the community, it seems that the construction of a single bhunga would take 25 days, broken down as follows:

| Activity | Days |
|---------------------------------|------------------------|
| ● Foundation Excavation | 1 |
| ● Stonework | 2 |
| ● Filling of crevices | 1 |
| ● Plinth RCC band readymade) | 1 (steel mesh for band |
| ● Superstructure Shuttering | 1 (for walls) |
| ● Ramming | 1 |
| ● Curing | 10 |
| ● Roof | 4 |
| ● Packing | 2 |
| ● Doors & Windows | 1 |
| ● Painting | 1 |

A large supply of metal shuttering had to be available as at least six bhungas would be under construction at any given time.

H. Costing:

| | | | |
|--|-------------------|-------------------------------|-------------------|
| Total costs and main sources of financing: | Comparative costs | Qualitative analysis of costs | Maintenance costs |
|--|-------------------|-------------------------------|-------------------|

| | | | |
|---|--|--|---|
| The total construction cost of Nani Dadar was \$59,346, of which \$18,873 was spent on labor (steel cutting, carpentry, and other special works) and \$39,241 was spent on materials. Additional logistics will cost him \$1,230. Households donated at least \$106 per bunch, sometimes in the form of salvaged materials such as doors and windows. | For building walls, rammed earth is 40% cheaper than a concrete block and 47% cheaper than non-kiln-fired bricks | The cost per bhunga was \$531 and the cost per square meter was \$27 | The new Bhunga is virtually maintenance-free. Hammered earthen walls do not need repair, unlike ancient walls built with wattle, and Mangalore's bricks do not need to be replaced constantly like the dry grass on a thatched roof. Freed from the extra burden of maintenance, women can regard decorating bhunga as a source of enjoyment. |
|---|--|--|---|

I. Functional assessment:

Bhunga is perfectly adapted to the lifestyle and needs of the Banni community. The houses built after the earthquake are adaptations of a typology that makes people feel comfortable. Instead of the imposition of imported technology, there is a revival of tradition.

A. Performances:

| Climatic performance | Response to treatment of water and rainfall | Environmental response |
|---|---|---|
| The bhunga is a cooler place than a concrete house. | As it is an arid region, water is very precious. Therefore, water harvesting also occurs at the household/community level. Abhiyan member NGOs are researching different ways to improve water treatment. | Unlike brick, the main material components of mud/soil/sand do not cause pollution. Minimal wood is used for frames and openings. It is worth noting that the earthquake left a lot of debris. SISC advised the community to use this debris to build a temporary shelter and |

| | |
|--|--|
| | salvage as many doors and windows as possible to make it a permanent shelter. Excess debris was buried under the Bunga pedestal. |
|--|--|

B. Impact of the project on the site:

These are small round structures that blend nicely into the overall landscape. Because of their shape and size, Bhungas is unimpressive even as a group.

Durability and long-term nature of the project: Bhunga seems to have been adopted by the locals. The government has also capitalized on their popularity to create a tourist resort called 'Sharm-e-Sarhad' consisting of a collection of bhungas tastefully equipped with all the comforts a traveler might need. There is great potential for ecotourism and bird watching around Little Run of Kutch. The design of the resort also allows tourists (both Indian and foreign) to understand the unique culture of the region. Interior design and furnishings: Maintaining the Bunga typology allowed people to live in interiors functionally and aesthetically in a centuries-old fashion.



Figure 10. Location of Bhuj Region.



Figure 11. Site Plan of Nani Dadhar Housing

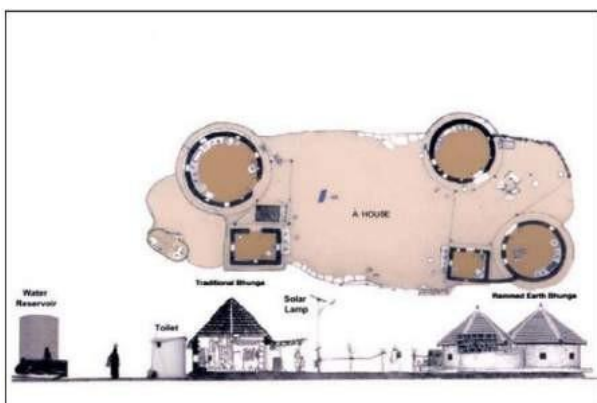


Figure 12. Typical Plan and section.

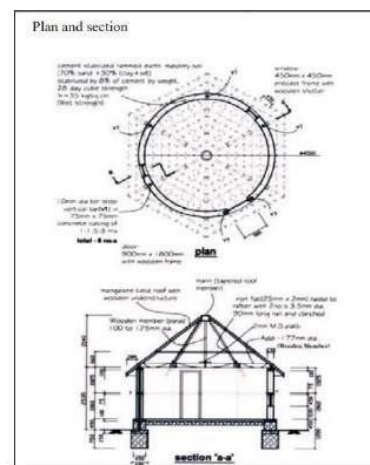


Figure 13. Construction details



Figure 14. Raised plinth leading to bhunga for various activity.



Figure 15. Raised plinth leading to bhunga with painted wooden door and windows.



Figure16. Painted and decorated windows



Figure 17. Painted and decorated window



Figure 20. Detail of a construction joint of a hexagonal Mangalore tile roof.



Figure 21. Bhunga and bathing shed (naini) in a corner of the plinth



Figure 22. The circular wall is used to display the household goods.

2. Shaam-e-Sarhad Village Resort

Location: Bhuj, Hodka, Gujarat

Built year: 2008

Completed:2010



Figure 24. Shaam-e-Sarhad Resort Exterior View

Introduction:

Shaam-e-Sarhad (Sunset Over the Border) Village Resort is a simple, rustic style eco-friendly hotel in the village of Hodka near Bhuj, run by the local community. The name "Sharm-e-Sarhad" means "Border Sunset". Inspired by the traditional architectural style of the area, the overall theme is adobe, from the lobby to the dining area, everything is made of adobe and beautifully decorated with the local handicrafts that the area is famous for. increase.

Accommodation in Shaam-E-Sarhad consists of simple, clean, and comfortable tents and bhungas (round earthen huts with sloping roofs) typical of the Banni region. All rooms are tastefully decorated with mirrorwork, textiles, and other local artifacts and feature a private bathroom with a Western toilet and running shower. The bathroom is in another mud building behind her Bhunga. Shaam-E-Sarhad serves home-cooked traditional Gujarati cuisine in a dining area overlooking the wallless courtyard. Shaam-e-Sarhad is managed by the Hodka Endogenous Tourism Project. The project aims to promote local culture and artisanal tourism for integrated rural development. Therefore, it should be noted that the hotel is staffed by friendly locals who are courteous and try to meet the wishes of their guests. Shaam-E-Sarhad is a small organization operating under the initiative of the Endogenous Tourism Project/Rural Tourism Scheme.

Description:

A. Project:

The Hunnarshala Foundation, in partnership with Kutch Mahila Vikas Sangathan, UNDP, and the State Government, has worked with the community of Hodko village to build a village resort called Shaam- e-Sarhad (Sunset Over the Border). Sham-e-Sarhad has been successfully running for 9 years now. Sham-e-Sarhad is ideally located in a tourist destination. Banni covers an area of 3847 square kilometers of which covers about 8.4% of the total geographical area of the Kutch District. The resort is surrounded by villages that are home to a variety of arts and crafts. For naturalists, the area offers unique biodiversity.

B. Concept:

The resort is situated in Hodka village, surrounded by an area of impressive natural beauty, an ideal location from which to discover the captivating lands of Kutch. Designed in local style, and exquisitely decorated with mirror work, textiles, and other local crafts, the Shaam E Sarhad Village Resort is the perfect gateway to a genuine travel experience in India. An authentic and charming retreat. Complemented by the unique experience of being hosted by the local community and the richness of culture that awaits you here.

C. Exterior:

The resort is a small eco-friendly property with 4 Bhungas, 6 mud tents, and 2 family cottages. The maximum material used for making is eco-friendly and they have decorated it with local materials. Technically it is in Hodka village but a little away from the main population of the Village. The reception was semi-open but hand paintings on the walls and decorated in traditional style. The sitting area around the reception was decorated with colorful cloths and the floor as well walls were painted with mud. It was rustic looking. There is a mud boundary wall around the resort for privacy and to restrict the entry of grazing animals. The area was very peaceful and there was no noise issue.



Figure 25. Exterior of bhunga with landscape



Figure 26. Outside sitting places

D. Interior:

Bhunga Hut is spacious with a high roof. The floors are clean and old-style with mud mixed with cow dung. The washroom and bathroom are integrated, but not connected to the room. Between the room and the bathroom, there is a five-foot space, but in that space, he had six or seven feet of clay wall covering. It was used as a place to sit during the stay. The bathroom wall was made of clear glass and faced a clay wall with a covered area. It was a spacious

clean bathroom with modern amenities. The dining area, like the rest, was mostly semi-open and colorful. Seating includes an arrangement of tables and chairs.



Figure 27. Dining Area with resting.



Figure 28. Integrated Toilet Facility



Figure 29. Clay wall Covered area.

E. Construction:

It was designed and built-in collaboration with village artisans and showcases their traditional arts and crafts. Hodko's experience is important because it was community-centric. They have been involved in the project from the beginning and own, manage and operate the resort. This brought economic, social, and political benefits to the community. For example, soon, entire clay construction may be replaced with concrete. The success of Shaam-e-Sarhad has spurred many other similar initiatives in the region. Unfortunately, not all follow the same parameters that his Shaam-e-Sarhad set. A total of 50 rooms are now available on Hodka itself. The appearance of these rooms may resemble Shaam's-e-Sarhad rooms, but Bunga is now built of concrete and is often not maintained to the same standard of cleanliness. A typical example of what could happen is the resort town of Dhordho, which adjoins the tent city of Ran Utsav. Inspired by traditional architecture, his resort has Bhungas-style rooms, although all rooms come with air conditioning and flat-screen TVs.



Figure 30. Bhunga hut with spacious high roof



Figure 11. Clay Construction replaced with Concrete

F. Material:

Based on traditional architecture and design, there are numerous bhungas, tents, and family huts built using indigenous resources. A bhunga is a round mud hut made of water and cow dung. The huts have sloping roofs typical of the Banni region. They are made of grass straw, an indigenous invention to combat extreme climates. Bangs are cool in hot Kutch summers and warm in cold desert winters. Colorful textiles covering the ceiling in the common/dining area. Bold native patterns can be seen on the walls, and mirrors are used to incorporate the

design into the walls. Half-timbered windows were drawn along the border.

G. Accommodation:

Categories of Rooms – Eco-Friendly Accommodations

Premium bhungas (Mud Huts) – 03 numbers

Eco-friendly mud tents – 06 numbers

Quadruple family cottages (Four Beds) – 02 numbers

Standard bhunga (Standard HUT) – 01 number

Each Bhungas has a private open space with armchairs, an ideal place to relax and look out into nothingness. The Tents and Bhungas can normally accommodate 2 people, and the Family cottage 4 people.

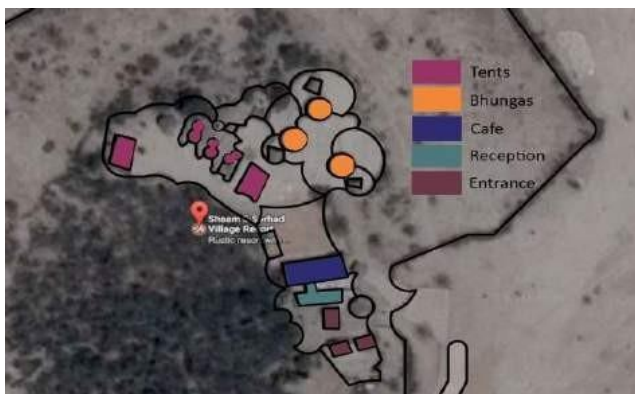


Figure 32. Site plan of Shaam-e-Sarhad resort



Figure 34. Various patterns and motifs on the wall.



Figure 35. The reception desk was made of mud and the wall were painted and designed with murals and frames.



Figure 36. Standard suites with mechanical ventilation in circular bhunga



Figure 37. King size Double bed room with mechanical ventilation.



Figure 38. Family Suite



Figure 39. Timber framed window painted along the border.



Figure 40. Sitting area



Figure 41. Sit-out with mud irregular-shaped murals



Figure 42. Mud painted flooring with glass window.



Figure 43. Bathroom service.



Figure 44. Mirror work

COMPARATIVE ANALYSIS OF CASE STUDY 1 & CASE STUDY 2

Given below table 1.1 mentions the architectural factors related to the case study.

| POINTS | NANI DHADAR HOUSING | SHAM-E-SARHAD VILLAGE RESORT |
|-----------------|---|---|
| Location | Bhuj, Gujarat | Bhuj, Hodka, Gujarat |
| Built year | 2001 | 2008 |
| Completion year | 2002 | 2010 |
| Client | Kutch Mahila Vikas Sangathan | Kutch Mahila Vikas Sangathan UNDP |
| Area | <ul style="list-style-type: none"> ● The village is spread over 22.35 hectares. ● Each bhuna is 20 square meters. ● Number of bhungas – 110 ● Total built-up area of bhungas – 2,200 square meters ● Total built-up area of plinths for family compounds – 10,500 square meters. | Banni extends across an area of 3847 sq. km covering about 8.4 percent total geographical area of the Kutch district. |
| No of Bhungas | 110 bhungas | 6 bhungas,4 tents,2 cottages |
| Construction | June 2001 – May 2002 25 days to build a single bhunga. | The design and construction were undertaken in partnership with the artisans of the village and it showcases their |

| | | |
|-------------------------|--|--|
| | | traditional arts and crafts. |
| Construction technology | The construction was actively carried out by both men and women under the general supervision of the engineer /master mason from SISC | Skilled Labours and masons from the village itself. |
| Material | Mud or cement block, water, mud, sand, bricks, cow dung, cement paints, stones, timber, thatch, Mangalore tiles. | Cement blocks, concrete, bricks, timber, sandstone, cow dung, marble, glass, thatch, jute, cloth, cement paints, mirror. |
| Planning shape | Circular | Circular, Rectangular. |
| Interior | The interior is richly decorated. For women, decoration is a way of expressing individual creativity and craftsmanship with plaster, mirrors, and paint. The kitchen or rosado is on one side and can be open plan or covered. | The washroom and bathroom are integrated, but not connected to the room. There was a five-foot space between the room and the bathroom, but that space was covered with six or seven feet of clay walls. I used it as a place to sit during my stay. The bathroom wall was made of clear glass and faced a clay wall with a covered area. It was a spacious clean bathroom with modern amenities. The dining area was mostly semi-open and colorfully decorated. The walls of the room were painted and mirrorwork was added |
| Exterior | The traditional bhunga house has circular mud walls and a thatched roof. Timber frame windows are set at a lower level to draw a cooling breeze over the occupants | The reception is semi-open, but the walls are hand-painted and decorated in a traditional style. The seating area around the reception was decorated with colorful fabrics and the floors and walls were painted with clay. It looked rustic. A clay wall surrounds the resort to ensure privacy and limit the access of grazing animals. |
| Capacity | Nani Dadhar has about 59 families. A total of 110 bhungas were constructed, eight of them for widows and disabled people. Each family built two bhungas – people live in extended families. | 2 people in one bhunga and 4 in a cottage or tents. |
| Ventilation | Natural and mechanical | Mechanical: Ac or fans |
| Flooring | Plastered with lime | Painted with Cow-dung |

| | | |
|---------------|---|--|
| Roofing | Hexagonal | Conical and semi-circular. |
| Toilets | Outside the bhunga The bathing shed is called “naini” No washbasins are provided. | Attached to the bhunga. Modern bathroom with commodes and washbasins. |
| Aesthetics | Hindus decorate their houses with plaster patterns and mirrors, creating a very cheerful environment. Muslims refrain from elaborate decoration. | The sitting area around the reception was decorated in colorful cloths and the floor as well walls were painted with mud |
| Water | Fetched from a nearby well, water harvesting is done. | Plumbing service |
| Electricity | No electricity | From Bhuj powerhouse |
| Building type | Housing | Commercial |

Table 1. Comparative analysis of case study 1 and case study 2.

Conclusion:

A study of traditional architecture reveals many climate-friendly design features, such as temperature control, enhanced natural ventilation, and protection from natural disasters. Kutch folk architecture is a socio-economic institution of cultural and favorable climatic conditions. Indigenous architectural practices are now encouraged for sustainable development. Despite the importance of ornamentation and form in cultural symbols and signs, indigenous architectural aesthetics are also a result of climate. Shapes, orientations, groups of people, building materials and colors, and construction and polishing techniques are always presented in aesthetic forms that interact and harmonize with nature. For the most part, indigenous architecture is still valued within an elitist conceptual aesthetic framework but is measured, defined, and protected based on elitist principles. The Indigenous architecture was based on an indigenous understanding of space, nature, and the forces it contains. It is an objective but subjective phenomenon

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