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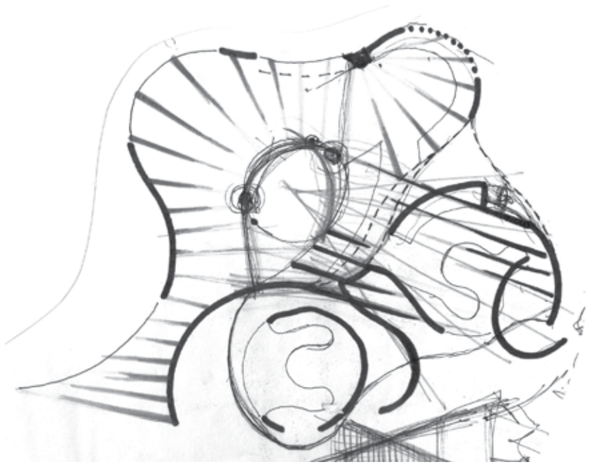
Cover: The central installation at the India Pavilion at Hannover Messe 2015, an artistic assemblage of info graphics and interactive installations that display information about the core sectors of the Indian economy, was the Trojan Lion. The Lion stands for strength, courage, tenacity and wisdom — values that are as Indian today as they have ever been. By adding a sense of forward movement and using manufacturing elements as graphic texture, this *Make in India* icon was born.



Sketch of the Brick House by iStudio Architecture which highlights the seamlessly fluid, organic nature of the design.

MAKING / KNOWING

Kaiwan Mehta

From design a condition of work and life emerges, a condition of humanity that delights in objects and materials, produced and reproduced within sites, studios and times. Time is the crucial motif of design, and especially architecture.

Planners and architects, and designers, work with stories that tie up characters (forms), plots (site/programme features), climaxes (features of built volumes or objects in the landscape) and contexts (the landscape/use that needs to be re-stitched). To tie up objects, terrains, landscapes and material features into a storyline is the essential job of the designer – to build up relationships between objects; it is not to dominate through geometry or fake recreations of natural systems, but to draw out on dreams, and reproduce material realities through human capacities to imagine, and expand imagination, shape it through craft and technique. Stories let the ambiguities and anxieties of the personal, home in the landscape of the universal; the outcrops of the personal settle within the primeval states of being through narratives of architecture, time, and space.

How do we shape the stuff of objects and architecture? From nature to myths, human civilisations have constantly produced a man-made (human-made) world. Nature exists, but our understanding of nature is a product of human thought and vision (ideological). Myths are vehicles through which humans travel the complex realities of the earth and its environment, galaxies and cosmic projections. Early image-making activities emerge from this struggle with nature and the myths. In the arbitrary behaviour of nature, one constantly tries to find an inherent structure of time or an ordering principle of form; and the process as well as its outcome are imagined as scientific. On the other hand, myths occupy the narrative world of imagination, fantasies, and poetic licences. Myths work on the science of human mental thought-processes and social structures; yet they occupy the necessary space of wonder, mystery, as well as awe. The question of how best can the real world of experience be represented is important for both – nature, as well as myths.

Architecture, and one could say nearly all of human material culture, exists within the blurs in between science and myths, nature and the man-made. It is primarily the structure of design – to make meaning in human life, and reproduce as much as reinterpret the experiences and imaginations of realities and human existence. At times, the natural is shaped into man-made frameworks, while at other times, the man-made produces through poetic imagination and story-telling sciences the structure and cosmos of the natural. We imagine the limits of science and myth are fairly defined and clear, but at all times we actually have to carefully draw out the myths within science, and the science of wonder and imagination within myths. As objects within human culture, especially architecture, actualise and realise these human anxieties within material constructions and the ideas of form and texture – the man-made is constantly producing a world of myth as well as reality. The crossroads and confluences are necessary for human civilisation to shape and further its ideas of knowledge and human production; but the differences are equally important to know. Architecture and design are sites of rich confluences and it is necessary to celebrate these as much as it is necessary to remember the individual structures and roles of each – myths and sciences, realities and fantasies, as they shape our culture and bolus of experiences.

This issue builds an encounter with the shape and functioning of visual culture in human history and society; and it does this employing the 'image' itself. The photos by Karl Blossfeldt featured here were imagined to be specimens for educational purpose – teaching students of arts and craft to understand the form and geometry 'inherent' in nature. Today, they are testimonials to the thinking of modern human societies. The photographic technique employed to render natural forms as geometric structures is telling of how the relationship between the natural and the man-made, or form and ornamental rendering are structured within a broader civilisational discourse of our understanding of reality and the projection of an imagined reality. These images also hint towards the techniques designers and architects developed around the 18th and 19th century of designing through projection drawings, where a certain flattening of form or neutralising structure is inherent to the formats of representation and drawings for construction. On another note, the photos by Jyoti Bhatt produce the world of humans as they render it natural to environment and their understanding of everyday life and experience. At one point, these images can be read as documentary, or misunderstood as ethnographic, but these images focus surely beyond the systems of data collection and classificatory analysis. The images of Bhatt focus on the idea of human labour and human intervention in the everyday world. Artistic production, as ritual or for decorative purposes, is a way in which humans transition their intervention into the natural world. These socio-cultural activities such as painting and decorating built forms, animals, and human beings is a way in which the man-made redraws, or maybe even freshly produces the natural world. The production of images on walls, or hide and skin, is a translation of the experiential space into collective and shared space of everyday life; in the process the natural is stylised, but yet again in the process a new-natural is invented and introduced into human civilisation.

In these issues, one concern remains Time – how do we read time in the act of photo- or image-making? Blossfeldt renders Time null and void in his technique, making the images appear universal and beyond or even free from Time. But in their flatness, and manufacture/production of details through enlargement and other techniques, there is the phantasmagorical reading/interpretation of life in the modern world too. Bhatt's photos are reminders of 'time past, and time present' – they are in themselves living within a specific time. We often make the mistake of reading images such as the photos of Bhatt as also capturing a 'timeless tradition' – as if the images have now captured that which is anyway beyond or again, free of time – also unchanged, or never-changing. However, as Bhatt points out, it is work in the way K G Subramanyan defines as 'living traditions' – the fact that human cultures process and make their traditions at all time continuously – maybe changing them, maybe even renewing them.

The other two photoessays by Y D Pitkar and Hemangi Kadu bring forth for us the way human creativity reproduces the physical, natural, and man-made world constantly through architecture and design. The mythic and human, the real and phantasmagorical are enacted through sculpture and architecture; form is textured not just through carving material surfaces and manipulation of light and shadows – but form is textured through story-telling and visual repertoires. The geometry of form is only a super-structure that contains the stuff of life in the details of patterns, scenes from popular epics, and sharply sculpted human bodies interacting with the world of philosophy (looking in the mirror, erotic, and so on) or the human (looking in the mirror, erotic, and so on).

In the feature on two proposed projects by architect Sen Kapadia – one of India's most thoughtful and intense architects – the thinking is around the question of form and place-making. Place is a notion of an environ that allows for human activities to take place in amicable and productive ways, producing a kind of sociality, and not just production as work-output. The discussions on geometry and form, monumentality and the difference between space and place are important, not as timeless arguments, but precisely as contextualised arguments within different time-frames. The idea of architecture is time-bound itself. Its nature is different for different historical locations; but then, how does a studio, an architect, locate his values and ideas within different epoch and changing values? The two projects share a common ground – a concern towards place-making, but their approaches speak of new imaginations of geometry and form, yet the design ethos, the primary concern remains in continuation. This exercise is extremely important in our times, when values and primary ideas change so fast that a single life-span may witness two or even three paradigmatic shifts in professional and subject development.

The concern with changing times and changing buildings continues with three projects in this issue – all of which deal with reworking of older buildings towards a newer use. As said before, every conservation project, every building that undergoes adaptive reuse is always a new building in a new ethos. It is indeed important to shape well the transition or preservation, but the value of conservation itself is a contemporary value. Design, once again here, struggles between science and myths – the science of history, the science of construction and architectural materiality, the science of decay, as well as the myth of time and past, the myth of unchanging values, the myth of design and aesthetic taste.

These struggles are important as they should essentially help us rise above the cliched and stereotypical arguments, the safe and chewed (pre-digested) discussions around some of the issues that this edition of *Domus India* brings forth. To recognise certain nuances, read many layers from the cluster at hand, to challenge set notions, is the essential task of a magazine, clarifying critically the shape and going-ons in the profession. **km**

CONFETTI

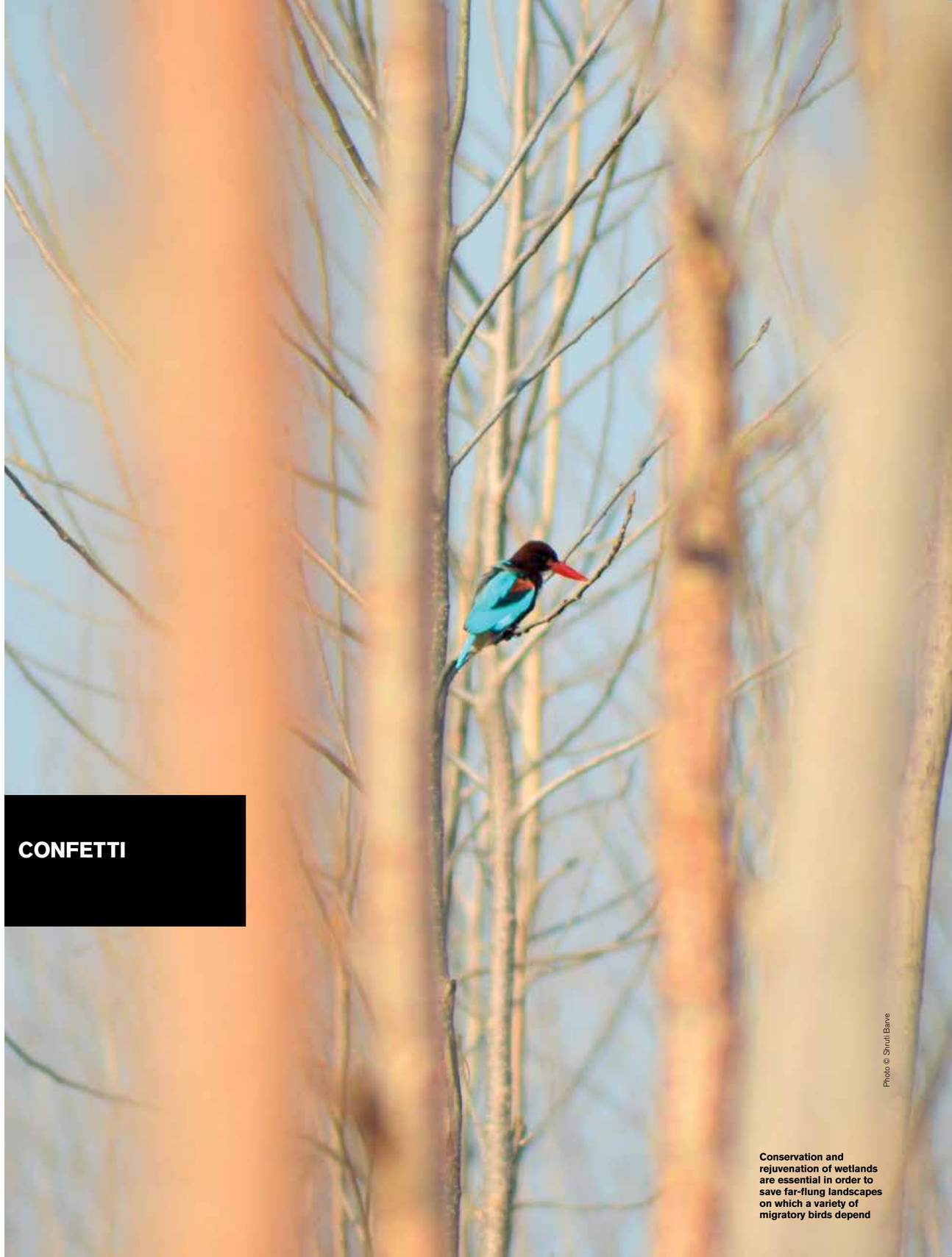


Photo © Shruti Barve

Conservation and rejuvenation of wetlands are essential in order to save far-flung landscapes on which a variety of migratory birds depend

TALKING DESIGN

IT'S NOT ABOUT THE MUD

This study addresses the use of locally available materials like mud, bamboo, and stone, with labour-intensive building techniques and community-based craftsmanship in a swiftly globalising and homogenising rural India, stating examples from across the country pointing out the unique ways in which building techniques are adapted to make them more contextually relevant

Siddharth Menon

The subcontinent of India has a diverse history and tradition of building with indigenous materials, especially mud. Mud has been the staple material of choice of the indigenous people for centuries owing to its abundance, simplicity, and economics of use. Various techniques of using this material have been developed over the years. These techniques vary from region to region depending on the properties of mud, climatic considerations, and socio-cultural patterns. One has to travel no more than a 100 km outside any major urban centre to experience the use of this material.

Not all mud is of building quality. The top soil is never used for building as it contains decaying organic matter which is ideal for farming. Thereafter, the four main constituents of mud are gravel, sand, silt and clay (descending order in terms of size) and these are found in all mud samples in varying proportions. This variation is often found in samples from the same site not more than 50' apart! This scale of diversity and lack of standardisation has led to the exclusion of this material from scientific and engineering studies and is referred to as a material of the poor or 'vernacular'. Traditionally, mud has had limitations in terms of poor compressive strength dictating the height one could build to and excessive damage due to rain.

But by ingeniously using it in conjunction with other native materials, some of these limitations were overcome.

Unfortunately today, it's easy to get stuck within the boundaries of these technicalities. Techniques of mud are being propagated with a standard boutique-approach across various contexts without actually understanding its true essence.

We need to try to move beyond the material and start absorbing its economic, socio-cultural, and political implications, apart from its ecological benefits alone.

Over the past one and half years, I have had the opportunity to travel across different geographic and cultural regions of India as an interdependent travelling architect. What I experienced was a rich cultural legacy of building with different indigenous materials, especially mud, and its links with the rural economy, socio-political structure, climate, and availability of materials. Although there were differences with climate, materials, and culture, a common thread connected all these regions together. This thread is the principle of building with common sense, of using what you have in the most economical and creative way possible in your climatic context to produce an aesthetic of scarcity, necessity, and frugality.

These are important lessons to be imbibed in today's day and age of base extravagance and excessive consumption. This generation of architects and designers could be at a unique precipice where we could lose these rich building traditions and systems to the marauding forces of globalisation and capitalism. The need of the hour is carefully understand these systems and try to take them forward if necessary, into the new millennium. This article is a step in this direction. ◉

DISTRICT KASGANJ, WESTERN UTTAR PRADESH

Latitude
27.48N
Longitude
78.42E
Height Above Mean Sea Level
177 m
Average Annual Rainfall
694.9 mm
No. of Precipitation Days
66
Max. Summer Temperature
42-43 degree Celsius
Min. Winter Temperature
3-4 degree Celsius
Primary Materials Used
Adobe (sun dried mud brick), Baked Brick, Mud Mortar, Slaked Lime, Red Sandstone Slabs, Sarkandi (Reed) Thatch, Neem Wood
Language of the Indigenous Builders
Hindi, Urdu

Opposite page: cob walls over laterite stone foundation. This page (clockwise from far top left): adobe wall with alcoves and niches to maximise space; adobe wall section showing 27' wall thickness; flat roof of Neem wood beam, joists and batons; house with south-facing lean to verandah made of sarkandi reed; adobe walls with lime plaster

The vast fertile plains of the Ganges have harboured countless dynasties in history. The clayey fertile soil is ideal for the production and use of 'adobe' or sun dried bricks. Cheap, abundant and easy to make, these have been the answer to the housing needs of the masses in this region for generations. The baked brick, with its superior compressive strength and imperviousness to moisture, is certainly a more refined material, but its costs are a hindrance, being more than 4 times as expensive as its unbaked cousin. It is used sparingly, only in elements of building construction where you need their advantages – the foundation and verandahs.

There are two advantages to this. Firstly, the baking of bricks involves the burning of huge amounts of non-renewable fossil fuel like coal and firewood, especially in large-scale kilns, leading to environmental destruction and degradation. Secondly, adobe is poor compressively and hence one builds thicker walls to compensate for the same. These thick walls act like a heat battery, slowly absorbing the heat during the day and releasing it into the interiors during the night. This provides adequate relief from the peak summer and winter temperatures.

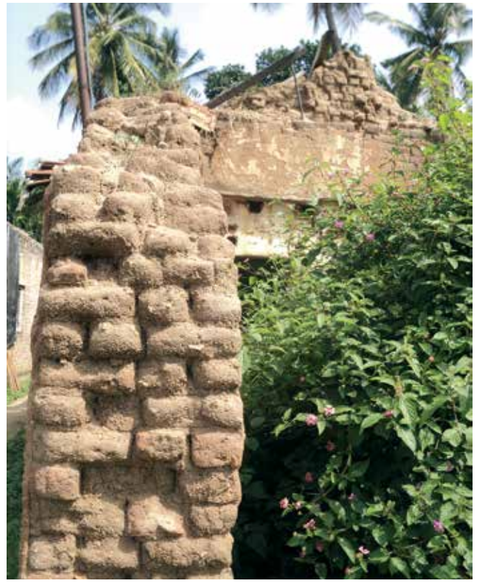
This region receives 694.9 mm of rainfall annually (Agricultural Contingency Plan for District Kasganj, 2014) compared to the National average of 1183 mm (GOI Ministry of Statistics and Programme Implementation). This is reflected in the indigenous architecture of the region with use of flat roofs made of Neem beams, joists, and batons. It is topped with a mud-lime screed, gently sloped to handle the rain water runoff. Only verandahs have a lean to pitched roof made of sarkandi thatch which is grass that grows in water beds and lakes and is harvested every summer.

The size of the adobe is a standard 9"x4.5"x4.5" and wall thicknesses vary from 18" to 27". As built space is at a premium, alcoves and niches created in the thick walls are used to store items and light diyas at night. Walls are plastered with a mud and cow dung mix or whitewashed with slaked lime slurry. This extra layer protects the external walls from the S-W monsoons rains.

DISTRICT TUMKUR, KARNATAKA

This page, left: abundance of good quality granite stone. Below (from left): adobe wall section showing 18' thickness; adobe Walls with 1.5' mud plaster; adobe walls with granite corner stone for adequate distribution of load and breaking of vertical joints. Far below right: adobe walls over 3' high impervious granite stone walls

Latitude
13.34N
Longitude
77.10E
Height Above Mean Sea Level
894.6 m
Average Annual Rainfall
698.5 mm
No. of Precipitation Days
39
Max. Summer Temperature
34-35 degree Celsius
Min. Winter Temperature
16-17 degree Celsius
Primary Materials Used
Adobe (sun dried mud brick), Granite Stone, Mud Mortar, Areca Nut Trunks, Coconut Palm Trunk, Granite Slabs, Granite Pillars, Bamboo, Coconut Leaves Thatch, Kadappa Stone slabs
Language of the Indigenous Builders
Kannada



The Tumkur district of Karnataka lies on the leeward side of the Western Ghats due to which its average annual rainfall is much lesser than Udupi although they both are on the same latitude. The material of choice of the indigenous people has been adobe, made of mud, sand, rice straw, the latter being added to act as fibrous reinforcement to prevent excessive cracking when dried. Like Uttar Pradesh, the size of the brick is 9"x4.5"x3" and wall thicknesses do exceed 18". These houses are generally only ground-floor high.
Good quality granite stone is readily available. Due to its impervious nature and strength, they are used in the foundations along with mud mortar. Above the ground the stones are dressed by skilled masons and raised to height of 3' on the exterior walls. This is done to protect the adobe walls from the splash back of the rain. Thereafter the adobe walls continue to the eaves level of the roof. Granite corner stones are used in the adobe wall section to distribute the load over a larger cross section area and break vertical joints, if any.
Roofs are pitched with bamboo, areca nut and coconut palm wood rafters and beams. The roofing material traditionally was coconut leaves thatch. This has given way now to the omnipresent Mangalore tile due to superior strength and lack of maintenance. Shahbad stone slabs are used as 1.5' long overhangs at the eaves level to protect the exterior mud walls from the rain.
A 1.5" coat of exterior plaster is provided on the external walls to protect them from the rain. As the mud is not stabilised with any chemical stabilisers, this protection is very essential. This plaster needs to redone every few weeks to months depending on its wear and tear. Generally these processes are weaved into the community culture with festivals or child birth offering reasons for the community/ family to plaster and lime wash their walls.

DISTRICT BIRBHUM, WEST BENGAL

This page, left: a Santhal house with tar render upto 3' height. Below left: artistic mud relief work on walls. Below: rice paddy straw thatch; detail of joinery between Mahua wood ridge and bamboo rafters; mud from termite mound used for plaster of walls

Latitude
23.91N
Longitude
87.53E
Height Above Mean Sea Level
54 m
Average Annual Rainfall
1572.9 mm
No. of Precipitation Days
68
Max. Summer Temperature
38-39 degree Celsius
Min. Winter Temperature
25-26 degree Celsius
Primary Materials Used
Cob (mud balls), Laterite Stone, Bamboo, Mahua Tree Wood, Bitumen, Rice Straw Thatch, Termite mound mud, Reed
Language of the Indigenous Builders
Santali, Bengali

The Santhal tribals are the natives of the Birbhum district of West Bengal and they are expert cob builders. They are the third largest tribe in India and reside in parts of West Bengal, Bihar, Odisha, Jharkhand and Assam as well.
Santhal houses are generally G+1 with the cob walls rising to 18' in height. Red laterite stone found in this region is used in the foundation and plinth as it stronger and more impervious to water than mud.
These are not dressed. Thereafter cob walls start and their thickness ranges from 18" to 24". All houses have an upper storey or attic which is used for sleeping, etc. This is made using bamboo and Mahua tree trunk, topped by bundles of reed and a 3" mud layer which forms the top of the floor. Windows and openings are generally small. Staircases are made with bamboo and mud to form the profile.
Pitched roofs of a steep 45-degree pitch are extensively found here and it is dictated by the limitations of the roofing material – rice paddy straw thatch. Any lesser slope would not have been able to handle the rain. Even though some families have switched over to Corrugate GI sheets, the steep pitch is still continued. Roof structure is made with bamboo and the Mahua trees. These are either tied together or nailed.
External walls are rendered with bitumen or tar only up to a certain height. Bitumen is a very good waterproofing layer and this is exploited beautifully by the Santhals. Further up, external walls are lime washed and this process is in sync with socio-cultural customs and practices. The Santhal are very artistic in their expressions and this is evident in some of the mud relief work that they do on their walls.

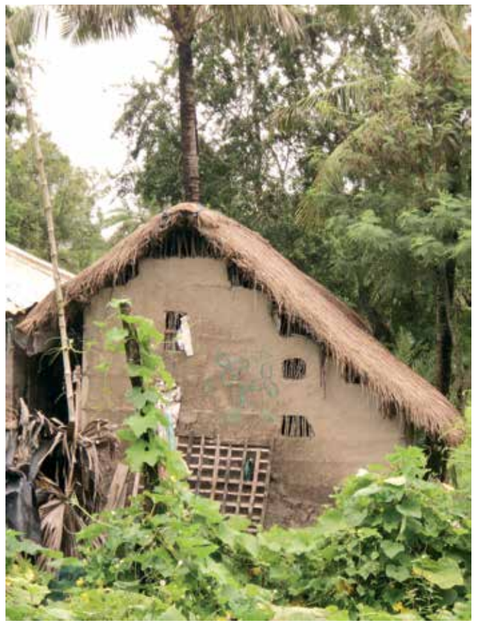
SUNDARBANS, DISTRICT NORTH 24 PARAGANAS, WEST BENGAL

This page, left: at work on the mud embankment. Below left: an indigenous bamboo bridge. Below right: wattle made of branches of the Sundri tree

Latitude
22.13N
Longitude
88.5E
Height Above Mean Sea Level
0-5 m
Average Annual Rainfall
1559.8 mm
No. of Normal Rainy Days
65
Max. Summer Temperature
32-33 degree Celsius
Min. Winter Temperature
24-26 degree Celsius
Primary Materials Used
Wattle and Daub (mud plaster on wood/ bamboo frame), Mud, Sundri Tree Wood, Rice Straw Thatch, Bamboo, Jungle wood
Language
Bengali

The Sundarbans delta is one of the richest ecosystems in the world. The region contains arguably the world's largest remaining area of mangroves, and is known for its exceptional biodiversity, including numerous threatened species such as the Bengal tiger and several species of river dolphin. It was accorded status of World Heritage Site by UNESCO in 1987.
This rich forest does not have a long history of inhabitation. In the early nineteenth century, the British East India Company leased out land to the Zamindars to harvest and clear out the forest, who in turn hired people from other parts of the state, including indigenous tribals, to carry out this task. These people cultivated the cleared land and became the first settlers of this region.
Ever since then, the preferred technique of building here is Wattle and Daub. Not a load-bearing form of construction, this framed structure uses pillars and posts made of bamboo or trunks of the Sundri tree. Within these frames is a complex mesh of bamboo strip or Sundri tree branches which are weaved together to form a porous membrane with air gaps in between them. A 1.5"-2" coat of mud plaster is applied on both sides of the wall thus forming a thin porous breathing wall. This works extremely well in the hot and humid climate here as the air circulation through the house enables cooling through evaporation of perspiration. Openings for doors and windows are left unplastered.
Steep pitched roofs of bamboo are found here. Rice paddy straw thatch is the prevalent roofing material and the steep 45-degree pitch takes care of the water runoff. The bamboo rafters and trusses are connected to the vertical posts and the load is carried down to the ground through them. Due to the non-availability of a strong impervious material, foundations and plinth are made of mud. Foundations are kept high, around 3'-4' to account for periodic flooding that occurs here.
In many parts of the Sundarbans, the sea level is higher than the land level and there is an extensive set of mud and brick embankments to protect the land from the sea. This, combined with periodic cyclones, floods and torrential downpour, makes this a very intimidating place for human habitation.

This page, left: pre-cast RCC posts for the house frame anchored in mud. Below left: rice paddy straw thatch. Below right: periodic flooding causing erosion and damage to mud plinth. Far below right: a typical Wattle and Daub house



DISTRICT MEDAK, TELANGANA

This page (clockwise from far left): cob mud balls being prepared from the loamy mix; cob balls being thrown up to the master mason; Neem wood roof truss with moving joints; intermediate roof of Neem wood beam, joists and batons

The Medak district of Telangana, the newly formed state, is a study in contrast. Located in the Deccan Plateau region of the Indian Subcontinent at an altitude of 442m AMSL, this region is characterised by hot and dry summers and moderately cold winters. The prevalent building construction technique here is that of cob – balls of semi-wet, stiff mud slapped on and massaged together to form load-bearing walls. These walls vary in thickness from 18" to 24" and can rise up to 20' in height if built well. Good quality granite stone is available in this region. Due to its superior compressive strength and impervious nature, they are dressed by a mason and used in the foundation, plinth, and external walls upto the cill level using mud mortar. This is done to protect the external mud walls from the splashback of the rain. Stone chips are used in the cobbing process to prevent excessive cracking due to drying. Neem trees are part of courtyards of houses here and are woven into community culture due to medicinal values. Door and window frames and shutters are made of this wood. The availability of wood had a given encouragement to tradition of refined wood craftsmen. This can be extrapolated from the intricate wood work that is found in some of the upper caste houses here. Unfortunately, with migration to cities and their eventual loss of skill, these skills are slowly dying.
Two-floored houses have a system of Neem beams, joists and batons forming the intermediate floor. This is topped by a 3" layer of mud which forms the floor of the room above. Window sizes are small owing to the limitation of the spanning materials and the use of the space, as most day time is spent outdoors in manual labour.
Annual average rainfall here is 922 mm, which is more than UP. This change is reflected in the pitched roofs of this region. They are made of an intricate system of Neem wood trusses, rafters and batons and inclined at an angle of 23 degrees. The closely spaced batons provide an almost impervious surface on which is topped a stiff mixture of mud, 3"-5" thick. This section of mud has two purposes- to hold the semi-circular hollow clay tiles that come over them and to provide an extra layer of insulation from the intense summer sun.
Niches and alcoves are provided in the walls for storage. External walls are whitewashed with lime. In some cases you see continuous horizontal bands in the walls. This showcases the height of each course of cob done in a day, so that the wall dries and does not collapse under its own wet weight. Neem leaves are mixed into the cob mix as it is believed to act as a deterrent to termites. Shahbad stone slabs are used to provide a 1.5' overhang at the eaves level of the roof to protect the walls from the rain.

Latitude
17.73N
Longitude
78.17E
Height Above Mean Sea Level
442 m
Average Annual Rainfall
922 mm
No. of Precipitation Days
52
Max. Summer Temperature
46-47 degree Celsius
Min. Winter Temperature
6-8 degree Celsius
Primary Materials Used
Cob (mud balls), Granite stone, Mud mortar, Neem wood, Semicircular Hollow Clay Tiles, Slaked Lime, Shahbad Stone Slabs, Kadappa Stone Slabs, Neem Leaves
Language of the Indigenous Builders
Telugu, Urdu, Hindi

This page, top: a typical Medak house with cob walls over 3' granite stone walls. Left: intricately carved Neem wood brackets. Below left: play of the roof scapes of hollow interlocking clay tiles. Below right: a G+1 cob house showing horizontal bands