Applying the Lessons of Indian Vernacular Architecture: The Bungalow as Example of Adaptive Climatic Response

Kimberly Kramer
Martin Centre, University of Cambridge, Cambridge, United Kingdom

ABSTRACT: As Britain’s political influence in India grew and spread in the middle of the 18th century, so too did its settlements. Faced with the challenge of building comfortable and affordable dwellings in a climate very different from their own, the British settlers took many of their cues from traditional local architecture. The building form that resulted, commonly known as the bungalow, incorporated many traditional Indian strategies for improving climatic response. Built from natural local materials, it utilised vernacular solutions to the challenges of maximising natural ventilation and shade for environmental comfort and providing protection from the heavy monsoon rains. This essay examines the environmental design and climatic response principles of traditional Indian architecture, and the application and adaptation of these principles in the creation of a modern dwelling built to meet European expectations of both form and comfort.

Keywords: climatic response, traditional architecture

1. INTRODUCTION

Britain’s official involvement in India began as a purely mercantile concern, with the founding of the East India Company in 1600 to challenge the century-long Portuguese monopoly of the spice trade. France, Sweden, Denmark and the Netherlands also entered the Asian spice market around this time, each establishing trading posts in India. Until the middle of the 18th century, the extent of European control was limited to small trading settlements along the coasts, but a series of battles between 1757 and 1764 expanded the area of European control considerably and marked the beginning of Britain’s political, commercial and military hegemony in India. By 1818, the British conquest of India was effectively complete and the interior of India, previously largely closed to Europeans, was opened to the military and administrative armies of the British Empire.

The political shift in the mid-18th century created a shift in British settlement patterns as well. As their settlements grew and spread into the interior, British settlers were faced with the challenge of building comfortable and affordable dwellings in a climate very different from their own. Taking many of their cues from traditional local architecture, the settlers developed a new building form. Commonly known as the bungalow, it incorporated and adapted many traditional Indian strategies for improving climatic response to create a dwelling built to meet European expectations of both form and comfort.

2. ORIGINS

2.1 Early British Settlement in India

The first British citizens in India were merchants rather than settlers. Until the mid-18th century, most Britons spent a brief career in India living in the East India Company’s fortified ‘factories’ on the edges of the country. These factories were in an urban setting, either inside newly constructed forts, for security purposes, or in converted native buildings. (Figure 1) They were fortified compounds containing accommodations, offices and storehouses, which have been described as ‘the commercial counterpart of a University college,’ where ‘even the chiefs were rarely accompanied by their wives, and the others were not expected to marry...Meals were taken in common...there were daily prayers, and the gates were closed at stated hours.’[1]

Figure 1: Factory of the East India Company, 17th century [i]

The other main British presence in India before the mid-18th century was the military, which had a similar settlement pattern of small defensible compounds and communal life. Like their merchant counterparts, the soldiers adopted ready-made shelter when possible, generally in the form of canvas
service tents carried from Britain. (Figure 2) When
they did build, they built primarily for security.

Figure 2: British army service tents in India [ii]

After the military victories in the middle of the 18th
century, the British in India began to look beyond the
goal of commercial exploitation to the possibility of
settlement and control.[2] As British power in India
continued to grow, settlers began to emerge from the
relative safety of the factory and military camp to
settle the interior of the country.

This expansion created a need for a new building
pattern. Neither the factory nor the military camp
provided a suitable model for independent settlement
at such a large scale. Designed for security and
intended only for temporary housing, they also made
few concessions to environmental comfort in the
harsh Indian climate. The new settlers would have to
look elsewhere for an appropriate housing model as
they began to settle the interior of India.

2.2 Climatic Conditions

The first large expansion of British settlement in
the mid-18th century was centred in Bengal, an area
on the east coast of India, stretching to the north and
west of Calcutta. As they moved from the relative
comfort of the coast into the interior of Bengal, the
British settlers encountered a climate very different
from their own. One Englishman who experienced the
difference firsthand in the early 1800s wrote
"Were I disposed to pursue a contrast between the
climate of Bengal and that of England; it would be
easy to turn the scale on either side."[3]

While the English climate is temperate, that of
Bengal is tropical. The plains that make up most of the
southern region are hot and humid all year except for
the short winter season. The temperature in the
hills and mountains in the north is cooler, but the
humidity is still high. The hot season lasts from
March to early June, with daytime temperatures
ranging from 35 to 45 degrees Celsius across the
region. The monsoon arrives in mid-June and lasts
through September. Autumn is mild, and lasts until
mid-November, when winter sets in. Winter on the
plains is also mild, with minimum temperatures rarely
dropping below 15°C. Rainfall is rare in winter,
averaging only 0.1 inches (2.54 mm) in December
compared to 13 inches (330 mm) in August. The
humidity is thus substantially reduced, making winter
a very pleasant season on the plains. The cold
season lasts for about three months, and is followed
by a brief month-long mild spring season. Summer
heat arrives again in mid-March.[4]

2.3 Vernacular Influences

The architectural and climatic adaptations that the
British had developed for their own temperate climate
were not applicable in this new environment. The
traditional English country house or cottage model
was inappropriate in a number of ways. An English
house was generally built as a tightly closed box to
minimize drafts wherever possible. This was sensible
in a cold climate, but not appropriate in a hot, humid
climate where a bit of breeze is quite valuable in
enhancing the cooling effect of evaporation. The
traditional band of large South-facing windows which,
in England, allowed valuable warmth from the sun to
gather in the cooler months, would also have been
wholly inappropriate in the hot and relentlessly sunny
Indian climate where the sun's penetration must be
tightly controlled.

The earliest British settlers in India, concerned
with trade and security rather than long-term
settlement, had not developed an environmentally
appropriate building model for the Indian climate. Even
the canvas service tents of the military, though
similar in form to the simple thatched huts of the local
population, were not wholly appropriate. Without
the shading of a thick thatch roof, the inside temperature
rose quickly. The memoirs of one traveller who went
to India in 1765 record that '...in the soldiers' tents,
composed only of a single canvas, Farenheit's [sic]
thermometer often rose to 116 degrees [47°C]...This
exceeded every thing I had before experienced, and
had it continued long no European constitution could
have supported it.'[5]

As the British settlers moved out of the factories
and military camps to settle the interior of the country,
they sought a form of affordable and reasonably
comfortable dwelling that could be built with the
abundant local labour. The factory model was no
longer appropriate, and because the settlers were
dependent on local labour outside of the cities, much
of the form was adopted from the local vernacular
tradition.

The traditional Bengali dwelling provided a model
for the British bungalow designs which developed.
Travellers' accounts provide a fairly consistent
account of these buildings, which are generally
referred to as 'bangla' (or 'banggolo'). The bangla
was a thatched hut, generally built with a distinctively
curved roof. The walls were generally made of mud.
Where the mud was not suitable for this purpose,
walls were constructed of bunches of straw or mats,
tied to each other and to the bamboo frame to form
walls. Where straw was used, it was often plastered
with cow dung and clay.[6]

The frame of a bangla was typically constructed
entirely of bamboo, though wood posts and beams
were occasionally used in the houses of the very
wealthy. The thatched roof generally extended
beyond the walls to provide additional shelter from the
rains and one side of the roof was often extended four
or five feet beyond the wall and supported by a row of
bamboo poles to create a small veranda, sometimes
used as a shop. Contemporary accounts and images
give no indication of a consistent orientation for this
veranda.
The window of this dwelling is shaded by a jhangp which has been propped open. In many banglas, the door was the only opening, 'crevices excepted'. In the houses of the very wealthy, this opening might be covered by a wooden door which folded from the side. In most cases, however, it was shut by a hurdle (jhangp) which was tied to the upper part of the door and either propped open or left down to shut the door. Windows, when present, were shaded in the same way. (Figure 3)

Floors were made of mud and were generally raised a foot or two above the ground to provide some protection from flooding.

In describing these native dwellings, Francis Buchanan, a European traveller, wrote in 1810, 'The style of private edifice that is proper and peculiar to Bengal, consists of a hut with a pent roof constructed of two sloping sides which meet in a ridge forming the segment of a circle so that it has a resemblance to a boat when overturned...This kind of hut, it is said, from being peculiar to Bengal, is called by the native Banggolo...Where the materials admit, the walls of the hut are made of mud and the floor is always raised a foot or two above the level of the plain, but not always so high as to be above water in the rainy season; so that a platform of bamboos is then constructed at one end of the hut and upon this the family sit and sleep while they must wade through the mud to reach the door.'

Buchanan’s account is supported by contemporary drawings by George Chinnery and by later photographs, which show both the distinctive roof shape and the gallery extending to one side. (Figures 4 & 5)

There appear to have been three main variations in the shape of the thatched roof among the native huts, leading some historians to divide them into 3 different types of structures. The most common was the distinctively curved roof, often illustrated in travellers’ accounts and drawings. There does not seem to have been a significant climatic advantage to this shape, though the lack of ridges at the joints of each slope, may have made it slightly less vulnerable to leaking in the rainy season. In some dwellings, the roof had a simpler shape, with four sloped faces joining at the apex to form a pyramid. Where the sides were not of even length, the longer sides of the roof would join to form a ridge line. The third form was similar to the second, but the roof was divided into two sections with a clerestory between for light and ventilation. This last form represents a clear advantage in a hot humid climate, where breeze is at a premium and indirect daylighting is ideal. However, it seems to have been common only among the rich.
3. FORM AND CLIMATIC RESPONSE

The traditional Bengali hut, and the climatic adaptations that it embodied, provided the model for the British bungalow, the main housing form in the expansion of the British settlements. The main characteristics of the European bungalow in India were the pitched thatched roof, the veranda, the raised base platform, and the free-standing single-storey structure. (Figure 7) The British also seem to have adopted the custom of keeping multiple small buildings rather than one large one. The general adoption of these features is confirmed by contemporary accounts. Two particularly useful accounts are those of two Englishmen written at the end of the 18th and the beginning of the 19th century, when the English bungalow came into being as a distinct architectural form. In these accounts, the Englishmen struggle to relate the form to something familiar to the home audience, comparing it to both the military service tent and the English cottage. In 1803, a young army officer, Henry Roberdeau, wrote: ‘The Englishmen live in what are really stationary tents which have run aground on low brick platforms. They are ‘Bungalows’, a word I know not how to render unless by a Cottage. These are always thatched with straw on the roof and the walls are sometimes of bricks and often of mats. Some have glass windows besides the Venetians but this is not very common…To hide the sloping roof we put up a kind of artificial ceiling made of white cloth…There are curtains over the doorway to keep out the wind…I have two Bungalows near to each other, in one I sleep and dress and in the other, sit and eat.’[17]

The Europeans seem to have adopted almost universally the simple or elongated pyramidal roof, sometimes with clerestory. The ventilation effects of the clerestory may have been impaired somewhat by the white cloth which was generally hung to make what Roberdeau calls an ‘artificial ceiling’. Different accounts note different reasons for this innovation, from improving appearance and protecting from dirt and bugs falling from the thatch to improving the acoustics for musical performances.[18]

Because of the problems of white ants and warping, as well as the echoing of footsteps where ‘menials…are ever moving about’[19], Europeans eschewed the wood board floors that they were familiar with for the traditional Bengali mud floor, raised on a mud-brick platform to prevent flooding in the monsoon season.

The British settlers expanded the traditional veranda to encircle the house, often semi-enclosing it with permeable mat or brick walls to increase privacy and shade while preserving breezes.[20] To control the sun, the British adopted the Indian use of jhangps rolled shades (‘tatties’), or Venetians to shade both windows and verandas.

Figure 7: Early form of Englishman’s Bungalow [vii]

The corners of the veranda were often partitioned off as separate rooms for bathing or sleeping, thus providing for British notions of privacy while preserving air flow around and through each room. (Figure 8) This basic form later developed and became more complex, though the size and complexity of the floor plan was limited by the necessity of maintaining airflow around and through each room. (Figure 9) Even large estates were generally composed of a moderately-sized great house and a number of smaller bungalows used to accommodate guests and for other household functions.

Figure 8: Bungalow plan with partitioned corners [viii]

3.2 Limitations

Despite the advantages of climatically-appropriate dwellings, British settlers continued to struggle to adapt to the tropical climate of Bengal. This was, in large part, due to a general reluctance to change their behaviour to suit the demands of the climate. English settlers and military men continued to take large, heavy lunches and to walk out in the noon sun, when the locals stayed inside. One naval surgeon lamented that Europeans often injured themselves in India ‘from a kind of false bravado, and the exhibition of a generous contempt for what they reckon the luxurious and effeminate practices of the country…Perhaps they will not even carry an umbrella to screen them from the rays of the sun, but will ramble about, and take their former exercise in

Figure 9: Developed bungalow forms [ix]

Each room opens onto a veranda on at least two sides to take advantage of the cooled air and to allow access to any available breeze.
the heat of the day, till some climate sickness is
brought on, and teaches them...to distinguish
between what the inhabitants of the country have
learned from experience...and their own erroneous
and rash conjectures.'[21]

To encourage more rational behaviour, Company
servant James Forbes composed a short poem to
prepare the youth of England for their encounter with
the East. The last two stanzas read:
Observe the Hindoo, whose untutor’d mind,
All false seductive luxury declines;
To Nature’s wants his wishes are confined,
While Health her empire o’er his frame maintains.
His modes of life, by ancient sages plan’d,
To suit the temper of his burning skies,
He, who the climate’s rage would long withstand,
Will wisely imitate, nor e’er despise!”[22]

The British also forced upon themselves the
disadvantage of inappropriate dress. (Figure 10)
Formal European dress was required of military and
civil servants on most public occasions. Though
some relaxed their customs with time, the increasing
number of British citizens in India and the resultant
formalization of British life there through the end of
the 18th and into the 19th century only reinforced the
problem. In 1836, James Johnson, in his treatise on
the Economy of Health, commented on the continuing
problem of climatically inappropriate dress. 'The
necessity which tyrant custom – perhaps policy, has
imposed upon us, of continuing to appear in
European dress – particularly uniform, on almost all
public occasions...under a burning sky, is not one of
the least miseries of a tropical life! It is true, that this
ceremony is often waved, in the more social circles
that gather round the supper-table, where the light,
cool, and elegant vesture of the East supersedes the
cumbrous garb of northern climates. It is certainly
laughable, or rather pitiable enough, to behold, for
some time after each fresh importation from Europe,
a number of griflinish sticklers for decorum, whom no
persons can induce to cast their exuviae, even in the
most affable company, pinioned, as it were, in their
stiff habiliments, while the streams of perspiration that
issue from every pore, and ooze through various
angles of their dress, might almost incline us to fear
that they were on the point of realizing Hamlet’s wish;
and that, in good earnest, their “Solid flesh would melt
– Thaw, and resolve itself into a dew!”.[23]

Because their habits of behaviour and
expectations of thermal comfort remained largely
unchanged when faced with the realities of the
Bengali climate, maintaining thermal comfort for the
British settlers became a very labour-intensive
process, powered by abundant and cheap local
labour. (Figure 11) During hot periods, servants
would splash the ‘tatties’ with water to cool the
breezes that passed through them and into the
house.[24] Servants were also utilized to operate
punkahs, heavy cloths hung from the ceiling and
attached to a rope, which a servant pulled to wave the
cloth and create a breeze. (Figure 12)

Figure 10: The Rev. J.F. Cole’s Bungalow [x]
A large bungalow with clerestory, shaded veranda, open
park and a number of servants. Note the dark, heavy dress
of the Reverend’s wife, in the left foreground.

Figure 11: Abundant local labour [xi]
English households in India typically employed a large
domestic staff, in this case nineteen servants, who were
responsible for the labour-intensive process of maintaining
thermal comfort.

Figure 12: Labour-intensive thermal control [xii]
One servant operates a punkah while another brings a
change of clothes.

One cultural importation was well-applied in the
Indian context. During the hot summer months, when
even the punkah was insufficient to maintain an
acceptable comfort level, the British settlers in Bengal
simply left the heat of the plains and took refuge in
the relative cool of the hills to the north. Many settlers
maintained a second home in the hills and the change
of climate was thought to be so beneficial to health
that the ‘government very liberally built a number of
small bungalows in airy situations around it, for the
accommodation, gratis, of any of their civil or military
servants who might come...for their health.’[25]
Figure 13: Bungalow as hill station and second home

5. CONCLUSION

The case of the British settlers in India seems to present an interesting contradiction: in spite of the climatic adaptations adopted from the local vernacular architectural tradition, a well-designed building was able to make up only some of the difference between European expectations of thermal comfort and the realities of the Bengali climate. Still, the British settlers were unwilling to change their daily behavioural patterns to suit the climate as they had their houses. Why would a group of settlers so quick to adopt a new form of dwelling be so reticent to change their patterns of exercise and dress for similar advantages?

The answer may be that the development of the European bungalow as a dwelling form was not a choice, but a compromise resulting from circumstances on the ground. The British citizens who settled India were not ‘settlers’ in the true sense of the word. They were generally merchants, officers and diplomats who simply found themselves in need of a house. Unlike early emigrants in North America, Australia or South Africa, who built their new dwellings with their own hands according to the cultural models in their heads[26], the British citizens who spread across Bengal had access to ready and cheap native labour. Even the common soldier had servants of his own. The British ‘settlers’ focused on their own civil or military roles in the expanding British government in India, and depended on local labour for the construction of their dwellings. Though they may have had a different form in mind, the execution of the design was in the hands of the native labour force and the result was often very much a native product. King notes that ‘The persistence of Indian ‘housing models’ over those of the European patrons for whom they were built was a frequent source of amusement.’[27]

While it may not have been their ideal, the European-style bungalow did provide its tenants with a climatically-appropriate housing model so effective and affordable that it soon became a standard, reproduced throughout India and eventually imported in a modified form to Britain and America. Its proliferation is a testament to its effectiveness in striking a compromise between the oft-opposing European expectations of form and comfort.

ACKNOWLEDGEMENT

I would like to thank Ms. Mary Ann Steane for her patient advice, criticism, and discussion throughout the writing process.

Thanks are also due to the many scholars whose work I consulted in my research, particularly Anthony King, whose excellent study of the evolving bungalow form is oft cited in this essay.

REFERENCES

[22] Forbes quoted in Harrison, 86.

Figures