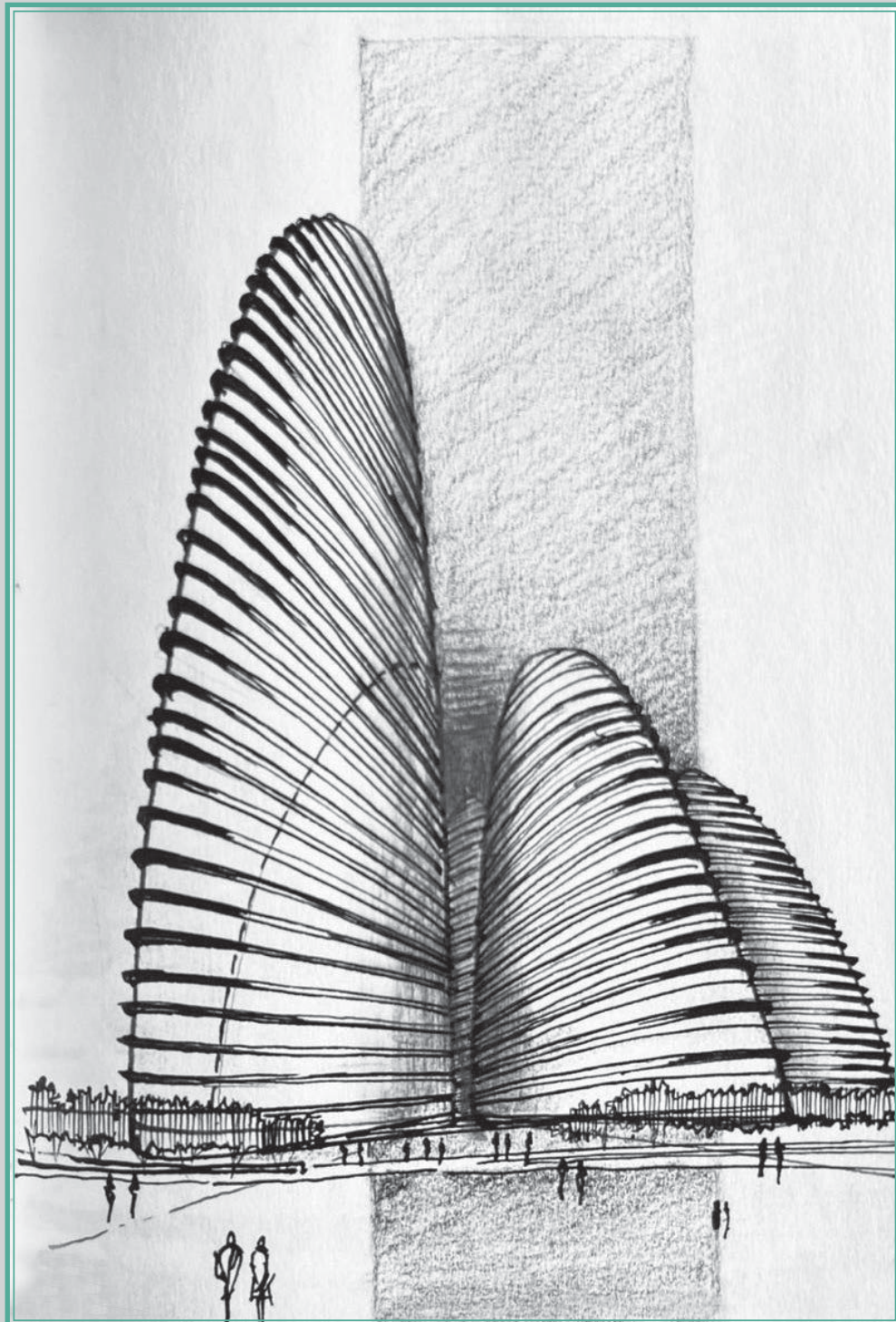




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# PRESIDENT'S MESSAGE



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## IIA OFFICE BEARERS



**Ar. Chamarthi  
Rajendra Raju**  
Imm. Past President, IIA

Dear Fellow Members,  
Happy 2025 to all the Members of IIA,  
We have completed almost one and a half years of our tenure. Even though our all Chapters, Centres and Sub-Centres are doing very well and organizing events successfully, but more needs to be done and the time is short.

The first event of the *Leadership Conclave* by IIA Odisha Chapter at Bhubaneswar guided every leader of IIA with the essential *do's & don'ts* in September 2023. Thereafter, the *Rajasthan Architecture Festival* at Jaipur was held in October 2023. In December 2023, *Design Symphony* by IIA Punjab Chapter at Amritsar. In January 2024, *IIAPL Golf Season 2* was arranged by IIA Jammu & Kashmir Chapter at Jammu, creating memories that will last for long.

January end and February 2024 saw a well-curated *IIA Premier League (IIAPL)* at Sambhajinagar. The *MAHACON* and *Western Region Conference* in January 2024, conducted by IIA Akola Centre of IIA Maharashtra Chapter, brought knowledge and camaraderie.

In the month of February 2024, the *IIA National Convention* was hosted by IIA UP Chapter at Lucknow, with the Ram Mandir presentation as the highlight for one and all. The *IIA National Awards* hosted by IIA Brihan Mumbai Centre of IIA Maharashtra Chapter in the month of March rivalled any award ceremony of Bollywood.

By the end of March 2024, the *IIA ANVESHAN International Research Conference* was hosted by IIA Trivandrum Centre of IIA Kerala Chapter. It was the first of its kind held by IIA, and the Office Bearers decided to make this event as one of the National Events of IIA.

The *IIA Young Architects Festival (YAF)* hosted by IIA Goa Chapter in the month of September 2024. In the month of November 2024, we had *PINK PRINT* at Odisha, Bhubaneswar, again another first-of-its-kind *International Women Architects'* celebration. It was done in a very graceful way, and again this will be another new National Event of IIA hereafter. The innovative fashion show by women architects, depicting architecture across time, was the cherry on the cake.

All the regions of IIA hosted Conferences at their respective regions, and each Chapters of those regions have participated wholeheartedly. The *Southern Region Conference (SRC)* at Wayanad by IIA Kerala Centre, the *IIA Eastern Region Conference (ERC)* hosted by IIA Jharkhand Chapter at Ranchi, the *IIA Western Region Conference (WRC)*, hosted by IIA Thane Centre, IIA Maharashtra Chapter hosted by Thane Centre at Thane and *IIA Northern Region Conference (NRC)* hosted by IIA Punjab Chapter at Ludhiana, were all success stories. All these IIA Regional Conferences were conducted in a systematic way and as per the norms given by IIA.

Two international feathers were added to the IIA cap. IIA bagged the opportunities to host two major architectural events: the *ARCASIA Forum 2026* to be at New Delhi - Agra - Jaipur and the *UIA forum 2027* in Mumbai.

As we look back on all the successes IIA has fostered, we also look forward to newer and more events that bring the architectural community closer, both in India and world-wide.

**Ar. Vilas Avachat**  
IIA President

# EDITOR'S NOTE

Wishing all the IIA members a very happy new year 2025. The new year comes with new aspirations and new opportunities. It also allows us to reflect on our actions of the year gone by for making them better this fresh New Year. This New Year marks a special milestone in all *Bharatiyas* with the experience of the Mahakumbh observed after 144 years at Prayagraj, Uttar Pradesh. It is going to be the biggest confluence on earth with participants from all over the world.

Another confluence of architects will also be witnessed at the MAHACON on 24 - 25 January 2025, organized by the IIA Thane Centre of the Maharashtra Chapter as the Western Regional Conference (WRC). The theme of the Conference is the relevant aspect of urbanisation, Adaptive Reuse and Parametric Architecture. Apart from a diverse lineup addressing the theme of the Conference, the main attraction of this confluence is the exhibition of documentation of the Konkan Temples called *Deolkathan*, which was acknowledged by the Chief Minister of Maharashtra, Hon. Devendra Fadnavis in his address as well. MAHACON was attended by dignitaries like the Hon. Transport Minister of Maharashtra-Shri Prataprao Sarnaik, the Hon. Ex-Housing Minister – Shri Jitendra Awhad and Hon. MLA Shri Kelkar, all hailing from Thane city.

This is immediately followed by the Northern Regional Conference (NRC) SANJH, organised by IIA Ludhiana Centre, under the aegis of IIA Punjab Chapter on 31 Jan - 1 Feb 2025 celebrating the spirit of togetherness by fostering meaningful connections between various stakeholders. It has been one of the vibrant events with participation by all northern Chapters and Centres and very well-received by the fraternity.

As we are aware, IIA participation on international platforms like ARCASIA and UIA is becoming very significant. We won the bid for hosting the UIA forum in Mumbai, India. We have also won the bid to host the ARCASIA Forum in 2026 in India. This will be hosted by three important cities of India known as the Golden Triangle, comprising Delhi, Agra and Jaipur, and promises to be a fascinating event.

Kudos to all the Office Bearers and the respective Committee Members, along with

all other IIA members who are constantly working to achieve such accolades for IIA. It is imperative for every IIA member to participate in preparation of these events to showcase our leadership in architecture worldwide.

The new year is calling out to us for more of such opportunities, collaborations and ventures. Let's work together to achieve these higher goals for IIA and our fraternity. We urge all IIA members to participate in all these events and continue the support which you have shown for the year gone by.

An appeal to all IIA members to contribute to JIA with articles, projects, research papers, and most importantly, in terms of sponsorship and funding.

Thank you for your continued support and readership.

**Prof. Vinit Mirkar**

Editor



Ar. Vinit Mirkar

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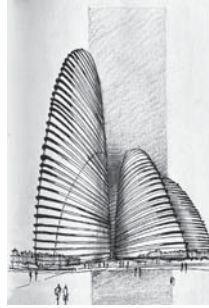
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# Confluence

## Adaptive Reuse and Parametric Architecture MAHACON '25 Western Region Conference



CONFLUENCE in architecture means meeting at one point and flowing freely together with thoughts and ideas for innovative design. IIA Thane Centre is creating a platform for the convergence of adaptive reuse and parametric architecture, as concepts within the realm of architecture, addressing different aspects of design and sustainability.

The concept of adaptive reuse involves re-purposing existing buildings or structures for new functions, rather than demolishing them and constructing something entirely new. It is a sustainable approach to architecture because it reduces waste, preserves cultural heritage, and often results in more unique and character-filled spaces. Adaptive reuse projects can range from converting old warehouses into loft apartments, turning factories into office spaces, or transforming historic buildings into museums or community centers.

Parametric architecture involves the use of algorithms and computational design techniques to create buildings and structures with complex, often organic forms. Parametric design allows architects to explore a wide range of design possibilities and optimize various parameters such as shape, structure, and environmental performance.

While these concepts might seem distinct, they can intersect in certain contexts. Parametric design techniques can be applied to adaptive reuse projects to optimize the transformation of existing structures while preserving their historic and architectural integrity. Similarly, adaptive reuse principles can inform the sustainable aspects of parametric architecture by encouraging the reuse of materials and resources in innovative design solutions.

The structure shown on the cover is a sketch of the Wangjing Soho by *Zaha Hadid Architects*, a mixed-use development comprising three towers. These are parametrically designed as three interweaving 'mountains' that combine building with landscape to bring a public park to the surrounding community.



### Cover Image Artist

**Ar. Nikkhil Naik** heads NN Architects, a young design group of creative architects, interior designers and 3D visualizers working closely with experienced consultants and administrators in various sectors of design. They work closely with clients to build experiences with an efficient team.



### Theme Author

**Ar. Makarand Toraskar** (F-19382) has been practising for the last 26 years. He founded *Ambiaance Design* in 1998 (then as *Makarand Toraskar & Associates*), with a team of architects, engineers, designers and support staff, and oversees a diverse project portfolio. The firm has a ranges from redevelopment projects, regeneration, urban planning and affordable housing, all considering ecological conservations, and actively minimizing negative environmental impacts. His firm has won awards for their green-compliant design.

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# JIIA Call for Papers, Articles, Projects

The Journal of the Indian Institute of Architects invites original and unpublished contributions from members **ONLY** (academicians, practitioners and students) under the following FIVE categories. Submission in each category is strictly only through the respective google forms.

In order to be accepted for publication, all material sent in these categories should have the following components:

1. MS Word document file with text only. Please do not format it in anyway. The numbered captions for all the images will also be in this document.
2. Folder with all images (minimum 300 dpi), numbered according to the captions given in your text file
3. Photograph of the author/s (minimum 300 dpi).
4. Author biodata – Maximum 50 words.
5. PDF (optional)– showing the intended layout. This pdf should include text and all images, with numbered captions.

## Category 1 : Articles

google form link: <https://forms.gle/7pDFva1HDH4hfUyj8>

Essays, interviews, articles (1500- 2500 words), book reviews (600 and 750 words), travelogues, sketches and photo-essays in the areas of architecture, planning, urbanism, pedagogy, heritage, technology, ecology, theory and criticism, visual design, practice or any other relevant subject pertaining to the built environment. (Details of the format will be available on the JIIA website).

- For a design project, please include the 'Fact File' with the following details : Project Name, Location, Plot area, Total built up, Structural consultants, Project completion. Also please give the photo captions and credits. Please ensure that the image is referred to within the text. For eg, "As seen in Figure 1...". This is essential for the layout.
- For design projects, plans and sections of the project are desirable along with the photographs.
- Book reviews should be only of books by Indian authors. please include the "Fact File" with the following details: book title, author name, publisher, year of publication, ISBN, language the book is written in, genre (technical/ fiction/ etc.), no of pages, dimensions (in cm), type (Kindle/ paperback/ hardback), available at (amazon.in/ flipkart.com/ others).
- Please send a write-up of about 200-300 words along with sketches and photo-essays.

## Category 2 : Student Work

google form link: <https://forms.gle/hyhsCoK6QPe6qDJu8>

Summaries of dissertations (2000-3000 words) at the level of B.Arch. & M.Arch., and theses at the Ph.D. level. The Guide for that work will be mentioned as the Co-author. (Format will be available on the JIIA website).

## Category 3 : Contributions from Chapter Correspondents

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- (a) *Chapter News*: This includes various interesting activities from the Centres of your Chapters (maxm. 500 words for the news from the *entire* Chapter).
- (b) News of conferences by the academic institutes in your respective Chapters.
- (c) *Obituaries* : Obituaries of IIA members should consist of the photograph of the departed soul, the dates of birth and death and a short 50-word note.

## Category 4 : Research Papers

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Research papers (2000-5000 words) in the prescribed format. The research may be based on their ongoing or completed research. (Format is available on the JIIA website). All contributions in this category will be double blind peer-reviewed before being accepted for publication by academic experts of repute.

## Category 5 : Cover Design

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Students from affiliated colleges are invited to design the cover page theme. This should be a graphic based on some aspect of Indian Knowledge Systems. The submission will include the graphic file (jpeg or corel draw); a theme note (with a title) of about 500 words explaining the concept of the graphic.

Please note that the image you send will be adjusted as per the layout requirements of the JIIA Cover.

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6. The review process takes anywhere between 4-6 weeks. Since it may not be possible to respond to all authors who send in their work, we will definitely revert if and when your work is accepted.
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9. All authors are requested to refer to further detailed information available on the JIIA website.

## RESEARCH PAPER

This research paper was presented at the IIA ANVESHAN Research Conference held at MCAP, Thiruvananthapuram, Kerala during 29-31 August 2024, under Stream I: The Celebrated Past

# Unravelling The Role of Soundscape in Urban Image Formation

## The Case Of Madurai Meenakshi Temple Precinct

By Navya Naveen and Ar. Anisha M. A.

### Abstract

Beyond the visual experiences, the pilgrimage towns are defined by their aural experiences. The soundscape is a crucial part of a pilgrimage town. The UNESCO 2003 Convention recognises the cultural sounds as an intangible cultural element. This dissertation explores how the soundscape contributes to the sonic identity of a pilgrimage town, focusing on the Madurai Meenakshi Temple Precinct in India. With the growing urbanisation the area's unique soundscape is threatened. This research investigates its role in shaping the sonic identity of the Madurai City. To understand the soundscape around the temple, the sonic data was collected through the soundwalks which were conducted during two different time periods in 3 different days. The survey helps in understanding the psychological associations people have with the soundscape. The study explores how the interplay of sounds contributes to the creation of a distinct and multifaceted image of the precinct although the city is undergoing urbanisation due to increasing population and commercial activities. By unravelling the emotional, cultural and spiritual significance of soundscape that is embedded within an aural environment, the research reveals the role of understanding of soundscape for preserving the character of Madurai. The dissertation concludes with the recommendations for the preservation of sounds that forms a part of intangible cultural heritage and identifying the aspects that influence the people's perception of sound within the precinct.

**Keywords:** Cultural soundscape, Intangible cultural heritage, Madurai Meenakshi temple precinct, Sonic identity, Perception of sound

### 1. Introduction

The soundscape of a pilgrimage town is a powerful symbol of its identity. Religious chants, traditional music and even the hum of everyday life portray the community's history, traditions and values. How we experience and remember a place is influenced by the distinct sounds linked to it, whether it be a bustling marketplace or a serene complex of temples. Pilgrimage towns create their distinctive soundscape due to the persistent presence of religious rituals and events. The unique soundscape becomes easily identifiable and linked to the town and enriches the pilgrimage experience by creating a unique atmosphere. They are constantly evolving and are vulnerable due to globalisation thus their preservation is essential.

Madurai, the Temple City, is known for its history, religion and culture and is a popular pilgrimage destination. Madurai's religious soundscape is at risk due to the city's expanding traffic, construction and overall buzz. Thus, it must be preserved.

The existing researches of soundscape focus more on Western cities with a limited exploration on the sonic characteristics of the Indian context. The interplay between the cultural significance of the sounds

(religious chants, hymns, etc.) and the psychological response they elicit in individuals from different backgrounds is not well-understood.

### 1.1 Aim and Objectives

The study aims to understand how the soundscape of Madurai contributes to the city's sonic identity and how it contributes to the psychological sense of place for the residents and visitors. The study also aims to investigate various components of soundscape in a temple precinct, documenting the religious soundscapes and people's auditory experiences. In addition, studying the relationship between soundscape and urban space formulates practical recommendations for protecting, preserving, managing and integrating soundscape in the Madurai city core.

This research examines the concept and the role of soundscape in shaping the perception of a city. It involves fieldwork like soundscape recordings and interview surveys to understand how people perceive the sounds of the precinct. The study is focused on Madurai's core area. The research is constrained by limited access to the temple precinct, the subjective nature of human perception, time constraints for data collection and the potential for limited applicability of findings to other contexts.

### 1.2 Research Framework

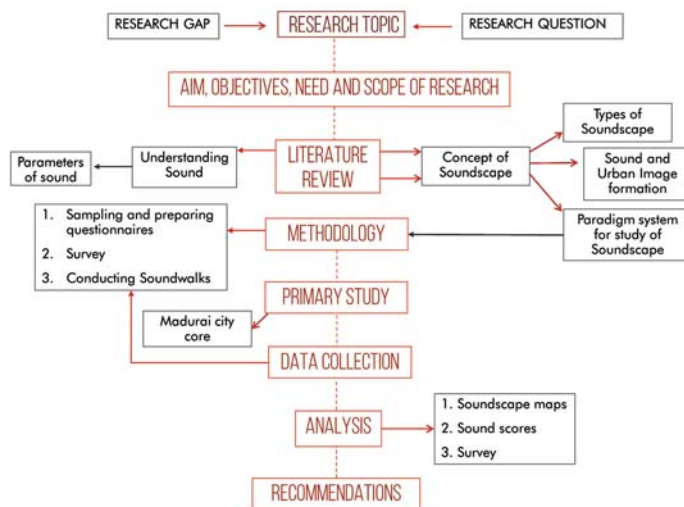


Figure 1: Research Framework

Source: Author

## 2. Literature Review

The concept of the soundscape was introduced by R. Murray Schafer in his book 'The Soundscape: Our Sonic Environment and the Tuning of the World', in which he described it as an acoustic environment consisting of events heard rather than objects seen (Schafer, 1994). The soundscape can be analysed by

different methods like Soundwalk, Soundscape map and Soundscape score. The Soundscape map was adopted from Michael Southworth's sound event map, featured in R. Murray Schafer's book 'The Tuning of the World'. It is a tool that represents how the sonic and visual elements combine to create an aesthetic experience for the visitors (Schafer, 1977). The soundscape score was introduced by Wang (2004) in this thesis study, which tells about the time factor and is important for analysing soundscape.

## 3. Methodology

### 3.1 Study Area

In the research, the study locale is the temple precinct of Madurai Meenakshi Amman Temple, located at the Core of Madurai, Tamil Nadu. Madurai is known as the 'City of Festivals', the soundscape of Madurai acting as a sonic identity. Due to urbanisation, Madurai's soundscape is vulnerable and must be preserved. By considering the existing soundscape of Madurai, the planners and the urban designers can create a more sustainable and lively space in the future.

### 3.2 Parameters Identified through literature review

Different parameters were identified through literature reviews to analyse the soundscape. They include Acoustic character of sound, Background and Foreground sounds, Psychological parameters and methods for performing the soundscape study. The methods adopted were Field measurements done through Soundscape Walk, Soundscape map, Soundscore and Surveys. The instrument used is Soundlevel Meter for the measurement of sounds and Cadnaa software is used to prepare the soundscape map (Mohammed et al., 2021).

### 3.3 Methods

The soundwalk was conducted through the peripheral streets of Madurai Meenakshi Temple. Chithirai Street and Avani Moolai Street were chosen for the sound walk based on their location, sound diversity and social and community dynamics (Figure 2). The soundwalk was conducted during the Morning and Evening for 3 days (festival day, weekday and weekend). During the sound walk, all the sounds were noted along with the decibel levels at each point and the background and foreground sound (soundmark, keynotes and signals). Soundscore was prepared based on the period of the sound source. Surveys were conducted to understand the people's perception of each sound.



Figure 2: Figure 2: Soundwalk Routes of Chithirai Street and Avani Moolai Street

Source: Author, adapted from Google map

## Data Analysis and Findings

### 4.1 Soundwalks

The soundwalk A (Figure 3) was conducted on April 21st, Chithirai Festival. The timings chosen for conducting the soundwalk was at Morning (8:30 AM- 11:AM) and Evening (8:00 PM- 9:30 PM).

The soundwalk B (Figure 4) was conducted on April 28th, Sunday. The timings chosen for conducting the soundwalk was at Morning (7: 30 AM - 9:30 AM) and Evening (7:00PM- 8:30PM).

The soundwalk C (Figure 5) was conducted on April 29th, Monday. The timings chosen for conducting the soundwalk was at Morning (7: 30 AM - 9:30 AM) and Evening (7:00PM- 8:30PM).

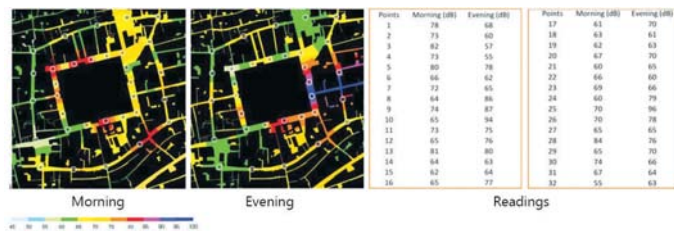


Figure 3: Soundwalk A - Soundscape Map and the readings

Source: Author

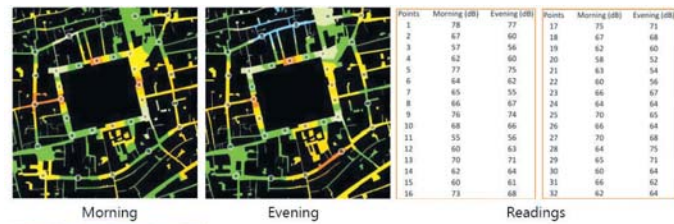


Figure 4: Soundwalk B - Soundscape Map and the readings

Source: Author

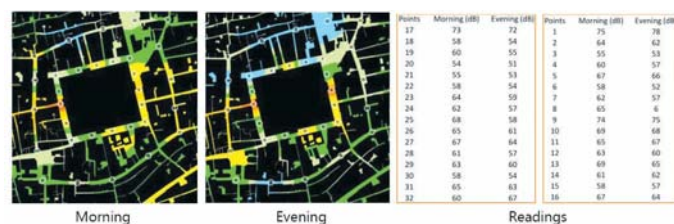


Figure 5: Soundwalk C - Soundscape Map and the readings

Source: Author

### 4.2 Analysis

The sounds were recorded through soundwalk conducted on 3 different days. The soundwalk was done in 2 different streets, Chithirai Street and Avani Street.

The Chithirai street allows only pedestrian movements for the public, hence the sound of vehicles are absent. In Avani Street, half of the street allows vehicular movement. The northern part of Avani Street contains residences, hence the sound in that particular street is low compared to the rest of the streets. Figure 6 shows the main sources of sounds. The sounds are mainly produced by speakers. The speakers are placed in front of each gopuram from which the chanting of hymns is heard. This sound is predominating in the surroundings.



Figure 6: Soundwalk Analysis

Source: Author

During festivals, the procession takes place through the street and the sounds of instruments are predominant during that time. The sound decibels range from 85 dB to 98 dB during this time. People gather in front of screens from which they view the rituals happening inside the temple. This also adds to the sounds in the temple precinct. Speakers are also kept in some places in Avani Street from which music is heard. This creates a spiritual atmosphere throughout the street.

During mornings, sounds like bells, etc. can be heard from commercial shops, as they do a small ritual before opening a shop. The commercial street also adds to the soundscape of the city. People are engaged in commercial activities. The sound in front of Gopurams is high throughout the year.

During evenings, the queue in front of the gopuram is relatively higher than morning. Avani street has a higher traffic movement during night time than morning. The sound near South Gopuram in Chithirai Street is relatively higher during the night times. Commercial activities are predominant in that area.

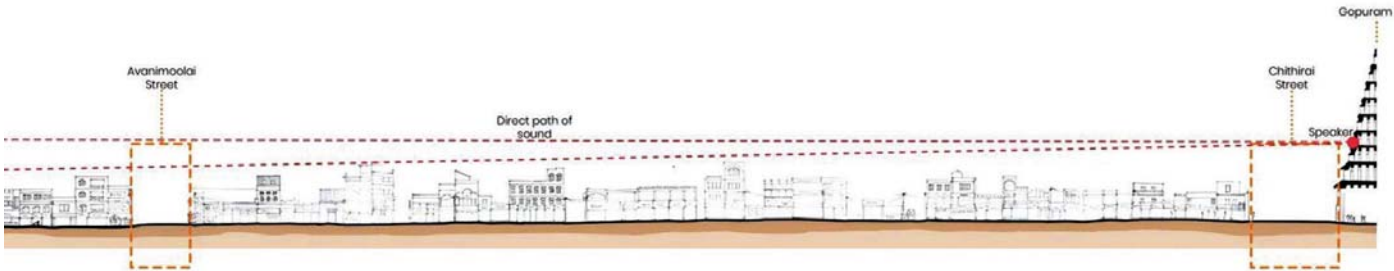


Figure 7: Direct Path of Sound  
Source: Madurai - Regenerating through Sacred Identity, CEPT Portfolio, Edited by Author

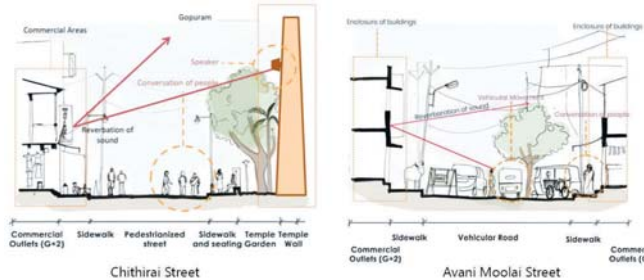


Figure 8: Street Enclosure - Sections  
Source: Madurai - Regenerating through Sacred Identity, CEPT Portfolio, Edited by Author

The soundscape of North Avani Street is very low, ranging from 50 dB to 58 dB.

Gopurams typically have a tapering design, starting from a broad base and reaching a pointed peak. This shape can act like a giant megaphone, focusing sound waves in a particular direction, forward from the speaker. This concentration of sound waves helps the audio travel farther with less divergence compared to omnidirectional speakers in open space. The placement of speakers at the top of gopurams provides a significant height advantage. Sound waves weaken as they travel due to inverse-square law so the sound has a greater distance to travel before reaching the ground where people are standing, reducing the impact of weakening intensity.

Soundscape score is used to portray the frequency and density of the sounds (Figure 9). Different types of sounds that are present in the temple precincts

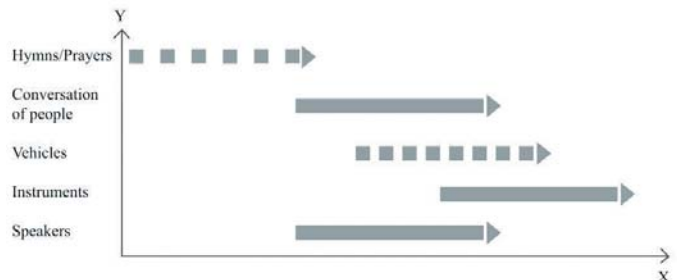


Figure 9: Soundscape Score  
Source: Author

of Madurai Meenakshi are identified and measured. The results are prepared based on the following observation:

- Hymns/Prayers : Low frequency, Low density
- Conversation of People: Moderate frequency, Continuous sound
- Vehicles: Moderate frequency, Moderate density
- Instruments: High frequency, Continuous sound
- Speakers: Moderate frequency, Continuous sound

## 5. Results and Discussion

In the research, we analysed how the Soundscape of the Madurai Meenakshi Temple contributes to the sonic identity of the city (Table 1). The soundscape of the Madurai Meenakshi temple precinct creates a spiritual realm and gives a sense of devotion to the visitors. The Hymns, the conversation of people,

Table 1: Inference from Soundscape Analysis and Survey  
Source: Author

| Street              | Hymns/Prayers |           | Conversation of people |         | Vehicular   |             | Instruments |           | Speakers    |           |
|---------------------|---------------|-----------|------------------------|---------|-------------|-------------|-------------|-----------|-------------|-----------|
|                     | Intensity     | Emotion   | Intensity              | Emotion | Intensity   | Emotion     | Intensity   | Emotion   | Intensity   | Emotion   |
| Chithirai Street    |               |           |                        |         |             |             |             |           |             |           |
| North Chithirai     | Very strong   | Spiritual | Very strong            | Neutral | Very Low    | Nill        | Moderate    | Peacefull | Very Strong | Spiritual |
| East Chithirai      | Very strong   | Spiritual | Very strong            | Neutral | Very Low    | Nill        | Moderate    | Peacefull | Very Strong | Spiritual |
| South Chithirai     | Very strong   | Spiritual | Very strong            | Neutral | Very Low    | Nill        | Moderate    | Peacefull | Very Strong | Spiritual |
| West Chithirai      | Very strong   | Spiritual | Very strong            | Neutral | Very Low    | Nill        | Moderate    | Peacefull | Very Strong | Spiritual |
| Avani moolai Street |               |           |                        |         |             |             |             |           |             |           |
| North Avani         | Strong        | Spiritual | Strong                 | Neutral | Moderate    | Distractive | Low         | Nill      | -           | -         |
| East Avani          | Strong        | Spiritual | Strong                 | Neutral | Very Strong | Distractive | Moderate    | Peacefull | Moderate    | Spiritual |
| South Avani         | Moderate      | Spiritual | Strong                 | Neutral | Very Strong | Distractive | Low         | Nill      | Moderate    | Spiritual |
| West Avani          | Strong        | Spiritual | Strong                 | Neutral | Moderate    | Distractive | Moderate    | Peacefull | Strong      | Spiritual |

the instrumental music and calls from speakers add to the soundscape of the precinct. The bustling activity adds to the temple's role as a social center. The intricate carvings of the Gopurams act as a natural amplifier and help in enhancing the sounds emanating from the speakers. The traffic noise, street vendors from the surrounding shops and the chatter of locals blend with the temple sounds which creates a unique sonic character that helps in enhancing the relationship between the temple and the city. The soundscape also evokes emotions and memories within the visitors.

The UNESCO 2003 Convention recognises cultural sounds as intangible cultural elements (ICH). The unique soundscapes of pilgrimage towns, with their specific chants, bells and rituals, are a vital part of their cultural identity. While doing the study of the Soundscape of the Madurai temple precinct, it was noted that the soundscape of most of the areas along the route had an average of 80dB instead of 55dB, which was recommended by The World Health Organisation for outdoor noise level. The festivals in Indian cities have a sound level of above 85dB, these sounds are considered as Intangible cultural elements.

During the sound walk, a sonic image will be imprinted in the minds of the listener as he transits from vehicular traffic to the conversation of people to the devotional prayer heard from the speakers of Gopuram. The listener associates these sounds with the City context.

## 6. Conclusions and Recommendations

### 6.1 Recommendations

Preserving the soundscape of the Meenakshi temple precinct is vital to safeguard its soul. The unique blend of chants, temple prayer, vendor calls and daily life's murmurs create an irreplaceable cultural identity that defines the pilgrimage experience. Due to the growing urbanisation, the temple soundscape is affected.

During the study and analysis of the soundscape of Madurai Meenakshi Temple Precinct, four main aspects that affect the Auditory Perception of the city were identified: Source and Character of sound, Urban Morphology, Weather conditions and Human activity and Perception (Figure 10).

Urban development plans must include guidelines that value the preservation of the existing soundscape. This might involve restrictions on overly loud establishments or designated areas for specific cultural activities.

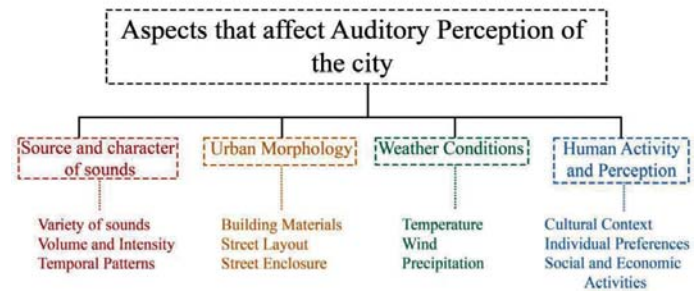


Figure 10: Aspects that affect the Auditory Perception of the city

Source: Author

- i. A baseline study must be conducted to analyse the existing soundscape of an area through sound walks and recordings.
- ii. Identify the sound sources and their character.
- iii. Evaluate how sound travels through the environment, by understanding factors such as buildings, vegetation and weather.
- iv. Use surveying to take note of variations in auditory sensitivity, cultural background and activities (walking, relaxing).
- v. Study how the brain interprets sounds, including attention, memory and emotional associations through surveys.
- vi. Study the activities (social, economic, spiritual, etc.) that help in contributing to the soundscape of the area.
- vii. Areas must be created with noise-dampening elements like vegetation or sound barriers near residences or religious spaces.
- viii. Identify and preserve the cultural sounds that are essential for the pilgrimage experience.
- ix. Noise pollution from traffic can be reduced by creating car-free zones, designated parking areas and by the promotion of electric vehicles.
- x. Use sound-absorbing materials in building design to manage noise from traffic and construction.

### 6.2 Conclusion

Cities are often thought of visually but a crucial element that shapes a city's character is often overlooked: its soundscape. Soundscape isn't just background noise, it's a vital part of a city's intangible cultural heritage. In Pilgrimage towns, the sounds associated with traditional practices and rituals are as important as the architecture itself. The rhythmic hum of prayers, the melodic calls of street vendors and the murmur of conversations all weave together to create a unique aural experience for the visitors. By considering the soundscape, we can create cities

that are not only visually appealing but also resonate with the cultural identity of their communities. This involves incorporating traditional sounds into public spaces, mitigating noise pollution from traffic, and using sound design principles to create unique atmospheres.

Designing for the ears is as important as designing for the eyes. It's about creating urban spaces that are not just functional but also evoke emotions, memories and a sense of belonging. This research paper identifies and documents the soundscape of the Madurai Meenakshi temple precinct. It also explains how the soundscape of the Madurai Meenakshi Temple precinct becomes the Sonic Identity of the city. During this study, it was noted how the soundscape of pilgrimage towns contributes to their sonic identity and their need for preservation. Recommendations are provided for considering the soundscape during the urban design development.

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# Performance of Three Types of Fixed Shading Devices and Their Impact on Visual Comfort Inside a Room in Composite Climate

By Dr. Janmejoy Gupta and Ar. Alankar Jharia

## Abstract

Daylighting is an essential feature of passive solar architecture, and its availability in sufficient quantity is crucial for achieving proper visual comfort. It is also recognised as an effective and valuable technique in energy-efficient design. However, in the composite climate of India, it is vital to ensure adequate visual comfort without glare while avoiding thermal discomfort caused by excessive heating. Predicting internal daylight levels is a key aspect of daylighting design. This study examines a south-east-facing room in a residential building in Jabalpur, located in the central state of Madhya Pradesh, India, which experiences a composite climate. The paper explores the effects of three types of fixed shading devices on daylight within buildings. For this purpose, an experimental study was conducted, and simulations were carried out using ECOTECT software. The findings revealed that the vertical and egg crate shading systems resulted in periods of visual discomfort, whereas the horizontal shading system maintained visual comfort levels.

**Keywords:** Daylight Simulations, Daylight, Illuminance, Luminous Levels, Shading Devices

## 1. Introduction

Daylight is a natural, non-depleting gift from nature to mankind and a priceless resource harnessed from the sun (Hopkinson R.G., 1966). Daylight entering a building can promote energy conservation, health, productivity and psychological responses. The basic purpose of daylighting is to reduce the use

of artificial light and lower the energy costs of a building; it can also help reduce HVAC costs. Artificial lighting generates significant heat, whereas, if appropriately controlled, natural lighting produces minimal heat, provided direct solar radiation is excluded. Daylighting has been associated with improved mood, enhanced morale, reduced fatigue and alleviated eye strain. The amount of daylight a building receives is primarily through window openings, which serve the dual purpose of admitting light to create a more appealing indoor atmosphere and allowing users to maintain a connection with the outside world (Danny H.W. Li, 1999).

Allowing excessive daylight can result in glare within a building. A direct view of a bright sky from inside a room can cause discomfort. Excessive solar radiation, when concentrated on a single spot, can be a source of irritation but is highly beneficial when evenly distributed across the room (Mahbuba Afroz Jinia, 2015). To reduce glare inside a room, the focus is primarily on the use of shading devices. These devices are designed to block solar radiation from entering the interior of a building.

In India, external horizontal illumination assumed for design purposes is approximately 8000 lux. The IS code considers a clear design sky as the basis for daylighting design. However, increasing the size of windows does not proportionately increase illumination levels (Simha, 1985). Since the brightness of the sky varies significantly depending on the hour, location, and season, predicting daylight

is challenging, and no universal solution can be provided. The colouring of the walls inside a room is also a significant factor, as the illumination level is considerably higher in a room with light-coloured walls compared to one with dark-coloured walls (IS: 2440-1975, 1989).

Indoor daylight depends on several factors, including the size and position of fenestration, room dimensions, interior finishes and external obstructions around the structure. The calculation of daylight factors requires the estimation of the sky component, external reflected component, and internal reflected component for a clear design sky condition, which is recognised as the standard outdoor condition (SP: 41, 1987). The intensity of daylight varies with the Earth's rotation, geographical location, atmospheric conditions, season and time of day. There is a need to integrate daylight and artificial lighting systems into energy-conserving, dimmable lighting installations to achieve energy savings (Ahuja, 1997).

## 2. Objectives of the study

This study focuses on the effects of different types of fixed external shading devices on daylighting levels in the interior of a room located on the south-east façade. The aim is to identify the most appropriate type of fixed external shading device that can help achieve both visual and thermal comfort in the room under study.

## 3. Literature Review: Shading Devices and Daylighting in the Tropics

Window size and placement are important strategies for reducing solar heat gain and preventing the transmission of shortwave radiation through glass with the help of external shading. The most suitable choice from a wide range of fixed and movable shading systems will depend on the location, orientation, building type and overall cooling, heating and daylighting strategies adopted in the building's design (Sealey, 1979).

It is asserted that the requirement for the presence of direct sunlight is determined by numerous factors, such as space function, user type, climatic zone and solar geometry (Bryan, 1979; Mayhoub, 2012). Li et al. (2006) posit that the implementation of design allowing daylight into a room largely depends on several internal conditions (position, placement, and size of the windows; the condition and depth of the spaces; as well as the colours of the interior walls) and external variables (light reflected from the ground and surrounding obstructions). Each of these variables plays a significant role in determining the amount of natural light an interior space receives.

Trupti and Vinayak (2018) affirm that the building profile plays a critical role in managing and controlling the direct penetration of daylight into the interior of a building. The considerable depth of external projections offsets the effect created by the building profile during the planning process and a window placed on such a façade is often inadequate. As a result, occupants may suffer from visual and thermal discomfort.

Lim, Y.W. and Ahmad, M.H. (2013) state that, despite the dominance of cloudy skies, outside luminance levels in tropical climates range from 10,000 lux to over 20,000 lux.

Some have attempted to provide a simplified analytical and GIS-based approach to assess the potential of daylight within a room under clear sky conditions (Mhaske, 2016). The research measures the quality of internal lighting in a residential apartment building based on the external lighting available.

Shading of windows reduces the amount of incident radiation and, thus, impacts both the heat transfer to the interior and the outside temperatures. Steemers (2002) discusses the purpose of shading in detail, noting its effectiveness in minimising the total solar energy entering a room and thereby reducing the average room temperature. Shading also prevents sunlight from falling directly onto occupants, which can otherwise result in an effective temperature increase of 3°C to 7°C.

The concept of daylighting to save conventional fuel in residential buildings has also been explored (Tiwari, 2014). The thermal performance of buildings has been investigated in terms of energy conservation. A building was designed to provide adequate daylighting, ventilation and thermal comfort for occupants while making optimal use of available space. Two rooms on the upper floor of the building were studied under clear sky conditions. Over the building's lifespan, an average energy saving from daylighting was found to be 7,933 kWh, equating to a reduction of 16.18 tonnes of CO<sub>2</sub> emissions (Tiwari, 2014).

### 3.1 Shading-Devices

Openings, particularly windows, play a significant role in influencing the thermal conditions inside a building. Windows typically consist of several components, some of which are adjustable. These elements perform multiple functions, including ventilation, provision of daylighting, privacy, security, glare reduction, protection from solar radiation, rain and dust, as well as noise reduction.

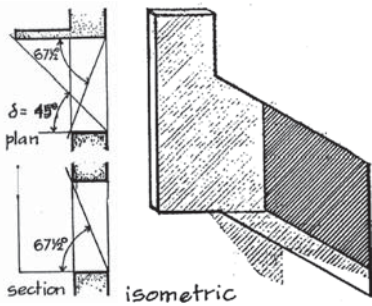
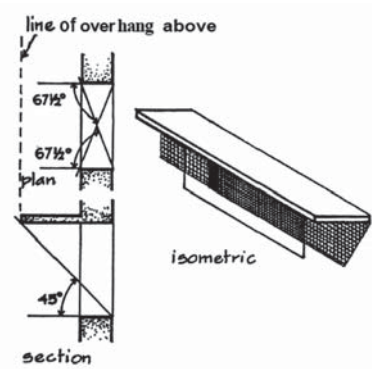
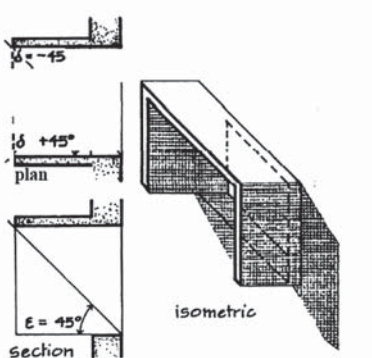
Among these components, external shading devices are a key element. Others include curtains, glass, solid or louvered shutters, security bars and mosquito screens. The primary functions of external shading devices include allowing an outside view, providing protection from rain and direct solar radiation, and reducing excessive sky glare. (Table 1 below illustrates the three basic types of external shading devices.)

### 3.2 Optimum Shading Calculation

The following section details the method for calculating the ratio between the depth of the overhang and the height of the opening for optimum shading. The depth of the overhang in shading devices is independent of the width of the window opening and relies solely on the height of the window opening. The performance of a horizontal shading device is directly proportional to the depth

Table 1: Three Types of shading devices and their geometries

Source: Author

| SHADING DEVICES                   | FIGURE                                                                              | DESCRIPTION                                                                                                                                                                                                                                                             |
|-----------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Vertical Shading Devices</b>   |   | <b>Vertical Shading Devices</b> composed of louver blades or projecting fins in 45° a vertical position. The horizontal shadow angle $\Delta$ (delta) measures their performance.                                                                                       |
| <b>Horizontal Shading Devices</b> |  | <b>Horizontal Shading Devices</b> can be in the form of canopies, horizontal louver blades or externally applied Venetian blinds or roof overhangs. The vertical shadow angle $\epsilon$ (epsilon) measures their performance.                                          |
| <b>Egg-Crate</b>                  |  | <b>Egg-Crate</b> devices are combinations of vertical and horizontal devices. They are usually in the form of grill blocks or decorative screens. Both the horizontal and vertical shadow angles $\Delta$ and $\epsilon$ (delta and epsilon) justify their performance. |

of the overhang. The ratio between the depth of the overhang and the height of the opening for optimum shading is illustrated in Figure 1 (Anisur Rahman, 2007).

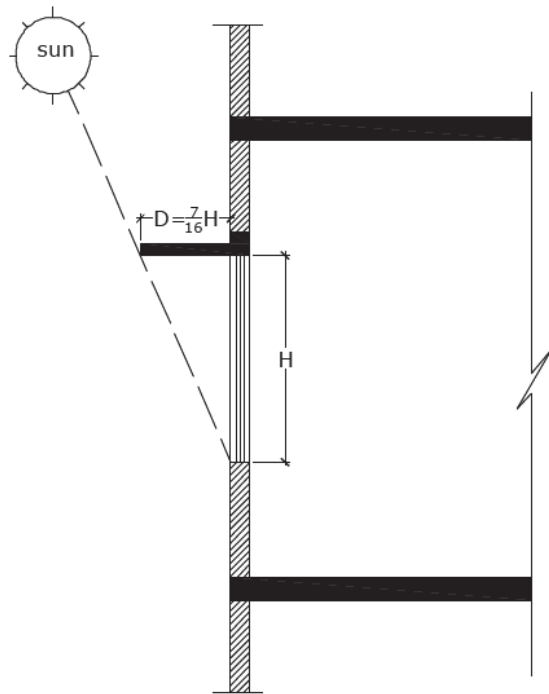


Figure 1: Ratio between Depth of Overhang and Height of the Opening for Optimum Shading (Rahman, 2007)

$D = \frac{7}{16} \times H$ , where D is the depth of the overhang, and H is the height of the opening.

Thus, calculating the depth of the overhang for the current condition:

$D = \frac{7}{16} \times 1.37 = 0.59 \approx 0.60 \text{ m.}$

**Table 2:** Study building-parameters used as input for simulation.  
Source : Author

| STUDY BUILDING PARAMETRES                                     |                                                                                                                            |
|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| ROOM DIMENSION                                                | 3.05 m X 3.55 m                                                                                                            |
| FLOOR HEIGHT                                                  | 3 m (First Floor)                                                                                                          |
| OPENING ORIENTATION                                           | SOUTH-EAST FACING                                                                                                          |
| OPENING DIMENSIONS                                            | 1.37 m X 1.37 m (sill level = 0.73 m)                                                                                      |
| WINDOW FRAME                                                  | WOODEN FRAME                                                                                                               |
| WINDOW GLASS                                                  | CLEAR GLASS WITH WOODEN FRAME                                                                                              |
| WALL                                                          | 230 mm BRICK PLASTER WALL, OFF WHITE COLOR IN INTERIOR                                                                     |
| FLOOR                                                         | CERAMIC TILES                                                                                                              |
| WORKING PLANE                                                 | 720 mm ABOVE FLOOR                                                                                                         |
| TIME PERIOD FOR DATA COLLECTION                               | READINGS ARE TAKEN FOUR TIMES A DAY : 10.00AM, 12.00PM, 2.00PM AND 4.00PM. ON WORKING PLANES AS MENTIONED IN FIG (b) & (c) |
| TOTAL NUMBER OF POINTS FOR LIGHT MEASUREMENT ON WORKING PLANE | 6                                                                                                                          |

4. Methodology

4.1 Studied Building

The building under study is located in Jabalpur, Madhya Pradesh (latitude 23°10'1.09"N, longitude 79°57'0.22"E, altitude 412 m), as shown in Table 2; Figure 2. It is a residential building situated in a colony in Jabalpur, a Grade I city. One of the rooms on the first floor (4.2 m above ground level) has been selected for this study.

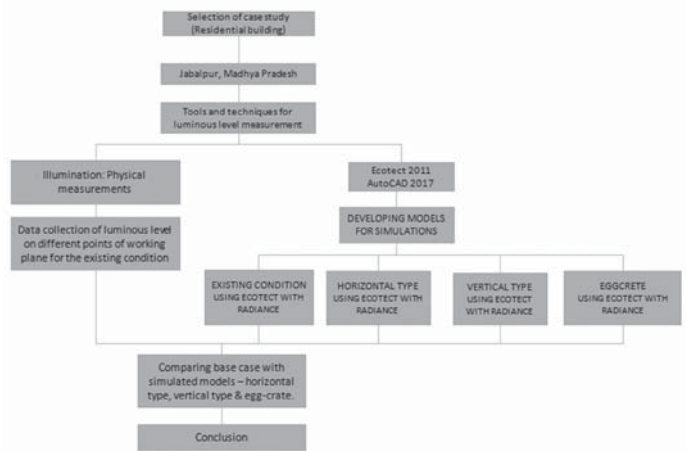


Figure 2: Research Methodology: Flowchart  
Source: Author

The total area of the residence is 184 sq. m. The room selected for the study measures 3.05 m × 3.55 m. The room has two openings, of which the one on the outer wall is considered, as the other is not in use. The size of the opening is 1.37 m × 1.37 m, with a sill level of 0.73 m (refer to Figure 4 for the section). The window is wooden-framed with clear glass. The walls are 230 mm thick brick with cement plaster,

and the interior walls are painted off-white. Ceramic tiles have been used for flooring. The working plane for measuring illuminance is set at a height of 720 mm above the finished floor level (see Figure 4).

To measure light levels inside the room, a TESTO 545 light meter was used. Readings were taken four times a day—at 10:00 AM, 12:00 PM, 2:00 PM and 4:00 PM—on working planes, as indicated in Figures 3, 4 and 5.

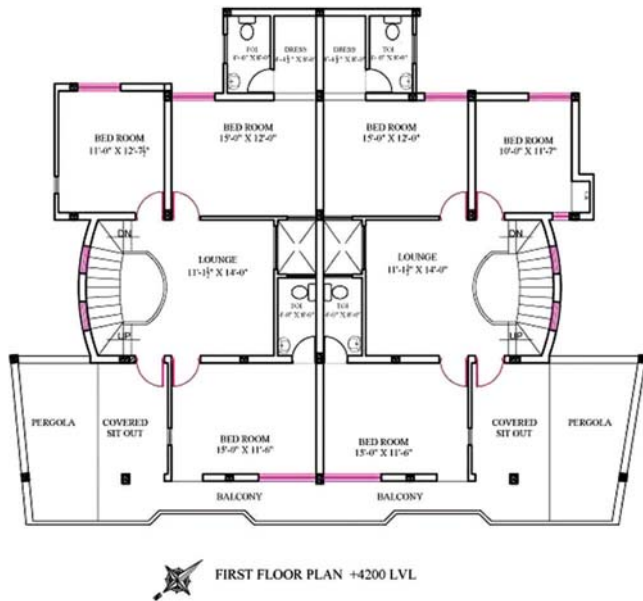


Figure 3: Floor Plan of Study Model

Source: Author



Figure 4: Interior View of Existing Room

Source: Author



Figure 5: Exterior View of the Residence.

Source: Author

## 4.2 Day-lighting Measurement Method

Illumination was measured using the daylighting instrument Testo 480 with a lux probe (Figure 6) at the working plane, positioned at a height of 0.72 metres, while keeping the doors closed on 22nd March 2019. Readings were taken at the identified node points at regular intervals from the window openings, as shown in Figures 8 and 9.

Simulations were conducted using ECOTECT (Version 2011), a building energy performance and simulation software developed by Autodesk. The simulation results corresponded to the same date and time as the manual measurements.

## 4.3. Scope and Limitations

The only types of shading devices considered for this study are: (1) horizontal shading devices, (2) vertical shading devices and (3) egg crates.

Daylight levels were simulated specifically for 22nd March under clear sky conditions. The research is limited to measuring the illumination level in the selected room. Different geometric patterns of fixed shading devices, as well as variables such as glare, thermal radiation, material, colour and obstructions in both interior and exterior spaces, are not considered in this study.

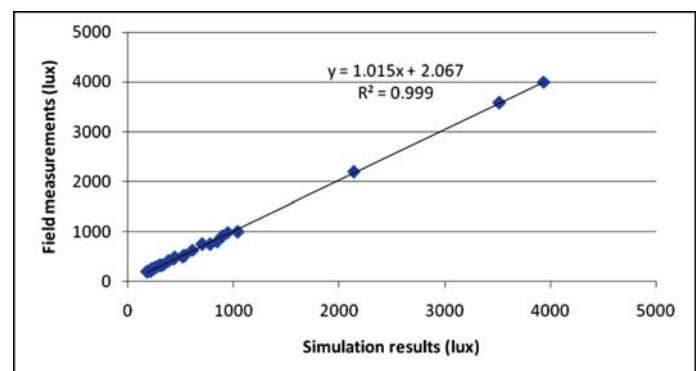


Figure 6: Scatter-plot Showing the Field Measurements versus the Simulation Results for the Study

Source: Author

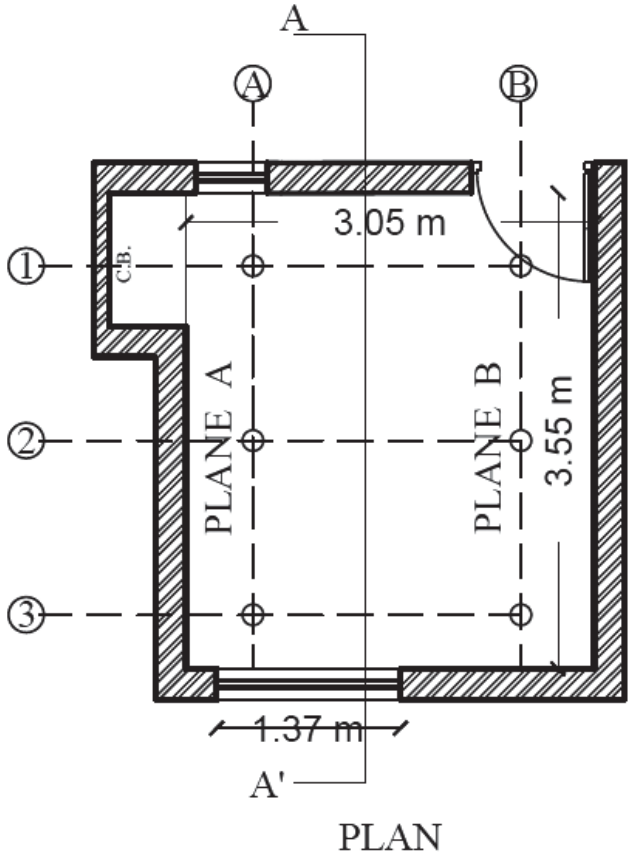


Figure 7: Location of the Measurement Points in Plan.  
Source: Author

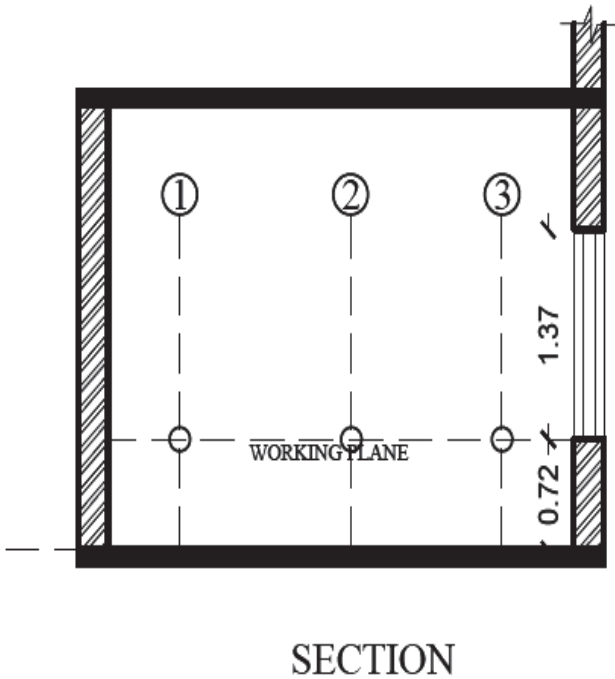


Figure 8: Location of the Measurement Points in Plan and Section  
Source: Author

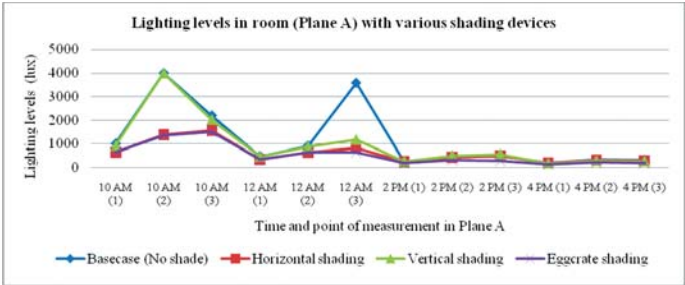


Figure 9: Lighting Levels in Room (Plane A) with Various Shading Devices  
Source: Author

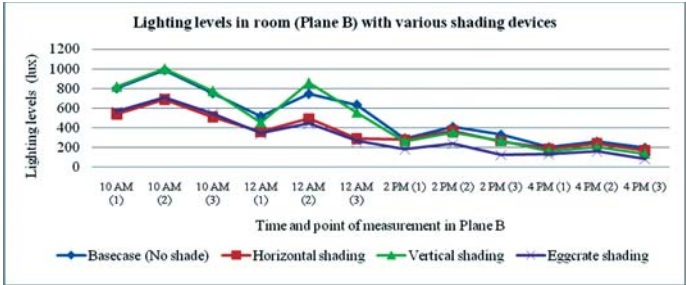


Figure 10: Lighting Levels in Room (Plane B) with Various Shading Devices  
Source: Author

## 5. Analysis of the simulation results:

### Comparison with the physical measurements with simulation results

The luminous levels at various points obtained from the field survey and simulation are detailed in Table 2. To assess the deviation between the measured and simulated data, a regression analysis was conducted using a scatter plot, as shown in Figure 7. The analysis indicates that the deviation between the field survey and simulation results is minimal. Therefore, the simulation results are validated and can be considered reliable for this research. The following section compares daylight levels (in lux) for horizontal, vertical and egg-crate shading devices.

## 6. Results and Discussion

The simulation results for all three types of fixed shading devices at various points in Plane A and Plane B are presented in Tables 3, 4 and 5, while Table 6 shows the daylight levels in Plane A and Plane B with and without shading devices. The results are plotted against the base case and represented in graphs, as shown in Figures 10 and 11. Since the selected room for the study has a south-east orientation, these areas tend to receive the maximum daylight at 10:00 AM compared to 4:00 PM. As indicated in Table 3, the highest daylight levels occur at 10:00 AM for all types of shading devices.

Table 3: Daylight level of existing condition (lux) in the field survey and the simulation result.

Source: Author

| Time  | Measuring point | Plane A      |             | Plane B      |             |
|-------|-----------------|--------------|-------------|--------------|-------------|
|       |                 | Field Survey | Simulations | Field Survey | Simulations |
| 10 AM | 1               | 1042         | 1003        | 842          | 802         |
|       | 2               | 3934         | 3998        | 943          | 989         |
|       | 3               | 2134         | 2191        | 780          | 752         |
| 12 PM | 1               | 447          | 483         | 534          | 515         |
|       | 2               | 898          | 915         | 704          | 745         |
|       | 3               | 3513         | 3581        | 612          | 633         |
| 2 PM  | 1               | 247          | 268         | 265          | 289         |
|       | 2               | 432          | 453         | 387          | 406         |
|       | 3               | 518          | 500         | 302          | 326         |
| 4 PM  | 1               | 214          | 207         | 187          | 198         |
|       | 2               | 339          | 345         | 227          | 255         |
|       | 3               | 318          | 324         | 185          | 193         |

Table 4: Daylight Level from Simulations with Vertical-Type Shading Device and Horizontal-type Shading device.

Source: Author

| Time  | Measuring point | Horizontal-Type Shading Device |         | Vertical-Type Shading Device |         |
|-------|-----------------|--------------------------------|---------|------------------------------|---------|
|       |                 | Plane A                        | Plane B | Plane A                      | Plane B |
| 10 AM | 1               | 639                            | 536     | 913                          | 819     |
|       | 2               | 1375                           | 687     | 3986                         | 1002    |
|       | 3               | 1560                           | 507     | 2014                         | 775     |
| 12 PM | 1               | 349                            | 361     | 458                          | 456     |
|       | 2               | 645                            | 492     | 892                          | 859     |
|       | 3               | 831                            | 291     | 1170                         | 555     |
| 2 PM  | 1               | 268                            | 278     | 269                          | 262     |
|       | 2               | 442                            | 369     | 514                          | 352     |
|       | 3               | 488                            | 263     | 567                          | 267     |
| 4 PM  | 1               | 195                            | 185     | 176                          | 162     |
|       | 2               | 327                            | 241     | 289                          | 204     |
|       | 3               | 297                            | 167     | 274                          | 135     |

Table 5: Daylight Level from Simulations with Egg Crate Shading Device

Source: Author

| Time  | Measuring point | Plane A | Plane B |
|-------|-----------------|---------|---------|
| 10 AM | 1               | 632     | 566     |
|       | 2               | 1346    | 706     |
|       | 3               | 1498    | 542     |
| 12 PM | 1               | 340     | 340     |
|       | 2               | 641     | 441     |
|       | 3               | 651     | 261     |
| 2 PM  | 1               | 187     | 178     |
|       | 2               | 309     | 235     |
|       | 3               | 285     | 120     |
| 4 PM  | 1               | 139     | 127     |
|       | 2               | 231     | 155     |
|       | 3               | 195     | 79      |

Table 6: Daylight levels in Plane A and B with and without various shading devices.  
Source: Author

|              | Base-case (No shade) | Base-case (No shade) | Horizontal shading | Horizontal shading | Vertical shading | Vertical shading | Egg-crate shading | Egg-crate shading |
|--------------|----------------------|----------------------|--------------------|--------------------|------------------|------------------|-------------------|-------------------|
| Time (point) | Plane A              | Plane B              | Plane A            | Plane B            | Plane A          | Plane B          | Plane A           | Plane B           |
| 10 AM (1)    | 1003                 | 802                  | 639                | 536                | 913              | 819              | 632               | 566               |
| 10 AM (2)    | 3998                 | 989                  | 1375               | 687                | 3986             | 1002             | 1346              | 706               |
| 10 AM (3)    | 2191                 | 752                  | 1560               | 507                | 2014             | 775              | 1498              | 542               |
| 12 AM (1)    | 483                  | 515                  | 349                | 361                | 458              | 456              | 340               | 340               |
| 12 AM (2)    | 915                  | 745                  | 645                | 492                | 892              | 859              | 641               | 441               |
| 12 AM (3)    | 3581                 | 633                  | 831                | 291                | 1170             | 555              | 651               | 261               |
| 2 PM (1)     | 268                  | 289                  | 268                | 278                | 269              | 262              | 187               | 178               |
| 2 PM (2)     | 453                  | 406                  | 442                | 369                | 514              | 352              | 309               | 235               |
| 2 PM (3)     | 500                  | 326                  | 488                | 263                | 567              | 267              | 285               | 120               |
| 4 PM (1)     | 207                  | 198                  | 195                | 185                | 176              | 162              | 139               | 127               |
| 4 PM (2)     | 345                  | 255                  | 327                | 241                | 289              | 204              | 231               | 155               |
| 4 PM (3)     | 324                  | 193                  | 297                | 167                | 274              | 135              | 195               | 79                |

Upon analysing the results, it was found that the room experiences glare in the morning between 10:00 AM and 12:00 Noon. This glare is significantly reduced to below 2000 lux with the horizontal shading device and the egg-crate shading device. The results also show that the presence of vertical shading does not effectively reduce glare during peak hours, making it less efficient than the horizontal and egg-crate shading devices. A uniform distribution of lighting is observed with the horizontal shading device. However, at one of the measurement points with the egg-crate shading device, lighting levels fell below the acceptable threshold of 100 lux. Therefore, for this study, the optimal solution is the horizontal shading device, as it eliminates glare, maintains acceptable lighting levels and ensures relatively uniform light distribution throughout the room.

## 7. Conclusion

This paper examined three types of shading devices used in a residential building in Jabalpur, Madhya Pradesh, through computer simulations to assess their daylighting performance and evaluate the quantity of daylight entering the interior. The findings indicate that horizontal shading devices and egg-crate shading systems are the most effective for providing visual comfort.

From this study, it can be concluded that to enhance daylighting performance, the room should be designed with appropriate window size and placement, along with suitable shading devices for the specific location. The research demonstrates that the type of shading device used in a building has a significant impact on indoor lighting levels and that the use of daylighting improves both thermal and visual comfort within the building.

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# Evaluating the Quality of Public Spaces in the Urban Environment

By Ar. Ketki Bharat Tendolkar

## Abstract

Public spaces serve as significant arenas where civic life thrives within urban areas. These spaces mirror a crucial aspect of public relations, social relations and traditional reflections of the region. Urban public spaces are intended to be hubs for social interaction and the cultivation of social life. Their objective is to enhance social capital within communities, fostering meaningful social interactions and connections that contribute to the development and formation of individuality and social identity. The evaluation of the urban landscape encompasses functional, self-motivated and aesthetic aspects and is dependent on the visual component of the Urban spaces. A Public space also represents the values of the city and this research will understand these values of public spaces and its contemporary reaction.

Beyond interactivity, the fundamental and essential characteristic of public open spaces is how it represents the city, interpreted in the context of grandeur. This character of public open spaces is measured by their capacity to depict cities and their inhabitants comprehensively. Landscape in Public places is an integral component of the land, shaped over time by natural forces and human activities, as perceived by both residents and visitors. The research employs a landscape approach, facilitating an assessment that considers and compares various aspects contributing to the layers of the landscape in a public space and how it shapes the way people engage with each other in that public space.

The interplay between the conceptual and historical dimensions of the natural environment, combined with the recreation of both natural and cultural perspectives, plays a crucial role in nurturing a sense

of community and place. Conversely, numerous current public spaces frequently exhibit features that are incompatible with their intended communal objectives.

A city constitutes a sizable and enduring human settlement, typically characterized by intricate systems, layouts, sanitation and services. The city's businesses and work culture actively promote interactions among its residents, thereby presenting a challenge and opportunity for the city's development.

The study aims to identify and evaluate the parameters influencing public spaces and their role in enhancing the activity, vibrancy, safety and functionality of these spaces. This is achieved through a comprehensive methodology comprising a literature review and survey analysis. The findings from both approaches are integrated to form the study's conclusions.

**Keywords:** Urban open spaces, Public spaces, Landscape, Identity, Social

## Introduction

Public spaces are the diverse canvas upon which communal life unfolds, spanning from casual street corners to majestic civic landmarks. Historically, formal public spaces have served as pivotal hubs within settlements of all sizes, acting as focal points for societal interactions, gatherings and festivities. On a smaller scale, these spaces may serve as havens for relaxation, socializing or recreation, offering a visual respite amidst the urban bustle. They encompass a spectrum of environments, ranging from classical squares to serendipitous urban

nooks, and even innovative designs that challenge conventional notions of public space. These spaces provoke contemplation not only in their physical manifestation but also in their societal significance and management dynamics, prompting us to reconsider our preconceptions about the essence of public spaces (Fagerholm, 2021).

In today's landscape, public spaces have emerged as essential components in a multitude of development endeavors worldwide. This recognition extends across a spectrum of projects, encompassing both residential and commercial ventures. The deliberate incorporation of public spaces into these initiatives carries significant implications for how these areas are perceived and utilized by the community. These spaces serve as vital connectors within the built environment, fostering social interaction, community engagement and overall well-being. Moreover, their thoughtful integration can improve the quality and attractiveness of the surrounding urban fabric, thereby contributing to the creation of vibrant, livable and sustainable neighborhoods and districts (Harrouk, 2023).

### Aim

The aim of this study is to explore the role and significance of public open spaces in urban development, focusing on their impact on social interaction, community engagement, and overall well-being. This research will examine how the thoughtful integration and design of public spaces contribute to the livability, sustainability and vibrancy of urban neighborhoods.

### Objectives

- i. To examine how public open spaces contribute to building social networks, encouraging cultural exchange and promoting collective activities within urban communities.
- ii. To evaluate how different architectural and design approaches influence the usability, inclusivity and overall experience of public spaces, particularly in enhancing well-being and encouraging repeat visits.
- iii. To explore the effects of rapid urban growth, population pressures and increased infrastructure demands on the preservation, availability and sustainability of open public spaces in cities.

### Methodology

This study uses a mixed-methods approach, combining literature review, surveys, observational analysis and data interpretation (Figure 1).

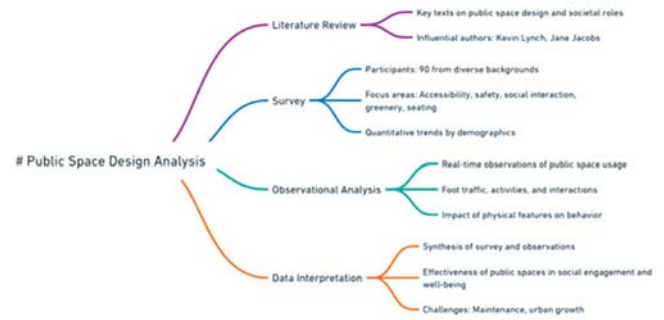


Figure 1: Structuring of the research

Source: Author

- **Literature Review:** Review of key texts on public space design, urban planning and societal roles of public spaces, drawing from authors like Kevin Lynch and Jane Jacobs, provides context for understanding their current relevance in urban settings.
- **Survey:** A survey was conducted with 90 participants from diverse backgrounds to gather data on the use, perceptions and design preferences of public spaces. The survey focused on aspects like accessibility, safety, social interaction and design elements, such as greenery and seating. Quantitative data analysis identifies common trends and patterns based on demographics.
- **Observational Analysis:** Observations in selected public spaces captured real-time usage, including foot traffic, types of activities and interactions. This analysis explores how physical features influence behavior in public spaces, offering insights into their social function.
- **Data Interpretation:** Survey and observational data are synthesized to assess the effectiveness of public spaces in promoting social engagement and well-being, while highlighting challenges like maintenance and urban growth.

### Literature:

#### Public open Spaces

The quality of public spaces largely shapes our perceptions of a city. When these spaces are well-maintained and inviting, they encourage repeat visits. Conversely, if they convey a sense of insecurity or are poorly maintained, we are unlikely to return. It should be standard practice for urban planning to prioritize the creation and upkeep of welcoming public spaces, rather than treating it as an occasional occurrence (WRI).

Public spaces which bring vitality to the empty areas of urban landscapes are integral to the creation of what we define as a city and play a key role in

However, the success of these public spaces hinges on several factors that determine their effectiveness



Figure 3: Effect of Public spaces on people and vice versa  
Source: Shivagunde, 2021



Figure 4: Project for Public Spaces helps people create and sustain public spaces that build strong communities.  
Source: Harrouk, Arch Daily, 2023

in fostering community connections and facilitating meaningful interactions. One key aspect is design: well-conceived layouts, amenities and aesthetics can foster people to gather and engage with their surroundings (Figures 5 and 6). Accessibility is also critical, as spaces that are easily reached and inclusive of all members of society promote broader participation and diversity (Shivagunde, 2021).

Furthermore, effective management and programming play pivotal roles in shaping the strength of public spaces. Engaging events, cultural activities and recreational opportunities attract visitors and encourage repeat visits, while responsible stewardship ensures the spaces remain safe, clean and welcoming for all. When residents feel a sense of ownership and responsibility for their shared spaces, they are more likely to actively contribute to their upkeep and programming, thereby reinforcing the space's role as a focal point of community life.



Figure 5: The Highline, New York  
Source: ISSU, 2024



Figure 6: Park & Play, Denmark  
Source: Duduch, 2019

The success of public spaces lies in their ability to foster connections, facilitate interactions, and reflect the diverse needs and aspirations of the communities they serve. Through thoughtful design, inclusive programming and active community engagement, these spaces can truly flourish as vibrant stages for public life.

### Redefining Urban Spaces: Exploring the Interplay Between Physical Environment and Human Actions

The concept of a reciprocal relationship between perceived safety and street usage underscores a fundamental dynamic in urban design. When people feel safer, they are more likely to connect with public spaces, whether it be for leisurely strolls, social gatherings, or commuting purposes. This increased human presence not only brings vibrancy to the streets but also serves as a natural deterrent to potential crime, as there are more 'eyes on the street' to deter illicit activities and provide a sense of collective security (Cheah, 2017).

In light of this relationship, it becomes imperative to establish principles for the development of public

spaces that foster both perceived and actual safety. These principles, often articulated through urban design guidelines or planning frameworks, aim to create environments that are welcoming, accessible, and conducive to positive social interactions.

For instance, one key principle may involve designing buildings with active facades—meaning storefronts or entrances that directly engage with the sidewalk, to promote pedestrian activity and create a sense of vitality along the street. When combined with considerations of human scale, such as sidewalk width, building heights, and street furniture placement, these design elements can enhance the overall pedestrian experience and encourage sustained use of the public area.

Moreover, the connection between well-designed public spaces and economic vitality should not be overlooked. By prioritizing human-centric design features and fostering an environment conducive to pedestrian activity, cities can stimulate local economies by attracting foot traffic to businesses, cafes and cultural institutions located along the street. This symbiotic relationship between urban form and economic activity highlights the importance of multiple dimensions—social, economic and spatial, in the creation of high-quality public spaces.

Ultimately, it is the thought through integration of these principles, considering how each element interacts with and reinforces the others, that ensures the creation of public spaces that are not only accessible and equitable but also safe and engaging for all individuals, regardless of background or circumstance. By prioritizing these principles in urban planning and design efforts, cities can cultivate environments that promote community well-being and enhance the overall quality of urban life (Figures 7 and 8).

### Observation through Literature study:

#### Key factors that influence the use of a public space

##### 1. Accessibility

Accessibility stands as a foundation for the vibrancy and functionality of any location. It encompasses the pivotal elements that enable individuals to navigate a public space with freedom, comforts and safety. As Davies (2000) outlines, the connectivity of public streets is paramount, characterized by several key attributes.

Firstly, streets must offer a sense of safety, attractiveness and upkeep. Well-maintained pathways and well-lit surroundings instil confidence



Figure 7: Chicago riverfront

Source: Tyndale Green by Markee, n.d.



Figure 8: Domino Park- privately-owned public space in Brooklyn

Source: Pintos, 2018

in pedestrians, encouraging their presence within the space. Aesthetically pleasing features further enhance the allure of the area, contributing to its overall appeal and desirability.

Secondly, the design of streets should prioritize user convenience and ease of movement. Thoughtful planning ensures that pathways are logically laid out, with clear signage and intuitive navigation aids. This design ethos facilitates seamless transitions for pedestrians, cyclists and other users, minimizing obstacles and enhancing overall accessibility. Efficiency is another crucial aspect of street connectivity. Streamlined routes and efficient traffic management strategies optimize flow, reducing congestion and bottlenecks. By prioritizing efficiency, streets become more conducive to pedestrian activity, fostering a dynamic and bustling atmosphere.

Lastly, the provision of amenities and facilities is essential for meeting the diverse needs of users (Figures 9 and 10). Access to amenities such as benches, rest areas and public restrooms enhances



Figure 9: Enabling Village by WOha, Singapore  
Source: Archdaily, 2016



Figure 10: Separate cycling track  
Source: Shivagunde, 2021

comfort and convenience, prolonging the duration of visits and encouraging extended engagement with the space. The seamless accessibility of public spaces, from conceptualization to realization, correlates directly with their design. When utilitarian elements in a shared space are unevenly distributed, they may inadvertently foster self-isolation among users. By prioritizing the removal of physical barriers, urban public spaces can transition from being divisive to inclusive environments (Haval, nd).

Accessibility serves as the key player of a vibrant public realm, shaping the experiences of those who interact with it. Designers can create inclusive environments that meet the diverse needs of the community by prioritizing safety, convenience, efficiency, and accessibility, fostering a sense of belonging and vibrancy in public spaces.

## 2. Diversity of Purpose

What do public space mean to each one of us?

Public spaces hold diverse meanings for various demographics within our society. To children, these spaces signify playgrounds, arenas where imagination

thrives and laughter echoes. For adolescents, they serve as hubs for socialization, offering spots to gather, chat and build friendships. The elderly view public spaces as avenues for reminiscence, places where tales are exchanged, and connections with the bustling world outside are maintained.

In congested living conditions, public spaces become sanctuaries, offering a let off from the confines of crowded homes. They provide an opportunity to breathe fresh air, stretch one's legs and momentarily escape the confines of four walls. For individuals dependent on street vending or performance for sustenance, these spaces are economic lifelines, offering platforms to showcase talents and earn a livelihood. (Harrouk, 2021)

Moreover, public spaces serve as arenas for communal expressions of joy or dissent. They witness celebrations of cultural events, victories and milestones, while also providing platforms for peaceful protests and advocacy. The perception of public spaces is deeply nuanced, shaped by a myriad of societal, cultural and economic factors, illustrating the multifaceted nature of our relationship with the spaces we collectively share.

## 3. Community Dynamics & City Liveliness

In vibrant public spaces, individuals have the freedom to express their cultural heritage and personal identities openly. These spaces not only facilitate cultural exchange but also aid as vital meeting points for children and young adults, offering avenues for play, social interaction and casual gatherings. They are more than just physical arenas; they represent the pulse of democratic living, embodying the essence of community engagement and shared experiences.

The significance of vibrant spaces lies not only in their function as meeting grounds but also as catalysts for fostering understanding and tolerance among diverse groups. Encounters with people from different backgrounds within these spaces promote empathy and appreciation for the richness of human diversity. Such interactions contribute to the fabric of a cohesive society where differences are honoured rather than feared (Shrestha, 2011). They serve as spaces for leisure and recreation, where people come all together to unwind, socialize and enjoy themselves. These shared experiences forge local attachments, forming the bedrock of a collective sense of belonging and identity within neighbourhoods and communities. In essence, vibrant public spaces play a critical role in nurturing a sense of community and belonging, adopting social cohesion and promoting democratic values of inclusivity and respect for all.

#### 4. Local Identity

Tangible cultural heritage, encompassing monuments and historic buildings, serves as a tangible link to the past, nurturing a sense of character and belonging among individuals and communities. These physical remnants of history evoke a connection to shared cultural narratives, traditions and values, enriching the fabric of society. As pedestrians traverse the streets adorned with such heritage, their behaviours are often influenced by the palpable presence of these landmarks, sparking curiosity, contemplation, and reflection (Muralidharan, 2022).

Moreover, the cultural significance of heritage assets extends beyond their intrinsic value, shaping the collective image and character of a city. Iconic structures and preserved sites serve as emblematic representations of a city's heritage, contributing to its allure and distinctiveness (Figure 11). Visitors and residents alike are drawn to these historic landmarks, eager to explore and immerse themselves in the rich tapestry of stories they embody.



Figure 11: Grand Bazar, Istanbul, Turkey

Source: Wikipedia, n.d.

Furthermore, the preservation and adaptive reuse of cultural heritage assets have emerged as potent tools for urban placemaking and revitalization. By breathing new life into old spaces, cities can reinvigorate their urban cores, fostering vibrant communities and bolstering economic prosperity. Adaptive reuse projects, such as converting historic buildings into museums, galleries or boutique hotels, not only preserve the integrity of the past but also inject vitality into city centers, attracting tourists, businesses and residents alike (Urbano, 2021).

In essence, tangible cultural heritage plays a multifaceted role in determining the urban landscape and the lived experiences of its inhabitants. Beyond serving as repositories of history and identity, these heritage assets catalyse social interaction, economic

development and urban regeneration, reaffirming their indispensable importance in contemporary urban development initiatives. As cities continue to advance, the preservation and celebration of cultural heritage remain essential pillars in fostering a sense of place, pride and belonging among diverse communities.

#### 5. Social Participation

Research indicates that public spaces witness the highest levels of activity when individuals are actively engaged in social interactions. Observations reveal that people often congregate in areas where pedestrian traffic is most concentrated, with many choosing to linger or engage in conversation without disrupting the flow of foot traffic. This phenomenon underscores the dynamic interplay between human conduct and the design of environments.

Outdoor social interactions can be categorized into two broad types: necessary activities, such as commuting or running errands, and optional activities, including relaxation or socializing with friends. Necessary activities are relatively unaffected by the quality of the physical environment, whereas optional activities are greatly shaped by how attractive and functional the space is (P.Vanka, 2014). It is noteworthy that people tend to gravitate towards public spaces that offer a sense of comfort, aesthetic appeal and opportunities for social engagement. Whether it's a bustling plaza adorned with street vendors and outdoor seating or a serene park with inviting benches and scenic views, the environment plays a crucial role in shaping the types and intensity of social interactions that occur.

The prevalence of social events in public spaces underscores the intrinsic human need for connection and community. By creating inviting, well-designed environments that cater to both mandatory and possible activities, cities can cultivate vibrant, inclusive public spaces that enhance the quality of life for all inhabitants.

#### Analysis of Key Factors Influencing the Use of Public Spaces:

##### 1. Accessibility as the Foundation of Usability:

- Accessibility determines how easily individuals can navigate and utilize public spaces.
- Safety, upkeep and aesthetic appeal foster confidence and encourage presence in public areas.
- Efficient and intuitive designs ensure smooth movement for pedestrians and other users, making spaces welcoming and functional.

## 2. Diversity of Purpose Enhances Relevance:

- Public spaces cater to varying needs, from children's play areas to social hubs for adolescents and relaxation spots for the elderly.
- They act as economic platforms for street vendors and performers while also serving as sanctuaries in rigidly populated areas.
- Their multi-functional nature makes them essential for diverse demographics.

## 3. Community Dynamics Foster Social Cohesion:

- Vibrant public spaces promote cultural exchange and inclusive interaction among diverse groups.
- They support democratic engagement, empathy and understanding, enriching the social fabric of communities.
- Such spaces contribute to emotional well-being by offering joy, relaxation.

## 4. Local Identity Through Cultural Heritage:

- Heritage elements like monuments and historic buildings enhance the character and uniqueness of public spaces.
- These landmarks connect people to shared histories, traditions and values, fostering pride and a sense of identity.
- They also influence behaviour, encouraging reflection and cultural appreciation.

## 5. Social Participation as a Catalyst for Activity:

- Public spaces thrive when they facilitate high levels of social interaction and engagement.
- Necessary activities (e.g., commuting) and optional activities (e.g., socializing) are influenced by the space's design and appeal.
- Comfort, aesthetics and opportunities for interaction play a pivotal role in drawing people to public areas, making them vibrant and dynamic.

### Survey:

In order to gain innate insights into the expectations of individuals regarding the quality of public spaces and their desires for their immediate surroundings, a comprehensive survey was undertaken. This survey encompassed various parameters designed to capture the multifaceted preferences and requirements of the community. A detailed analysis of the findings derived from this survey are presented below. The survey was done across 90 individuals.

The survey played an important role in enlightening the aspirations and hopes of stakeholders within the community. It shed light on their desires, providing

invaluable insights into how these ambitions could be leveraged to cultivate safer and more inclusive urban social environments. By understanding the core values and needs of locals, urban planners and developers can tailor their strategies to create active public spaces that echo with the community's vision. These spaces would not only be safe but also universally accessible, fostering a sense of belonging and interconnectedness among residents. Through thoughtful consideration of the survey findings, urban spaces can transcend mere functionality to become vibrant hubs where people from different backgrounds come together to connect, engage and thrive.

The survey also pointed out some very important points in terms of safety, accessibility and even availability of public spaces in the individual cities.

### Analysis of Survey:

1. The use of public spaces is commonly seen on a weekly basis the highest which establishes the fact that people very often visit public spaces.
2. Markets are the most visited public infrastructures which also means that people prefer utilitarian public areas. The second most visited spaces are the streets which also concludes the same.
3. The major population responded that they do feel safe in public spaces that they have visited but a 23% of people have mentioned that they have experienced unsafe behaviour in public spaces. This number raises concern in terms of safety in public spaces in India.
4. A fair number of people have commented negatively on the cleanliness and maintenance of the public infrastructure. Which could further be resolved by the local authorities and community participation.
5. 41% people said that there are neither ramps nor toilets nor tactile paths for differently abled to access the public space. This is a point that needs to be taken into consideration very seriously and must be dealt with at a policy level itself.
6. Most people seem to be satisfied with the number of greens these public spaces must provide. Landscape plays a crucial role in activating and engaging people in a space. But along with that the surveyors have also pointed out the lack of pause points and resting spaces. Seaters and pause points ensure longer public engagement and is extremely important.
7. A major issue pointed out in the survey is the lack of dedicated lanes for cyclist in public places in

India. This makes it difficult for the pedestrians as well as cyclists to co-exist safely. This again is an issue that can be dealt with at planning level.

### **Conclusion of the study**

In Conclusion the following points are observed and by addressing these points, public spaces can become vibrant, functional and welcoming environments for all.

#### **1. Enhanced Infrastructure:**

- Essential for addressing the diverse needs of the community.
- Public spaces should be functional, enjoyable and equipped with amenities like food options, recreational activities and entertainment.

#### **2. Safe Transportation:**

- Implementation of dedicated cyclist lanes is crucial for safe and efficient transportation.

#### **3. Addressing Challenges:**

- Immediate attention is required for managing feral dogs and ensuring inclusivity for all societal segments.

#### **4. Spaces for Children:**

- Establish dedicated, well-maintained spaces for children.
- Upgrade parks to meet safety and maintenance standards.

#### **5. Improved Facilities:**

- Upgrade public restroom facilities.
- Address vehicle-related issues by improving parking and public transportation options.
- Provide basic amenities such as clean drinking water and shelter.

#### **6. Comfortable Public Spaces:**

- Enhance seating arrangements.
- Implement measures for mosquito control and stray animal management.
- Maintain clear communication regarding maintenance activities.

#### **7. Universal Accessibility:**

- Ensure public spaces are accessible to everyone.
- Increase shaded areas and improve pedestrian and cyclist tracks.
- Designate spaces exclusively for pedestrians and vendors.

#### **8. Community Engagement:**

- Foster community involvement in the maintenance and development of public spaces.

### **Annexures:**

#### **List of Survey questions:**

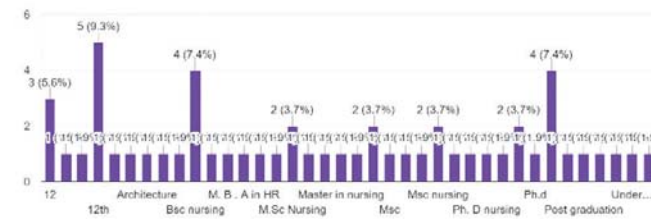
1. Age
2. Gender
3. Highest Educational qualification
4. Occupation
5. City-State-Country
6. Region
7. How often do you visit public spaces in your city?
8. Which public spaces do you frequent the most?
9. How accessible are public spaces from your residence?
10. Do you find the connectivity between different public spaces in your city adequate?
11. Do you feel safe when using public spaces, especially during the evenings?
12. How do you rate the lighting in public spaces during the evening and night?
13. Have you ever witnessed or experienced any incidents of harassment or crime in public spaces?
14. How would you rate the cleanliness of public spaces in your city?
15. Are public spaces adequately maintained?
16. What are the facilities for the differently abled in public spaces in your city?
17. Do public spaces in your city have sufficient greenery and landscaping?
18. How important do you think greenery and landscaping are for enhancing the quality of public spaces?
19. Are there enough seating and rest areas in public spaces for people to relax?
20. How would you rate the comfort and maintenance of existing seating arrangements?
21. Do you perceive pollution (air, water, noise) as a problem in public spaces?
22. How would you rate the integration of public transportation with public spaces in your city?
23. Are public spaces in your city designed to showcase cultural or historical significance?
24. Are there dedicated lanes or paths for cyclists in public spaces?
25. What improvements would you like to see in public spaces in your city?
26. Any additional comments or suggestions for enhancing the quality of public spaces?

## Data Received:

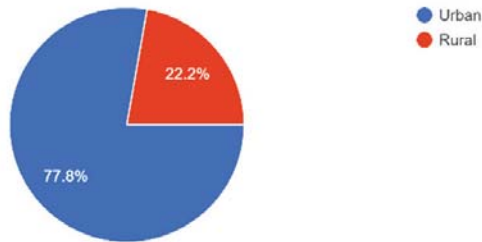
Age  
89 responses



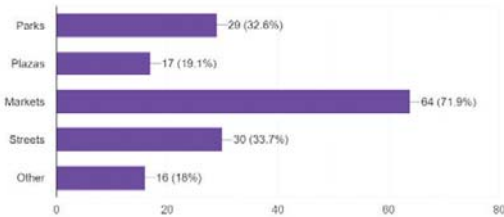
Highest Educational qualification  
54 responses



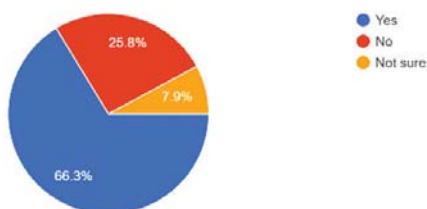
Region  
54 responses



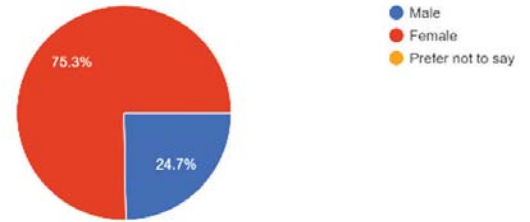
Which public spaces do you frequent the most?  
89 responses



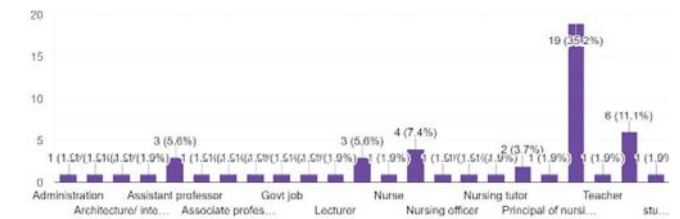
Do you find the connectivity between different public spaces in your city adequate?  
89 responses



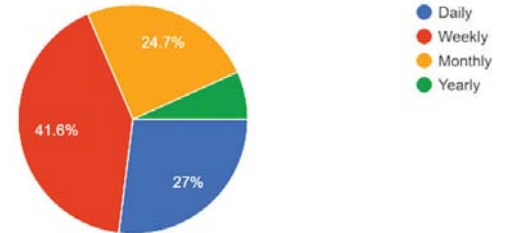
Gender  
89 responses



Occupation  
54 responses



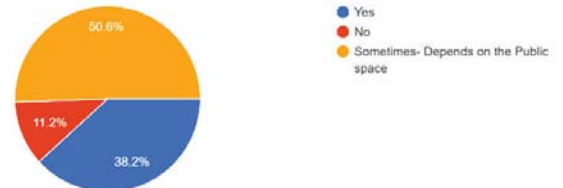
How often do you visit public spaces in your city?  
89 responses



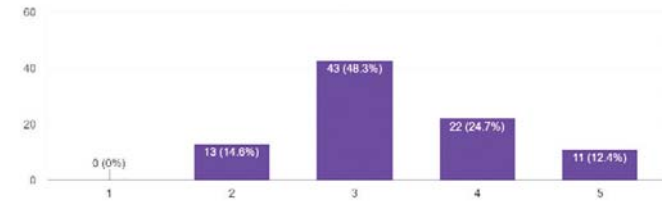
How accessible are public spaces from your residence?  
89 responses



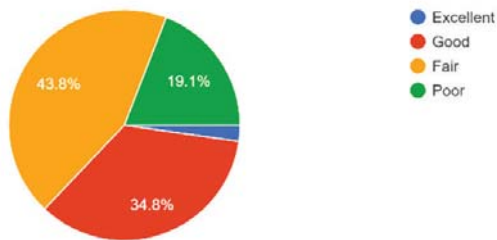
Do you feel safe when using public spaces, especially during the evenings?  
89 responses



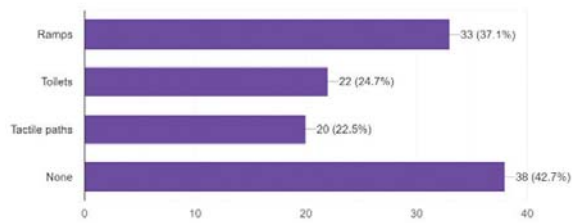
How do you rate the lighting in public spaces during the evening and night?  
89 responses



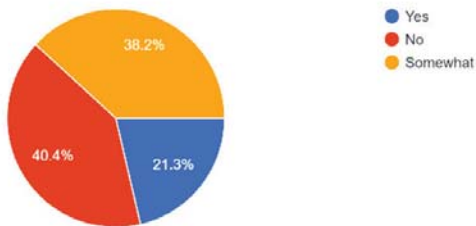
How would you rate the cleanliness of public spaces in your city?  
89 responses



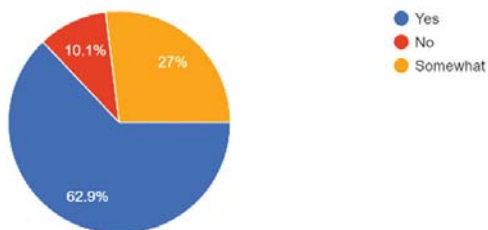
What are the facilities for the differently abled in public spaces in your city?  
89 responses



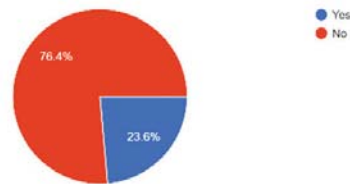
Are there enough seating and rest areas in public spaces for people to relax?  
89 responses



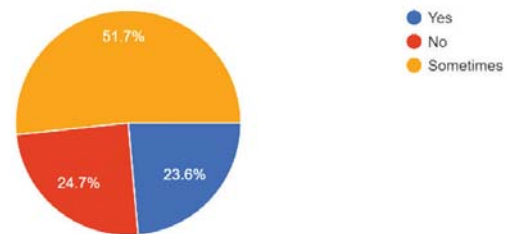
Do you perceive pollution (air, water, noise) as a problem in public spaces?  
89 responses



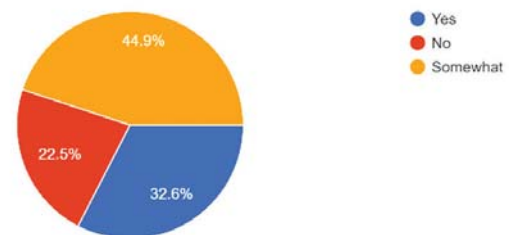
Have you ever witnessed or experienced any incidents of harassment or crime in public spaces?  
89 responses



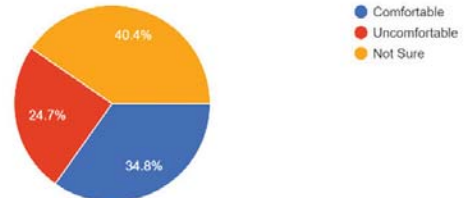
Are public spaces adequately maintained?  
89 responses



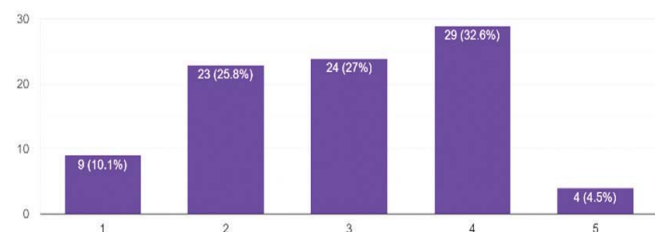
Do public spaces in your city have sufficient greenery and landscaping?  
89 responses



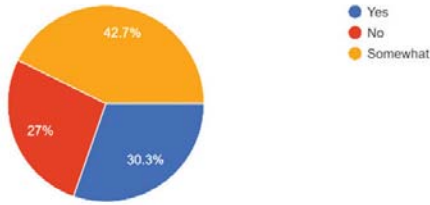
How would you rate the comfort and maintenance of existing seating arrangements?  
89 responses



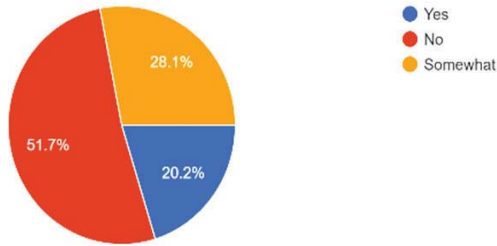
How would you rate the integration of public transportation with public spaces in your city?  
89 responses



Are public spaces in your city designed to showcase cultural or historical significance?  
89 responses



Are there dedicated lanes or paths for cyclists in public spaces?  
89 responses



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## ARTICLE

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# Assessment of Traditional Construction Techniques of Vernacular Architecture in Uttarkashi for Disaster Resistance

By Haardik Kansal and Venu Shree

## Abstract

*This research aims to study the traditional construction techniques of Uttarkashi, a region prone to natural disasters, and their vernacular architecture in respect with disaster resistance. The study focuses on two vernacular houses built in the 1700s and 1800s. The traditional houses in this study area are built using local materials such as wood, stone, and mud, with construction techniques that includes dry masonry, interlocking stones, and ring beams. These vernacular construction technique enables to withstand earthquakes and floods despite being constructed without modern engineering techniques. The analysis is based on structural parameters such as strength of building materials and mortar, wall to wall connection, wall to roof connection, foundation to wall connection, roof design, ring beam, and strength of walls whereas design parameters are siting, building plan, centre of gravity, door and window location and quality of workmanship. The findings emphasise the need for awareness and adherence to vernacular construction techniques for earthquake-resistant construction to reduce potential losses and enhance building safety.*

**Keywords:** vernacular construction techniques, earthquake, traditional, structure, natural disaster

## 1. Introduction

Since ancient times, India has seen many natural catastrophes that cause death and ruin in various areas each year. The Himalayan state of Uttarakhand is particularly vulnerable to natural calamities

including earthquakes, flash floods, cloudbursts, and landslides. Given that the Indian subcontinent pushed against the Asian landmass to construct the Himalayas, as a result of the seismic pressure, this area is now prone to earthquakes. Over 40 million hectares (mha) of the 329 mha total geographical area are susceptible to flooding. Floods are a common occurrence that result in significant loss of life as well as harm to property, infrastructure, public services, and livelihood systems. In cities like Uttarkashi, cloudbursts and strong rains are the main causes of floods.

Since its formation in 1960, Uttarkashi district in north-west Uttarakhand has witnessed several major disasters. This ancient region, known for its rich cultural heritage, is often referred to as the “Kashi of the North” (Uttara), holding a level of reverence comparable to that of Kashi (Varanasi) in the plains. The district has experienced significant destruction and loss of life due to earthquakes, floods, and landslides.

## 1.1 Background

Uttarkashi District contains a handful of preserved traditional dwellings with a particular building type known as Koti Banal structure. Koti Banal is a hamlet near Uttarkashi where the Koti Banal architectural method started. Historically, Uttarkashi inhabitants built their own dwellings. They collected resources such as wood and stone and also worked as masons. Also, Koti Banal homes were established as a food storage house for the entire village, therefore

everyone in the community contributed to its construction in order to have their fair portion of storage space.

## 1.2 Koti Banal Construction

Existing literature suggests that this architectural style appeared as early as a thousand years ago. Koti Banal's design was not restricted by any existing rules. It was erected at a time when science and earthquake resistance were not well understood by the general population. Despite these challenges, the multistorey dwellings' designs appear to meet contemporary seismic building standards. Form and proportion, a modest and single entry, and joinery details characterise these buildings' earthquake safety features. Several examples of structures of this style have endured the test of time for at least 200-300 years.

Traditional wisdom, local resources, collaborative efforts, and professional workmanship are all on exhibit here. Notable features of Koti Banal structures that make them earthquake resistant include:

1. **Site Selection:** From a seismic standpoint, slope stability and the usage of solid ground have been essential elements of construction.
2. **Building Plans and Massing:** Koti Banal dwellings feature a symmetrical central axis, a rectangular floor plan, and earthquake-resistant enclosures. The structure's seismic performance is not impacted by the absence or sparseness of ornamental components like as paintings or metals, which are replaced by wood carvings. Connecting walls extend along the narrower axis of these multi-family dwellings. By forming a rigid box with these overlapping walls, the building's seismic resistance is significantly boosted. The typical height for such dwellings is between 7 and 12 meters. These buildings are distinguished by their straightforward design, complicated, substantial, and raised foundation, restricted window apertures, and shear walls, among other features.
3. **Rigidity and Flexibility:** Flexibility and rigidity are important aspects of a structure's seismic resilience. They allow the structure to withstand large deformations without collapsing. Damageability is another feature that allows a structure to withstand considerable damage without failing completely or partially.
4. **The Materials Used:** This structure had been constructed with locally sourced wood and stone. Stone is brittle, whereas wood is ductile. Wood is a ductile material that can

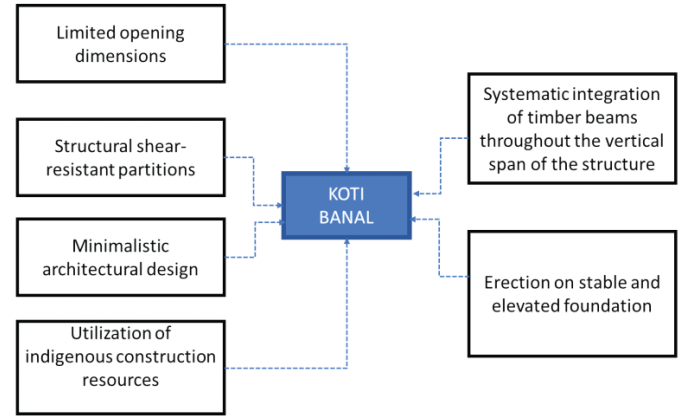


Figure 1: Koti Banal construction features

Source: Authors

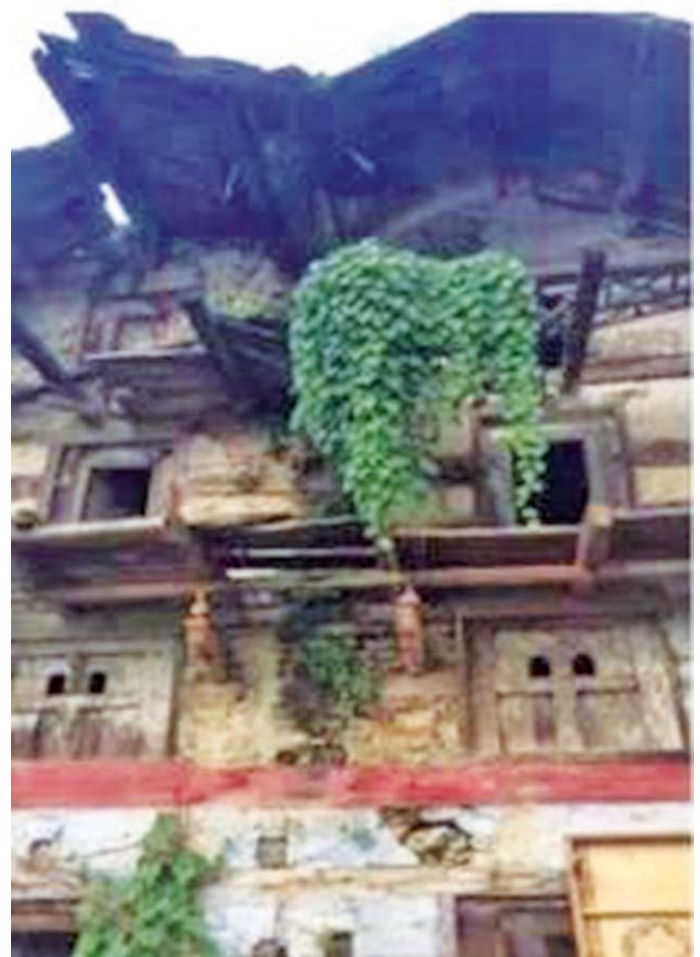


Figure 2: Bijola Residence Front Elevation

Rawat, 2019

absorb earthquake forces, hence it was widely employed in the construction of these dwellings.

## 1.3 Traditional Garhwali stone construction

This approach involves sloping roofs and dwellings with just two stories. They featured substantial masonry walls constructed primarily of timber and stone, which were abundant locally. Stone slates were commonly used above timber beams on slabs



Figure 3: Timeline showing calamities experienced by the structure  
Source: Authors

and sloping roofs. The slates were then coated with mud plaster. This mud plaster course is done on a regular basis to guarantee proper upkeep.

Due to a lack of water, dry masonry was used, which was flexible in horizontal motions, as stone slates were in abundant. The efficient interlocking prevents the wall from collapsing.

#### 1.4 Aim and Objectives

To investigate the resilience of Uttarkashi's traditional building methods to disasters and recommend the best suitable construction technologies for seismic resilient structures.

## 2. Literature Review

In general, earthquake-resistant construction features include a symmetrical configuration, better integrity, diminished mass, and masonry confinement with timber and/or bamboo. These characteristics have evolved over time as a result of local communities' long-term exposure to earthquakes and lessons learned from previous earthquakes (Ortega, Vasconcelos, Rodrigues, Correia, & Lourenço, 2017). In addition to seismic resistance, vernacular structures reflect the local social and environmental circumstances, as evidenced by the use of locally derived materials that are recyclable and durable, and adaptive in usage (Bothara, Ingham, & Dizhur, 2018).

According to an extensive literature review, researchers studying extant vernacular brick buildings around the world have generally concentrated on documenting their structural elements as well as their post-earthquake observed seismic performance (C Rai & Murty, 2006) (Ortega, Vasconcelos, Rodrigues, Correia, & Lourenço, 2017) (Yang & Langenbach, 2009) (Didem Aktas, 2017). Studies undertaken primarily in Europe have focused on the evaluation of existing European vernacular

buildings, with a primary emphasis on conservation. However, there are only a few studies that have addressed the engineering characterisation and associated design and assessment technique of vernacular buildings (Ali, et al., 2013) (Ali, Schacher, Ashraf, & Alam, 2012) (Ingham, Dizhur, & Bothara, 2021) (K Thakkar & Agarwal, 2000).

Because of this information gap, there are no criteria for these building forms in local building codes, despite the fact that vernacular buildings are one of the most extensively used and adopted construction systems. As a result, study into the development of construction standards for vernacular structures is critical.

The major purpose of the described exercise was to conduct a comprehensive examination of earthquake-resilient vernacular buildings, conduct qualitative evaluations of these buildings, and determine the feasibility of earthquake-resilient building construction in the region. One goal of this study was to give information about these structures that might be useful to scholars and practitioners, policymakers, and disaster management. It is hoped that the findings of this study could increase their interest in researching vernacular masonry buildings further.

The investigation and new knowledge will aid in the preparation and updating of existing construction guidelines (Bothara & Brzev, A TUTORIAL: Improving the Seismic Performance of Stone Masonry Buildings, 2011) (NBC, 2015) (IS13828, 1993) (IS, 1993), as well as the development of standards and guidelines on the state-of-practice for seismic assessment and retrofitting of existing buildings, as well as the design of new buildings that incorporate vernacular building technologies. Furthermore, new information and increased awareness of vernacular buildings will help to develop appropriate building norms and regulations for these structures.

### 3. Methodology

The methodology for this study is structured around understanding the background, disaster occurrences, and vernacular construction techniques in Uttarkashi. Initially, the study identifies the need and scope, formulating objectives to guide the research. The first objective involves a detailed case study of vernacular construction techniques in Uttarkashi, focusing on their behavior and problems during disasters. Data is gathered from literature case studies, books, research papers, websites, and articles, specifically examining the Koti Banal construction technique. The second objective is to analyse the underlying causes, and providing a comprehensive understanding of the factors influencing construction choices in Uttarkashi. Finally, the study concludes with recommendations for disaster-resistant construction technologies to improve the resilience of existing non-engineered constructions. This structured approach ensures a thorough analysis, leading to practical and informed recommendations for enhancing disaster resilience in Uttarkashi.

### 4. Data Analysis and Findings

#### 4.1 Bijola Residence, Uttarkashi, 1700s

The structure located in Dunda, Uttarkashi was built around 400 years old with koti banal style. Currently it is no longer in use since it was declared unsafe to live in and has been classified as a high-risk structure. But the structure has survived all of the previous calamities. Wood, stone, mud, mud plaster, and other materials were used to build this structure. Openings offered are extremely small, and floor heights are less than livable height, which is one of the causes for its decline or can be considered a negative of this building approach.



Figure 4: Panwar residence front elevation  
Rawat, 2019

**Siting:** The site is located on a stable hilly terrain.

**Foundation Design:** The foundation is constructed with irregular rubble masonry using stone. **Structural Balance:** The walls are parallel and uniform in height, with equally sized openings, ensuring overall structural balance.

**Building Plan:** The building has a symmetrical, rectangular plan, which helps minimise torsion during earthquakes. Projections and overhangs are supported by strong wooden brackets and beams that are securely bonded to the walls.

**Centre of Gravity:** The building's height exceeds its length, resulting in a slightly higher centre of gravity. Additionally, the lightweight roof helps lower the building's overall centre of gravity.

**Rigid Walls:** The structure features robust stone walls with a thickness of 0.5 meters, capable of effectively transmitting loads from the roof, slabs, and foundation. These walls are constructed using a combination of stone and wood

**Roof Design:** The roof is designed to be lightweight, consisting of timber rafters and purlins, with stone slates serving as roof tiles. It has maintained its structural integrity through various adversities.

**Door/Window Placement and Sizes:** Doors and arches are positioned at the corners and occupy large areas, while windows are relatively smaller in comparison to the wall surfaces.

**Foundation-to-Wall Connection:** The foundation is made of stone, with a layer of wall construction positioned above it

**Wall-to-Wall Connection:** Typical walls are 0.6 meters thick and consist of three layers, with a stone layer sandwiched between two anchored timber boards.

**Wall-to-Roof Connection:** The roof is securely attached to the walls, with rafters resting on the beams. **Ring Beam:** This load-bearing structure incorporates ring beams, including slab beams, tie beams, lintel bands, and sill bands. These bands are placed after every alternate course of the wall.

**Strength of Building Materials:** The stone and wood used in the foundation and walls have high compression strength.

**Strength of Mortar:** Mud mortar was used in the construction of this house and remains intact in some areas.

**Quality of Workmanship:** The joinery details are precise and robust, with materials assembled well, maintaining their integrity even after 400 years.

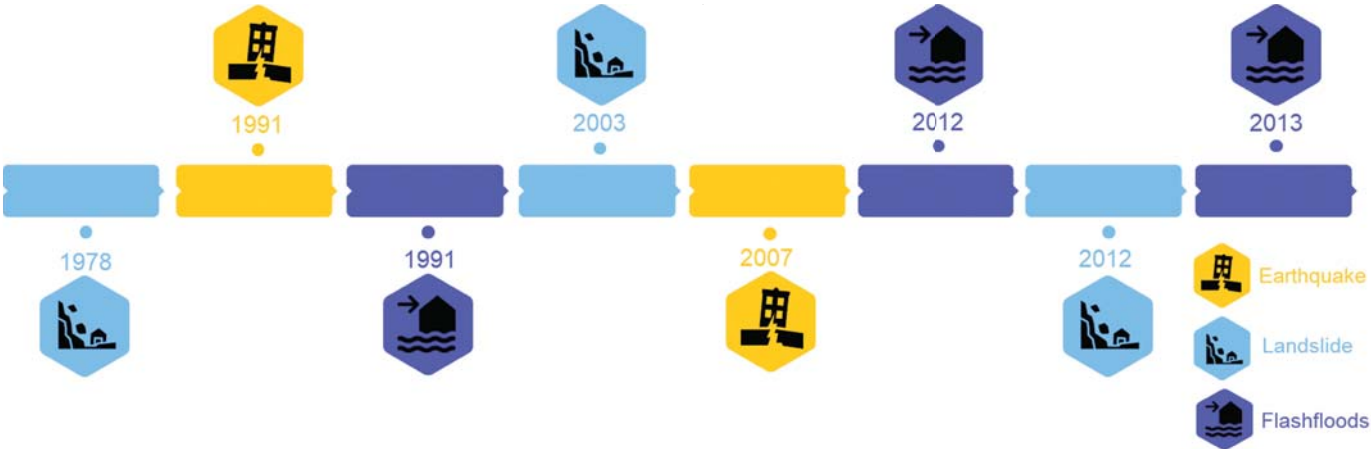


Figure 5: Timeline showing calamities experienced by the structure  
Source: Authors

4.2 Panwar Residence, Uttarkashi, 1800s

The residence is situated in Tilod, Uttarkashi which was built in mid 1800s.

Siting: The site is located on stable slopes, positioned at a high level away from the river.

Balance of structure: The structure is equally balanced, with openings of equal size on parallel walls. Building Plan and Centre of Gravity: The building features a simple rectangular plan, with the centre of gravity located inside the house.

Roof Design: The roof is sloping and consists of rafters, purlins, and stone slates.

Door/Window Sizes: Doors and windows are very small, measuring 0.5 meters by 0.45 meters. Foundation-to-Wall Connection: The stone foundation is connected to the wall without a plinth beam band.

Wall-to-Wall Connection: Walls are connected to the wall above through beams, and walls on the same floor are connected through columns at the corners.

5. Results and Discussion

Table 1 and Table 2 present an analytical comparison of two residential structures, namely Bijola residence and Panwar residence, based on various construction

Table 1: Analysis of Bijola Residence  
Source: Rawat, 2019

| S. No | Parameters for analysis         | Superior | Acceptable | Inferior |
|-------|---------------------------------|----------|------------|----------|
| 1.    | Siting                          |          |            |          |
| 2.    | Foundation Design               |          |            |          |
| 3.    | Balance of structure            |          |            |          |
| 4.    | Building Plan                   |          |            |          |
| 5.    | Centre of Gravity               |          |            |          |
| 6.    | Rigid Walls                     |          |            |          |
| 7.    | Roof Design                     |          |            |          |
| 8.    | Projection and Overhangs        |          |            |          |
| 9.    | Door/Windows Location and Areas |          |            |          |
| 10.   | Foundation to wall connection   |          |            |          |
| 11.   | Wall to wall Connection         |          |            |          |
| 12.   | Wall to Roof Connection         |          |            |          |
| 13.   | Ring Beam                       |          |            |          |
| 14.   | Strength of Building Materials  |          |            |          |
| 15.   | Strength of Mortar              |          |            |          |
| 16.   | Quality of Workmanship          |          |            |          |

Table 2: Analysis of Panwar Residence  
Source: Rawat, 2019

| S. No | Parameters for analysis         | Superior | Acceptable | Inferior |
|-------|---------------------------------|----------|------------|----------|
| 1.    | Siting                          |          |            |          |
| 2.    | Foundation Design               |          |            |          |
| 3.    | Balance of structure            |          |            |          |
| 4.    | Building Plan                   |          |            |          |
| 5.    | Centre of Gravity               |          |            |          |
| 6.    | Rigid Walls                     |          |            |          |
| 7.    | Roof Design                     |          |            |          |
| 8.    | Projection and Overhangs        |          |            |          |
| 9.    | Door/Windows Location and Areas |          |            |          |
| 10.   | Foundation to wall connection   |          |            |          |
| 11.   | Wall to wall Connection         |          |            |          |
| 12.   | Wall to Roof Connection         |          |            |          |
| 13.   | Ring Beam                       |          |            |          |
| 14.   | Strength of Building Materials  |          |            |          |
| 15.   | Strength of Mortar              |          |            |          |
| 16.   | Quality of Workmanship          |          |            |          |

parameters. Each parameter is rated as superior, acceptable, or inferior. For Bijola residence, notable strengths include foundation design, balance of structure, building plan, centre of gravity, rigid walls, wall to roof connection, ring beams, and strength of building materials, quality of workmanship, all rated as superior. However, projection and overhangs were rated as inferior. Conversely, Panwar residence exhibits strengths in balance of structure, building plan, rigid walls, door and windows location and areas, wall to wall connections, wall to roof connection, strength of building materials and quality of workmanship with these parameters rated as superior. Nonetheless, it has inferior ratings in ring beams as they are not constructed. Both residences share similar strengths in structural balance and foundation design, but they also face challenges in ensuring siting, roof design, foundation to wall connection and strength of mortar which is rated as acceptable.

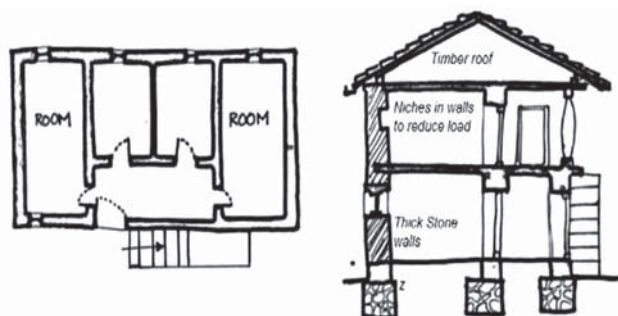


Figure 6: Floor plan (left), Sectional elevation (right)  
Rawat, 2019

## 6. Conclusions and Recommendations

In conclusion, the study of traditional construction techniques in Uttarkashi, particularly the Koti Banal, has revealed valuable insights into their remarkable resilience to natural disasters. These vernacular structures, built with local materials and ingenious construction methods, have demonstrated their ability to withstand earthquakes, floods, and other calamities despite being constructed without modern engineering practices. Notably, the analysis of Bijola and Panwar residences showcased various strengths in their construction, such as foundation design, structural balance, and roof design, but also highlighted areas for improvement, such as projection and overhangs, and the construction of ring beams. By recognising the efficacy of these traditional techniques, there is an opportunity for promoting awareness and adherence to these methods in contemporary construction practices, thereby enhancing disaster resilience and reducing potential losses. This underscores the importance of integrating vernacular construction techniques into modern building standards and regulations, as well as fostering further research and development in this area. Ultimately, the findings emphasise the significance of preserving and leveraging traditional wisdom and construction know-how to create safer, more disaster-resistant structures in susceptible regions such as Uttarkashi.

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## ARTICLE

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# Indigenous Settlement Patterns and Habitats

## A Case Study of the Mishing Community in Majuli, Assam

By Ar. Sanjukta Das, Ar. Maria Khan and Ar. Shubhada P. Agrawal

*Indigenous architecture reflects the unique identity and sustainable practices of communities shaped by their socio-cultural contexts and environmental surroundings. This paper explores the architectural heritage of the Mishing community in Majuli, one of the largest river islands in the Brahmaputra River, Assam. The study aims to illuminate the intricate relationship between the community's everyday life, livelihood patterns, and the built environment, emphasising local materials and sustainable practices tailored to the island's natural landscape. The architectural forms of the Mishing community are deeply intertwined with their cultural practices and ecological sensibilities. Through a blend of on-site studies, community engagements and literature reviews, this research documents the settlement patterns and habitable spaces that define their architecture. It examines the versatile uses of spaces, structural techniques and craftsmanship, highlighting their resilience and adaptability in harmony with the island's dynamic riverine ecosystem. Key aspects include mapping Mishing settlements, analysing architectural typologies, and evaluating environmental strategies embedded in their building traditions. By integrating insights from primary fieldwork and secondary research, this study provides a comprehensive understanding of how indigenous communities sustainably coexist with their natural surroundings through architectural practices that preserve heritage and promote environmental harmony.*

### 1. Introduction

Indigenous architecture refers to indigenous communities and their relationship with the built environment. Indigenous architectural practices and techniques are usually developed by the community's

socio-cultural, spiritual and environmental contexts of a specific geographic location (figure 1). The resources available in the specific region plays a major role in shaping the indigenous built form. The structures often reflect a deep understanding and connection to the land, landscape and soil using local materials and sustainable practices.

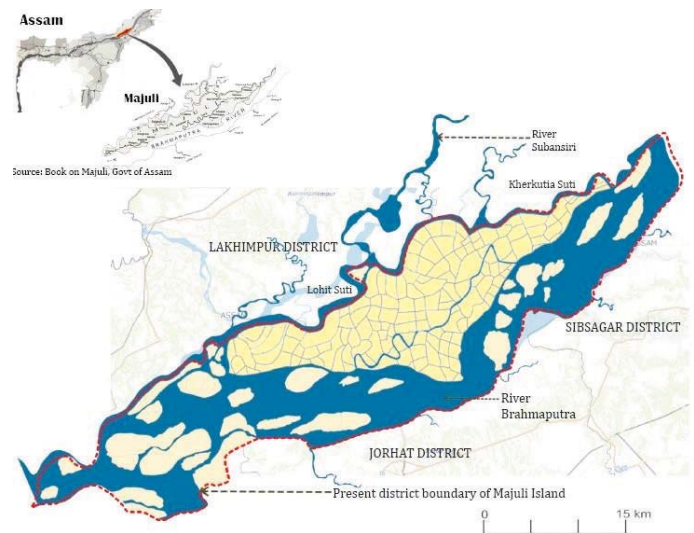


Figure 1: Map of Majuli island (not to scale)

Source: Authors

Majuli Island boasts multiplicity of ethnic tribes which have contributed immensely to the cultural heritage of the island. The Mishings, Kaibarttas and Koch were the early inhabitants of the island who migrated and settled in this region in search of agriculture and fishing. With respect to the context, this study is based on the study and understanding of the indigenous knowledge system with respect to the built environment of the Mishing community, along with a brief understanding about the island's natural features.

### 1.1 Aim

To study and understand indigenous architecture and traditional knowledge systems of the Mishing community with respect to socio-cultural aspects, housing patterns and adaptation to the natural environment along with highlighting value systems and strategies to preserve and promote local architecture.

### 1.2 Objectives

- To study the settlement pattern and housing typology as per the community's lifestyle and natural resources.
- To study the construction techniques and craftsmanship used in building their habitats and shelters.
- To understand the mechanism of flood resilient local structures —an adaptation to the local geography.
- To highlight values and significance attached with the indigenous built systems and skills.
- To understand various strategies in order to preserve and sustain these indigenous knowledge systems.

## 2. Literature Review

### 2.1 Climate Responsive Indigenous Architecture

Indigenous architecture is deeply rooted in the climate-responsive and cultural context of its inhabitants. It reflects the specific needs, values and lifestyles of the people who build and inhabit these structures. It not only serves functional purposes but also represents and signifies the symbolic and socio-cultural dimensions of the community it represents. The construction techniques and materials used are often locally sourced, ensuring that the buildings are sustainable and well-suited to their environment (Rapoport, 1969). One of the critical forces driving indigenous architecture is the adaptation to climate and available resources, though Rapoport notes that cultural and social factors often play a more significant role. For example, certain architectural features may persist due to their symbolic importance or social status even if they are not very climatically effective. Understanding indigenous architecture is essential as it reveals diverse cultural approaches to solving challenges in housing and spatial organization, offering valuable insights that can enrich present day architectural practices. Indigenous architecture addresses both environmental challenges and socio-cultural aspects specific to each community.

### 2.2 Indigenous Mishing Architecture: An Adaptation to the Natural Landscape

In the case of the Mishing tribe of Majuli Island, beyond their functional role, *chang ghars* symbolise the Mishing people's deep-seated cultural beliefs and practices in several profound ways. The elevated structure of *chang ghars* is not only disaster-resilient to some extent but also reflects the Mishing worldview of living in harmony with the Brahmaputra River and its seasonal rhythms. Moreover, the construction of *chang ghars* using locally sourced materials such as bamboo and thatch highlights the community's sustainable practices and traditional ecological knowledge. These materials are not merely chosen for their practical benefits but also hold symbolic value, representing the community's intimate connection to nature. In essence, beyond their role as shelter, *chang ghars* encapsulate the community's cultural identity, resilience and sustainable ethos. They stand as tangible manifestations of historical continuity and adaptation, reflecting values of community solidarity, environmental stewardship, and cultural pride that define the Mishing way of life on Majuli Island.

Overall, indigenous architecture is practical. In wet regions having a range of temperatures, the dwelling interior is kept dry, cool and clean. The overhanging, thick thatched roofs keep out rain while also retaining heat from the fireplace. The floors, either raised on piles or on mud plinths, are safeguarded from ground moisture, while the perforated walls allow light and ventilation. Smoke from the open fireplaces is drawn out through the roof, drying and sterilizing the meat and gourds stored in racks above the fireplaces and also drying the roof construction and covering (Kolkman & Blackburn, 2014).

### 2.3 Indigenous Architecture and Socio-Cultural Linkages

René Kolkman's detailed study on tribal architecture in northeast India reflects Rapoport's view that indigenous architecture is deeply influenced by climate, local materials and cultural practices. Kolkman aimed to thoroughly document the architectural diversity among 37 ethnic groups in the region, focusing on various structures like houses, granaries and ceremonial spaces. His approach involved meticulous documentation, using hand-drawn floor plans, sections and photographs to vividly portray the architecture of northeast India. This approach not only captures how these buildings look but also explains their cultural and environmental context. Beyond their physical aspects, Kolkman also explored the deeper cultural

meanings embedded in indigenous architecture. He highlighted how these buildings reflect social structures, rituals and community life, contributing not just to architectural knowledge but also to our understanding of how spaces are shaped by cultural identities. For example, the Mishing houses on Majuli Island in Assam illustrate these principles well.

## 2.4 Disaster Resilience

Disaster resilient design is crucial for communities vulnerable to natural hazards like cyclones and floods, intensified by climate change. It refers to the ability of built environments to withstand and recover from natural hazards effectively. Ankur, Kumar & Singh's study explores resilience strategies in Majuli and Bakkhali, categorizing into settlement, cluster and unit levels. They analyse village layouts, livelihood patterns and vegetation impact, emphasizing locally evolved strategies integrating community knowledge. These strategies are vital for adaptation and recovery, highlighting the need to embed resilient design in disaster risk reduction.

Similarly, Parth Champaneri's study titled "Disaster Resilient Houses" focuses on flood-prone Majuli, blending indigenous wisdom with modern techniques. Champaneri advocates for adaptive, community-oriented housing solutions that harness traditional materials like bamboo. His work highlights resilience as the ability to swiftly adapt and recover, informed by extensive site analyses and case studies across Majuli. By integrating community participation and emphasising sustainable livelihoods, his design strategy envisions durable housing that harmonises with local traditions, enhancing resilience against future disasters.

Together, these studies bring to light the importance of resilient design principles in mitigating natural disaster impacts and fostering sustainable community development in vulnerable regions like Majuli. They advocate for approaches that not only enhance structural resilience but also promote social cohesion and environmental sustainability.

## 3. Methodology

This study was carried out using both primary and secondary data collection methods (figure 2). Primary data was collected on-site through photographs, community and settlement mapping, documentation of natural setting and the built form and their condition analysis along with discussions with local community members through questionnaires and conversations. Secondary resources were utilised for literature reviews to understand the indigenous architecture as a whole and background study about

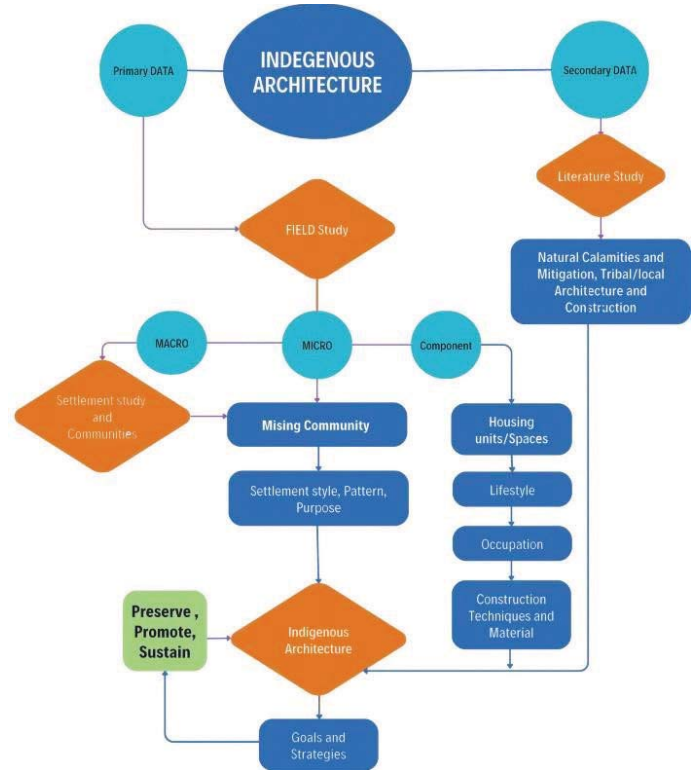


Figure 2: Methodology flowchart (not to scale)

Source: Authors

the Mishing community and their adaptability to the various geographical and ecological conditions of the island.

The primary study was divided into three parts: macro, micro and component levels. The macro study offered background information on the indigenous community through both literature and on-site research specific to Majuli Island. At the micro level, a Mishing settlement was selected to examine settlement patterns. For the component level study, samples of homes were studied to understand how spaces are used in relation to their occupations, daily activities and lifestyle. The study focuses on Mishings because they were the earliest known settlers of Majuli Island, making them indigenous to the land. Their primary occupations include fishing, agriculture, and handloom weaving.

## 3.1 Scope and Limitations

This study focuses on the documentation of the housing patterns of the Mishing tribe of Majuli Island as they are the indigenous and oldest inhabitants of the island.

## 4. Data Analysis and Findings

### 4.1 Understanding Natural Landscape and Settlement Patterns of Majuli Island

The Majuli river island of Assam has a very distinctive natural geography and riverine landscape (figures

3a and 3b). It comprises seasonal grasslands, paddy fields, farmlands such as mustard, black gram and sugarcane. Bamboo plantations, local vegetation, wetlands, small streams and tributaries, small ponds, sandbars (locally known as 'chapor') along with a wide range of flora and fauna are also present which are unique to this region. The island's ecology and natural landscape forms a vital source for the people and the community in several ways such as providing agricultural livelihoods for many communities, community fishing and supporting fishing industry, biodiversity and eco-tourism. Besides these, the island's climate and seasonal patterns have inspired the local culture, art, architecture and traditions. People have deep understanding about the natural phenomena of the island and their socio-economic activities and architectural systems are built upon this knowledge.



Figure 3a: Riverine landscape with Mishing settlements  
Source: Authors



Figure 3b: Wetlands in Majuli island  
Source: Authors

On the other hand, the island is also significant for its different community-based settlement pattern shaped by its natural and geographical factors which are identical to one another. Some of the settlement patterns are described below:

- Linear settlements (figure 4a):** These settlements are linear in form and are located along the riverbanks. The houses are constructed parallel to the river. Most of the Mishing community settlements are linear settlements. Wetlands and paddy fields form a major part in the landscape along the settlements.
- Rural agriculture based settlements:** These settlements are located in the interior part of the island and are surrounded with agricultural fields and farm lands. The Assamese Kaibartta community and some of the Deori tribe communities use this type of settlement pattern.
- Vaishnavite Sattra and clustered settlement (figure 4a):** This is one of the significant

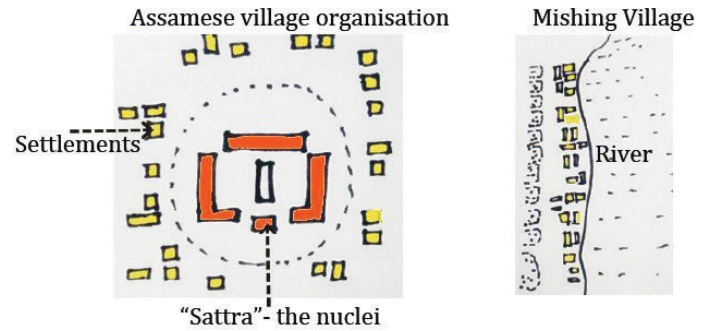


Figure 4a: Schematic sketch showing Sattra settlement and the linear Mishing settlement (not to scale)  
Source: Authors



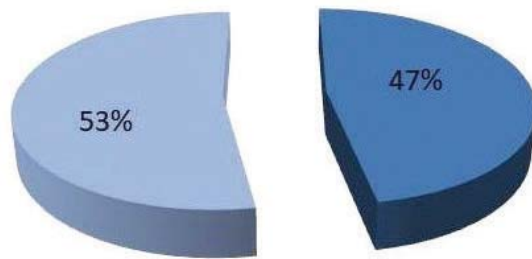
Figure 4b: Schematic cross-section showing the landscape and the settlements (not to scale)  
Source: Authors

settlement patterns of the island. These are based on the religious aspects of Vaishnavism. The settlement is divided into two zones planned around a rectangular area. Central area forms the religious zone and the peripheral area forms the residential zone for the monks. Many clustered settlements comprising the Assamese community are centred on these religious Vaishnavites institutions.

- Potter settlements:** These settlements are located near the river and they have a scattered pattern with nuclear housing units with clearly defined plot boundaries. The Kumhar's community resides in this type of settlement making it easier for them to get the desired soil from the river and for trading purposes.
- Mixed-use settlement:** These settlements often consist of residential areas, agricultural lands and forest areas and are spread across the island. It mostly comprises mixed communities, Assamese, Deoris and other indigenous groups.

Among the above-mentioned settlements, the Mishing settlements are one of the earliest and indigenous settlements of the island (the first being the Kumhar community settled around the early 15th century). The Mishing community is believed to be originate from the mountain range of Arunachal Pradesh who in search of fertile soil and water came and settled in Majuli Island. As per 2011 census, the Mishings comprises 47.4% out of the total population of the island (figure 5a). These settlements show a unique relationship with the natural environment of the island (figure 4b). Their indigenous housing typology is known to be resilient in nature as it has adapted to the challenging environments of River

- Mishing Population
- Other Communities (Deori, Sonowal, Kachari, etc)



Total Population : 167304 (100%)

Figure 5a: Pie chart showing Mishing population in Majuli island as per 2011 census

Source: Compiled by authors



Figure 5b: Pie chart showing percentage of livelihood pattern as per district information

Source: Compiled by authors

Brahmaputra, developing strategies to cope with floods and erosion.

#### 4.2 Documenting Socio-Cultural Aspects and Livelihood Patterns of Mishing community

The Mishing community has a rich socio-cultural heritage—their society is organized into clans with each clan having a headman and its own identity. This factor is also visible in their settlement pattern, as the settlements are grouped together into linear clusters, where a large number of families can reside together, facilitating communal living and reinforcing family bonding. Their strong community bonding is also prominent through social gatherings and festivals celebrated throughout the year. One of the major festivals is the Ali-Ai-Ligang festival which marks the beginning of the year and is celebrated in the beginning of spring season. Their daily lifestyle relies on sustainable practices, living in harmony with the natural environment.

The livelihood patterns of the Mishings are centered on the resources available around the

island. Traditionally they are into agriculture (rice cultivation), sustainable farming practices such as crop rotation, organic farming, nature conservation, livestock rearing, fishing, weaving and bamboo crafts, traditional building craftsmanship etc. All these occupations are characterized by self-sufficiency and sustainability, adaptation to the local environment, community bonding and preservation of traditional skills. Figure 5b shows the percentage of occupational patterns prevalent in the community.

#### 4.3 Detailed Analysis of Mishing Settlement Pattern

The Mishing settlements are primarily located near rivers, water bodies, and wetlands (figure 6a). This proximity is essential because the Mishing people's main occupations—fishing and agriculture—are heavily dependent on these water sources. The overall setting is closely integrated with the natural landscape. The agricultural lands are typically laid out near the settlement, ensuring accessibility for farming activities. These lands are often adjacent to wetlands and water bodies, which are crucial for irrigation and fishing.

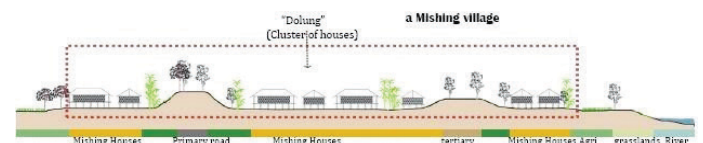


Figure 6a: Schematic section showing the layout of Mishing settlements (not to scale), Village name: Sumoimari, Majuli

Source: Authors

The settlement pattern is typically linear, with houses arranged along a pathway. These houses are clustered together without any defined plot boundaries, separated by natural vegetation like bamboo and other local trees and plants. A typical Mishing cluster of houses is known as “dolung”. Mishing houses are usually oriented along streets, facing the village road, and are oriented to ensure that the front lies in the shadow whenever possible. This arrangement helps in providing natural cooling and comfort. Many Mishing homes are longhouses, designed to accommodate multiple families, each having its own cooking fire.

As seen in figure 6b, these houses are elevated on high poles, which serve several purposes: protection from floods, better ventilation and keeping the living space above ground level. The area below the platform (*kritrig*) is used for firewood storage or setting up a loom. The granary (*koomsoong*) is built away from the main residence (Deka, 2018). Additionally, structures such as a fowl cage (*poutrir*), pigsty (*yougwm*), and cowshed are constructed

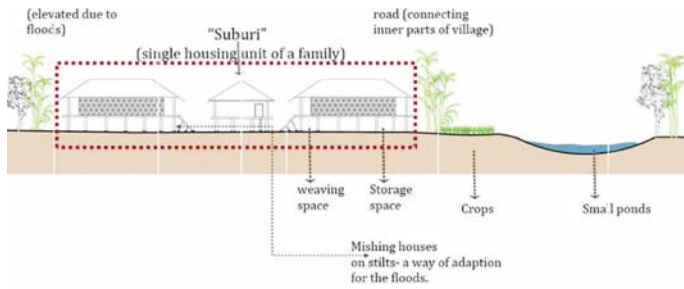


Figure 6b: Schematic section showing the layout of a single Mishing housing cluster (not to scale) Village name : Sumoimari, Majuli  
Source: Authors

within the homestead (Deka, 2018). The houses feature an overhanging front roof that provides a verandah for sitting and an open area at ground level, used for activities like weaving and rice pounding. Sometimes, bamboo fencing is used and the front area of the houses is often open, contributing to the communal feel of the settlement. The Misings also build seasonal structures like *tangi-ghar* (*payeb*) and *puyub*, which are constructed over anthills in their paddy fields (Deka, 2018).

#### 4.4 Detailed Analysis of House Forms and Spaces of Mishing Community

##### 4.4.1 Mishing House: Architecture, Zoning and Analysis

Mishing houses or *chang ghar* stand as prime examples of indigenous architecture in Assam, India, distinguished by their thoughtful interior planning and functional design. The primary living space in a Mishing house functions as a communal dormitory, accommodating families for sleeping, socialising and daily activities in a shared environment. Each family within the longhouse has its designated cooking area strategically placed for efficient ventilation of smoke and warmth, crucial during colder months. Adjacent to the living area, a verandah created by an overhanging front roof, provides shade and serves as a space for social interactions and drying agricultural produce. As seen in figures 7a, 7b and 7c, Mishing houses are elevated on high poles and feature a stilt level underneath that serves diverse purposes such as storage, weaving, rice pounding and safeguarding against floods, demonstrating a practical adaptation to the region's challenging environmental conditions. The sloped roof, typically thatched with bamboo or grass, effectively channels rainwater away from the house while providing natural cooling. This roofing method not only ensures durability but also reflects traditional building practices that integrate seamlessly with the natural landscape. Constructed primarily with local materials such as bamboo, wood and thatch, Mishing houses ensure

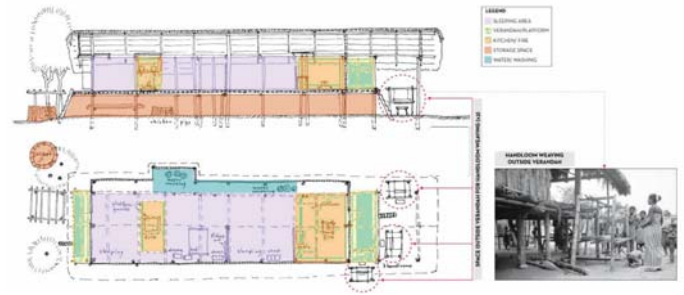


Figure 7a: Graphic representation of a Mishing longhouse, Majuli Island – plan and section (not to scale)  
Source: Adapted from Kolkman, R., & Blackburn, S. (2014). Tribal architecture in Northeast India. BRILL

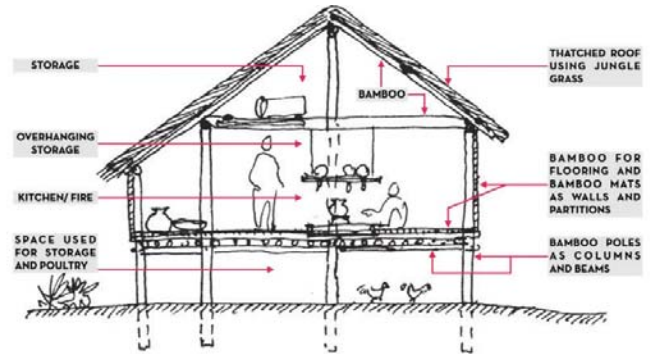
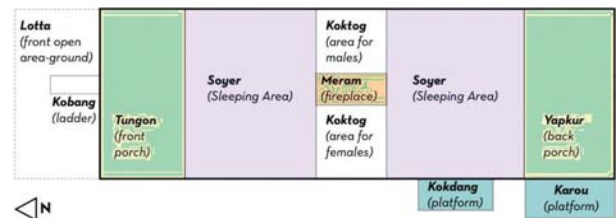


Figure 7b: Components of Mishing longhouse, Majuli Island – section (not to scale)  
Source: Adapted from Kolkman, R., & Blackburn, S. (2014). Tribal architecture in Northeast India. BRILL



General floor layout and zoning of a Mishing House (not to scale)  
Source: Adapted from Deka, N. (2018). Vernacular architecture of Assam.

insulation, privacy and protection while maintaining ecological harmony. The overall design integrates with the natural vegetation surrounding each house, contributing to the area's ecological balance and promoting a sustainable living environment. This holistic approach to architecture not only fulfils the community's practical needs but also protects the cultural identity and sustainable traditions embedded in Mishing house construction.

Symbolically and deliberately divided into distinct spaces, the interior of a Mishing house begins with an open ground area known as '*aoulang*' or '*lotta*,' comparable to a courtyard for various activities (figure 8). A ladder leads to an un-walled porch called '*tung-goung*' or '*tungan*,' used for guest meetings or by unmarried boys for sleeping. The inner platform space is symbolically divided, often with a fireplace

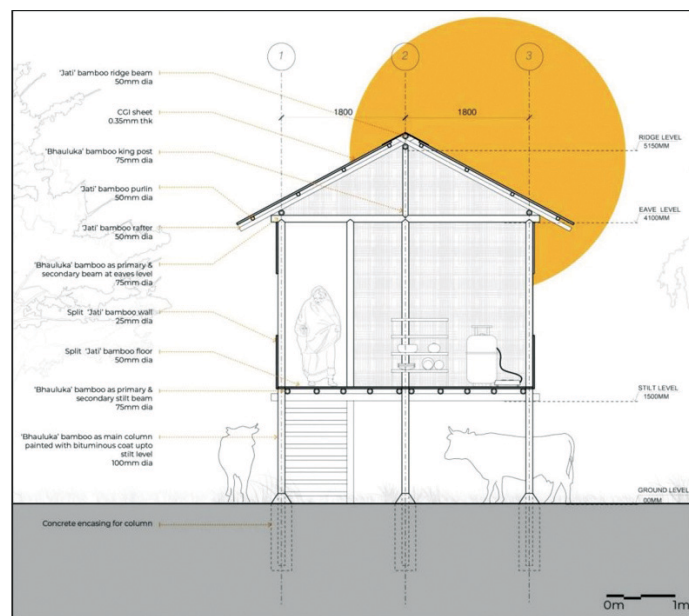


Figure 8: Different species of Bamboo used in Mishing house construction

Source: Sustainable Environment and Ecological Development Society

(‘mairam’ or ‘meram’) at its center, dividing the platform into areas with specific uses. Additional open platforms are sometimes attached to serve various purposes such as drying paddy or functioning as a kitchen, highlighting the flexible design approach of Mishing house architecture (Deka, 2018). Typically featuring a hanging shelf above the fireplace, Mishing houses use these shelves for storing and seasoning food supplies, drying wine pitchers, and safeguarding against fire hazards (Deka, 2018). This architectural style not only serves practical purposes but also safeguards cultural traditions and encourages sustainable living practices among the Mishing community of Majuli. Complete list of spaces with their descriptions is compiled in table 1.

#### 4.4.2. Gender Dynamics of a Mishing Home: an overview

In a Mishing home, gender dynamics are clearly delineated through the spatial organisation and specific roles assigned to males and females. The house features distinct areas for different activities, with certain spaces designated for men and others for women. For instance, the *tungon*, the initial un-walled porch, serves as a social space where unmarried boys meet guests or sleep, reflecting the more public and social role of young males in the household.

Women have their designated space called *koktog*, located to the right of the fireplace, which is regarded as the sacred area of the house. This indicates that women play a key role in maintaining the sanctity and order of the household. The *risong*, opposite

the *koktog*, is reserved for male family members and respected guests, highlighting the separation of male and female spaces within the home. Additionally, the orientation during sleep, where heads are kept towards *risong* and feet towards *koktog*, further emphasizes the symbolic respect for these gendered areas.

Domestic activities also reflect gender roles. Women are responsible for food preparation, especially during significant rituals like housewarming ceremonies. The involvement of young girls in preparing ritual meals highlights the importance of women in maintaining and executing traditional practices. This division of space and roles within a Mishing home illustrates a structured social order based on gender, where both men and women have specific areas and duties that contribute to the household’s functioning and cultural practices. (Deka, 2018).

#### 4.4.3 Climate Responsiveness and Sustainable practices

Traditionally, a typical Mishing house is designed to adapt to the recurring floods in the region, making them flood-resilient homes. Their ancient construction system involves raising the houses on stilts, allowing excess water to flow through. Flood levels are locally inspected each year based on long-term observations and past experiences, and houses are raised further as required. This traditional approach is a unique example of sustainable design, demonstrating flexibility and adaptive measures to floods. It showcases the unique interaction between humans and nature, respecting the integrity of Majuli’s ecology and geography.

#### 4.4.4 Local Knowledge Systems and Practices based on Indigenous Architecture

Table 2 shows a brief description about the design features, techniques and materials used in a typical Mishing house.

#### 4.4.5 Services and Utility Spaces (toilets, drainage etc.)

The Mishing settlement does not have a formal drainage system. Instead, water from daily activities like washing vegetables and bathing seeps through gaps in the bamboo flooring, gradually filtering into the soil (Singh, Ankur, & Kumar, 2018). The natural slopes of the land and the bamboo groves help direct water away from the settlement which is strategically developed higher from river level, preventing soil erosion. To manage excess water during heavy rains, strategically placed man-made channels and ditches direct it towards nearby rivers

Table 1: Mishing House Structure and Division of Space  
Source: Adapted from Deka, N. (2018). Vernacular architecture of Assam by authors

| S. No. | Space/Element           | Vernacular Terminology                    | Description                                                                                                                                         | Photograph                                                                            |
|--------|-------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1      | Initial open area       | Aoulang/ Lotta, Ki-per                    | The open area on the ground in front of the platform and under the protruding roof.<br><br>Used for husking rice, threshing, and social gatherings. |    |
| 2      | Ladder                  | Kobang / Kawbang, Lokgun / Lagjun / Pijun | Notched wood or bamboo ladder with odd-numbered steps, leading to the platform.                                                                     |    |
| 3      | Initial un-walled porch | Tung-goung / Tungon                       | The un-walled porch on the platform used for meeting guests or for sleeping by unmarried boys.                                                      |   |
| 4      | Rear un-walled porch    | Yapkur / Turpak                           | Similar to the initial porch but located at the rear side of the house.                                                                             |  |
| 5      | Door to interior        | Tung-gong ke Yapong / Yapgaw              | The door leading from the porch to the interior of the house.                                                                                       |  |
| 6      | Interior space          | Mesaw, Sapan, Satum- bare                 | The main area of the platform, symbolically separated by the middle post or a bamboo rod.                                                           |                                                                                       |
| 7      | Fireplace               | Mairam / Meram / Melung                   | The central hearth, dividing the platform into four distinct areas for various uses.                                                                |  |

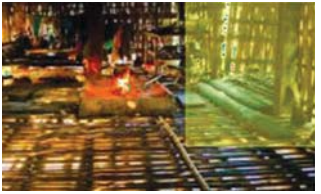
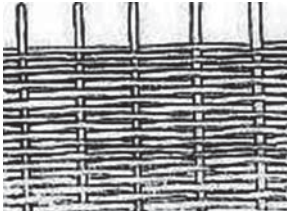
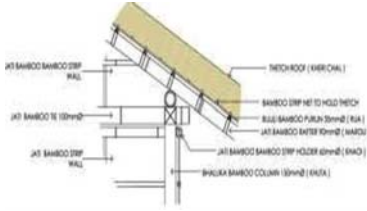
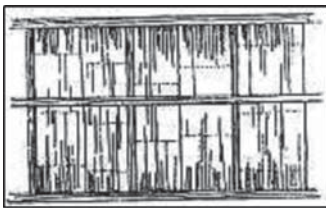
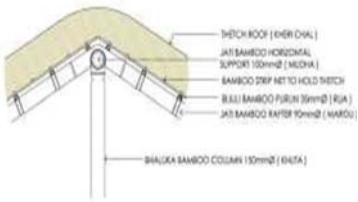
|    |                         |                                                                   |                                                                                                                                 |                                                                                       |
|----|-------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 8  | Sleeping area (eldest)  | Soyer                                                             | The area prior to the fireplace, used by the main or eldest couple for sleeping.                                                |    |
| 9  | Male guest area         | Riching / Risong                                                  | The area to the right of the fireplace, reserved for male family members or respected guests.                                   |    |
| 10 | Female area             | Koktog                                                            | The area to the left of the fireplace, occupied by females and regarded as sacred.                                              |    |
| 11 | Back area               | Soyer, Eyapo-kuroku / Turpak-yapgou                               | The area after the fireplace, leading to the backdoor and rear porch.                                                           |    |
| 12 | Additional platforms    | Karou, Kokdang                                                    | Additional open platforms attached to the main structure, either for drying paddy in the sun or for use as a kitchen workspace. |   |
| 13 | Varieties of fireplaces | Ramdoong, Ramtog / Yourongs                                       | Varieties of fireplaces, either resting on the platform or on a specially constructed structure.                                |  |
| 14 | Hanging shelves         | Pourab / Perab / Ramre, Rabbong / Perab / Raptaw, Kumbang / Rubbo | A three-tiered shelf above the fireplace for smoking food, drying wine pitchers, and storing firewood.                          |  |

Table 2: Design Features of Mishing Houses  
Source: Authors

| Feature                                                                                                                                                                                                                      | Stilt                                                                                                                                                        | Floors and Walls                                                                                                                                                                           | Roof                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description                                                                                                                                                                                                                  | Bamboo poles driven into the ground for elevation. Strengthened by lashing bamboo pieces together with natural fibers using traditional knotting techniques. | Floor and wall construction utilizes bamboo mats woven with strips, designed to be porous, allowing water to pass through, thus preventing waterlogging and dampness within the structure. | Sloping roof made of thatch (dried jungle grass) and bamboo. Designed to efficiently channel rainwater away to prevent both water accumulation and structural damage. |
| Materials used                                                                                                                                                                                                               | Bamboo poles, Brick piers, current scenario shows use of concrete columns.                                                                                   | Walls: Bamboo framed mats or mash walls, sometimes plastered with mud or lime.<br><br>Floors: Bamboo framed mats.                                                                          | Bamboo framed for truss, covered with thatch, currently use of GI sheets is also seen in few cases.                                                                   |
| Details                                                                                                                                                                                                                      |                                                                             |                                                                                                          |                                                                                    |
|                                                                                                                                                                                                                              |                                                                          |                                                                                                       |                                                                                                                                                                       |
| Image source: Amal Barman, Dr. Madhumita Roy, Dr. Arpan Dasgupta, (2020), <i>Vernacular architecture of Majuli Assam- meaning, model and metaphor in integrating the environmental, socio-economic and cultural realms</i> . |                                                                                                                                                              |                                                                                                                                                                                            |                                                                                                                                                                       |

or wetlands, ensuring efficient drainage. The use of permeable surfaces further aids in reducing runoff and prevents waterlogging. Elevated pathways, typically constructed from bamboo or wood maintain accessibility within the settlement during flood periods (Ankur, Kumar & Singh, 2018).

Handpumps, strategically located at elevated points within the settlement, ensure access to water for daily needs such as drinking, bathing, and household chores, even during the monsoon season when flood levels are high (Ankur, Kumar & Singh, 2018).

For the kitchens within these settlements, they are integrated into the raised stilted houses. Ventilation is a crucial consideration in their design, facilitated through openings or gaps in the bamboo walls. This

ventilation helps in dispersing cooking smoke, making the kitchen spaces more comfortable for daily food preparation and family gatherings. Materials such as bamboo and thatch are predominantly used in construction due to their availability and suitability for the local climate. These materials also aid in quick drainage and drying, essential in an area prone to flooding.

Despite the presence of government-provided toilets in Mishing settlements, many residents still practice open defecation. This is particularly prevalent during flooding, when the usual toilets may become inaccessible or unusable due to water levels. In such conditions, raised pit latrines are recommended as they remain above floodwaters, ensuring sanitation needs are met even during adverse weather

conditions. This adaptation helps mitigate health risks associated with open defecation and ensures hygiene standards are maintained within the community.

## 5. Results and Discussion

### 5.1 Summarizing the significance and values associated with Mishing culture and indigenous architectural practices

Through the above study, it is observed that the Mishing community's socio-cultural factors and their architecture is heavily influenced by the geographical character of Majuli Island. They have

uniquely adapted the coping mechanism to adapt with the annual floods in the region. The significance of Mishing culture and traditional building practices lies in its ability to reflect the community's cultural identity, showcase indigenous knowledge, self-empowerment, historical significance, artistic and local heritage, environmental sustainability, resilience and community bonding. Based on the study and understanding, the value systems that are attached with the indigenous architecture and traditional skills of Mishing community have been compiled in table 3:

**Table 3: Value system of Mishing architecture and culture**

Source: Authors

|   | Values Associated    | Value Typology                                                                                          | Value assessment |        |      | Description                                                                                                                                                                                                                     |
|---|----------------------|---------------------------------------------------------------------------------------------------------|------------------|--------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                      |                                                                                                         | Low              | Medium | High |                                                                                                                                                                                                                                 |
| 1 | Cultural Value       | Customs and traditions<br>Livelihood pattern<br>Settlement pattern<br>Dwelling units                    | -                | -      |      | It reflects the community's identity, values, and social traditions, promoting a sense of pride and unity among its people.                                                                                                     |
| 2 | Sustainable Value    | Livelihood pattern<br>Dwellings<br>Local Material                                                       | -                | -      |      | The sustainable value is held through the use of local materials like bamboo and thatch, which are renewable and well-suited to the local environment. .                                                                        |
| 3 | Architectural Value  | Natural landscape<br>Planning and aesthetics<br>Construction techniques<br>Craftsmanship                | -                | -      |      | The indigenous architecture of the Mishings holds architectural value through its adaptation to local environment, cultural expression through craftsmanship and design, functional and practical construction methods.         |
| 4 | Socio-economic Value | Livelihood pattern<br>Skilled craftsmanship                                                             | -                | -      |      | The indigenous architecture of the Mishings contributes to local economy by generating demand for locally sourced materials and skilled craftsmanship, thereby supporting livelihoods within the community.                     |
| 5 | Educational Value    | Traditional building knowledge<br>Practical skills<br>Environmental conservation                        | -                | -      |      | The indigenous architecture of the Mishings holds educational value by preserving and passing down the knowledge of traditional building techniques and materials.                                                              |
| 6 | Associational Value  | Community association<br><br>Association with built environment<br>Association with natural environment | -                | -      |      | The associational value of Mishing architecture lies in its role of fostering emotional and psychological connections within the community through shared experiences and memories associated with the architectural landscape. |

## 5.2 Current scenario and overview on the challenges faced in the island

The Mishing indigenous practices and knowledge systems possess a high value system which is still prevalent in the island and is continuing from generations after generations. However, with the advent of development and various climatic and environmental changes, the island as a whole is facing challenges to sustain its unique landscape and its indigenous built environment. Due to lack of effective management systems and government frameworks many communities are abandoning their traditional livelihood patterns. On the other hand, due to the lack of sustainable development plans and conservation frameworks, a shift in change can be seen in the traditional methods of construction and architectural practices. Following are few issues/current scenario that are addressed as a part of the study:

### Occupational pattern:

- A shift from traditional skills to new generation occupation. It is due to lack of management system and plans to generate economy from the traditional livelihood patterns. The newer generation is also shifting towards different occupations, sometimes even out migrating, thus widening the gap.
- Decrease in community fishing due to reclamation in many local wetland areas for insensitive tourism projects.
- Decrease in agricultural practices due to construction of tourist resorts on agricultural lands.

### Architecture and traditional techniques:

- Adaptation to newer techniques can be seen such as use of concrete and reinforcements in stilt houses. This is also causing a dampness in the structure as the material is non-porous.
- This shift is also causing a gap in the traditional knowledge system as the knowledge is not being passed down to the next generation.

### Material and craftsmanship:

- A shift from local indigenous materials to newer materials like cement concrete and galvanized iron sheets was observed.
- Due to use of new materials the indigenous craftsmanship is getting neglected.

## 6. Conclusions and Recommendations

Indigenous Mishing architecture is a unique and valuable part of the Mishing community's cultural

and heritage, reflecting their traditional knowledge skills and way of life. The following conclusions can be drawn with respect to the Mishing indigenous architectural practices:

- a. Sustainable and resilient
- b. Culturally significant
- c. Indigenous knowledge
- d. Community oriented
- e. Aesthetic value
- f. Need for preservation
- g. Potential for global tourism and economic empowerment
- h. Cultural exchange and educational value

In order to promote, preserve and sustain these above mentioned significant aspects of indigenous practices, certain strategies based on UNESCO 11 SDG's on sustainable cities and human settlements can be applied. Following are few strategy recommendations which can work towards preserving this unique cultural heritage and indigenous practices:

- a. Providing adequate shelter for all (with respect to the floods): Sustainable and flood-resilient structures can be incorporated prior to floods to provide adequate flood relief shelters during monsoons.
- b. Improving human settlements management: Incorporate management plans promoting indigenous settlement and promote traditional homes into home-stays which economically uplift society as well as preserve the continuity of traditional architecture. Also annual investigation can be done after floods and collaboration with various bamboo research centres for scientific research on strengthening bamboo structures.
- c. Promoting sustainable land-use planning and management: There can be planned reserve zones for settlements that are still using traditional techniques i.e. specific zones can be demarcated as traditional precincts, also demarcation of areas which are at higher level that can act as flood relief zones.
- d. Promoting the integrated provision of environmental infrastructure: water, sanitation, drainage and solid waste management.
- e. Promoting sustainable energy and transport systems in human settlements
- f. Promoting human settlements planning and management in disaster-prone areas:

Strengthening of structures, temporary shelters or adjustable portable habitable units can be built in higher grounds along with strengthening boat-making as it is a primary mode of commute during floods.

- g. Promoting sustainable construction industry activities: Bamboo research and training centres can be planned to promote the local craftsmanship and also get a global platform which will encourage the locals to continue with traditional construction techniques.
- h. Promoting human resource development and capacity-building for human settlements development: Skill development programs can be initiated for capacity building, annual basis monitoring and research on advanced scientific and technical assistance can be provided to the locals with respect to sustain and strengthen the local building construction.

As seen in figure 9, these strategies can act as model plans to have sustainable development and resilient and inclusive settlements globally.

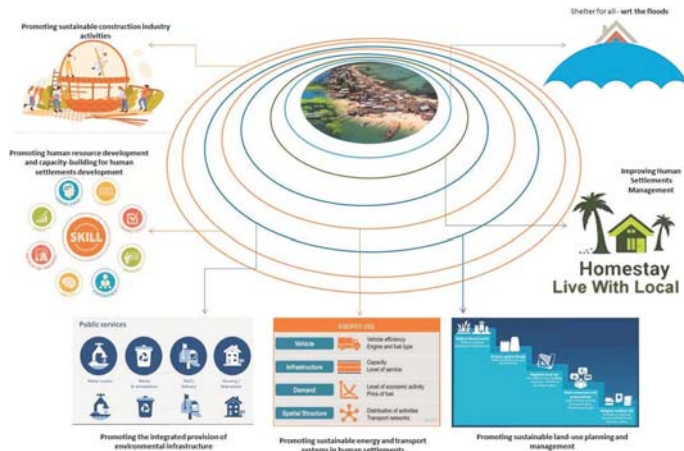


Figure 9: Schematic diagram of suggested strategies

Source: Authors

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# Investigating Spatial Semantic Authenticity in Indian Films with Historic and Socio-Cultural Context

By Ar. Anushka Anand Kulkarni, Dr. Vasudha A. Gokhale and Dr. Sharvey Dhongde

## 1. Introduction

Mainstream Hindi cinema has produced many films based on historical, socio-cultural contexts made with inventive ideas, presenting many historical events and stories in the past few decades featuring aesthetically pleasing visuals, splendour and spectacular costumes.

Many Indian films are based on an actual historical story like *Mughal-e-Azam* showcasing the Mughal Empire of Akbar. Some films are primarily fictional, but it does incorporate some actual historical events like *Baahubali*, which is set in the capital of the ancient kingdom of Avanti, a place mentioned in the Mahabharata, Ramayana and Buddhist literature. In such films the fantasy and extravagance in presentation dominate (refer figure 1).

Filmmakers often make efforts to portray a strong historical and socio-cultural background. For example, the film *Lagaan*, set in 1893, during the late Victorian period of British colonial rule in India,

showcases the inhabitants of a village in central India. The film *Sadma* captures a Tamil village and the film *Detective Byomkesh Bakshi* is set in pre-independent Calcutta in 1942. In these films, the filmmaker shared crucial spatial, architectural, iconographic and visual linguistic concerns of the cultural era, adopting a distinct, unique and idiosyncratic style that has previously remained largely unrecognised. Making a film with a historical background is a highly complex task. It includes efforts to represent old stories and events, brief them down, compose them into a sequence, and provide grandeur with set design and costumes that provide an exceptionally phenomenal experience of the past, immensely engrossing the audience (Sahu, 2018).

In addition to simply telling a story, filmmakers direct actors, place the camera in a particular position and assemble the resulting mass of shots into a cohesive narrative. How a narrative is constructed, interpreted and negotiated by the audience refers to semantics – a process of creating meaning through linguistic and visual signs. Visual semantic aspects or spatial semantics factors such as settings, props, images, performances and costumes further the narrative (Yan, 2014). Spatial semantics, as a whole, is a visual representation that relates objects to their spatial contexts, whether in films or real-life experiences. It also includes how viewers interpret visual signs or compare objects with their surroundings to generate a sense of meaning (Franz & Weiner, 2008).

A film's architectural presentation is a formidable challenge as films condense and superimpose space and time, engendering a queer conjugality between illusory and real, present and past, actual and virtual, where authenticity is a matter of concern.



Figure 1: Mughal-e-Azam  
Source: <https://www.cinemaazi.com/>

Authenticity in a film based on historical context is a felt, embodied historicity representing a creative habitus attempting to capture the past affirmatively. It is the adaptation of a heritage property as an authentic reproduction of the original story, event, artefacts and landscapes. Cinema's aesthetic authenticity represents its acquired awareness, expressing its unique spatial, material, historical and temporal context. Cinema's aesthetic authenticity outshines the realistic character of the set design, costumes, use of technical devices or ability to capture images and sounds, which can be achieved through the filmmaker's ethical seriousness (Salih, 2020). A good film enhances one's appreciation of an architectural space where a specific incident provides an engaging cinematic experience. This effect depends on the consistency of elements, spatial characteristics and use of finishes in the frames of a film.

This study analyses the integration of spaces and storylines in film frames to examine the consistency and authenticity of creating a visual effect providing a realistic cinematic experience. The language of cinema includes visual and linguistic codes, highlighting a shared set of imagery and iconography. This work analyses three films by renowned filmmaker Sanjay Leela Bhansali, focusing on visual aspects adopting a visual semantics approach.

## 2. Architecture and Films

The term "cinema" is derived from "κινῆiv" or "kinema", the Greek term meaning "to move" or "movement", also associated with the terms kinematic, kinetic and kinesthetic. Cinema represents multimodality in artistic expression, combining text, image, kinesthetics, sound and performance (Peng, 2022). It often manifests an architectural space where viewers participate in the visual system, allowing them to feel the movement in which they move. Giuliana Bruno explains cinema as a "geopsychic exploration" and a cartographic process probing the spaces. Cinematic space is the fundamental unit of spatial representation comprising people, objects, buildings and landscapes. It has three reference values, including the space represented in the individual frame, the assembled frames of the montage and the sound-simulated spatial imagination (Bruno, 2009). Architects and cinematographers share many common threads. Time, space, light, colour and sound are manipulated in cinema to enhance a film's narrative. In contrast, in architecture, they are utilised to communicate the intentions behind a design (Ryan & Lenos, 2020). Architecture is often portrayed in cinema mainly as a

prop or a backdrop rather than a focal point. Despite being vital to any narrative, most cinematographers consider architecture a secondary fiddle to the film's storyline (Yadav & Vishwakarma, 2020). In films, architecture refers to set design and backdrop, where exhilaration and glamour are manifested by documenting historical periods and styles through *mise-en-scène*. The term "*mise-en-scène*" is frequently used in cinema derived from the French and it means "having been put into the scene describing the visual aspects appearing within a single shot". A film setting conveys a story through space and time and is perceived as a signifier of authenticity, the place where the events are happening. They help viewers to place the characters within a frame created by the director to convey the space character and meaning (Rowe & Wells, 1999).

Architecture and films represent a kinesthetic spatial experience with embodied movement followed by ideated action. A cinematic presentation invariably includes the architectural character of place, space and time, where a filmmaker creates architectural imagery and experiences. The narrative in a film portrays a lived reality, where architecture provides the event ambience and meaning. Cinematography refers to the art and technology of visual storytelling in film. It involves assembling a series of visual contents through frames, where the place, structure, space, scale, situation and illumination are crucial architectural aspects. In this process, the presentation of architectural elements often governs human intentions and emotions, creating a phantasmagorical effect in a cinematic experience (Pallasmaa, 2012).

## 3. Cinematic Narration and Mediation

In films, image and sound come together subjectively and viscerally, facilitating viewers to experience the storyline through an empathetic or dispassionate lens. Films use unique techniques for the viewers to follow their storytelling and manipulate their minds and emotions (Koeck, 2012). Narrative is an act of storytelling and constituting temporal and spatial data creating a series of events which contain a start, in-between and end that reflect a judgment about the event's nature. The concept of 'narrative' represents what happens or what is depicted in films, while 'narration' refers to how narrative is presented to the audience. Here, narrative represents characters, actions and events; however, 'narration' controls the information on these aspects. It is a semiotic depiction of events, including spatial characteristics as efficacious agents (Stickells & Mosley, 2008). Many films have complicated

narratives conveyed through settings and objects symbolising the characters' emotions without narrative cues or dialogue. Many aspects of a film's narration primarily include the camera, which makes an individual a connoted author, a narrator and an implied director (Burgoyne, 1990).

Architecture is more than a background— it is a prerequisite to a film narrative to convey the story. A well-conceptualized cinematic space can be incredibly compelling, representing its unique strength in depicting time and space, building a more realistic world than other arts (Guest, 2012). In films, information is read by the human brain through the eyes and displayed on a frame through pixels. Frames in a film are like moving images, drawing people and objects through spaces, directing their attention to particular aspects, and at times, disrupting expectations and preconceived notions. A clear cinematic experience is mediated through a frame, where the geometry of the frame and what it contains describe a system in which the data is communicated to the viewers. The frame is directly connected to space; hence, its enhancement using architectural aspects depends on the frame or space setting (Franz & Weiner, 2008).

#### 4. Aesthetic Authenticity and Spatial Coherence

Films often create potentially revolutionary and new views of reality where the established worldview, the presentation and performance principle, becomes questionable. They are sensible manifestations of the idea containing more truth than everyday reality. Martin Heidegger, the German philosopher, believes that art views people's community in particular historical moments (Rhym, 2024). The film viewer imaginatively and perceptually effectuates the contents of a film based on prior fictional and non-fictional knowledge and experience. Reality always borrows from the 'real world' and implicitly deviates or rejects it as it is highly selective compared to real life (Yacavone, 2012). Combining the imaginary and the real enables a filmmaker to present an "illusion of reality", substituting authentic reality (Ameri, 2011).

##### 4.1 Authenticity

A film director constructs and guides a film's movements through a physical space. The structuring of space, circumstances, scale, place and lighting are manoeuvred and choreographed for a unique cinematic expression. The director's intentions dictate the set's authenticity, looking for the viewer's positive response to the storyline and setting. Viewers know they are watching fiction, but an authentic representation still makes

them believe in the content presented (Gardez, 2015). The authenticity of historical films is the interrelationship between the aesthetic forms presented and appropriated by a filmmaker through ideology and the cultural relationship with cinematic technology (Murray, 2010). In cinema, visual indices are represented with the *mise-en-scène* – set design, costume, locations and casting. However, filmmakers often distort perspectives, saturating the shots with ominous reflections, shadows and shapes, influenced by Expressionism. A film scene comprising an entertainment and executive space plays different roles in engaging an observer. While watching a scene, the entertainment space attempts to infiltrate the viewer's mind as if it is real and the executive space helps in evaluating the plausibility of the observed scene compared to the real-world environment (O'Rawe, 2011).

##### 4.2 Spatial Coherence

The filmmaking process communicates the qualitative aspects of a particular environment where a cinematic observation conveys meaning via multiple time frames and viewports simultaneously. Sequences of shots in films, referred to as scenes expressing narratively unified chains of events, need distinctive spatial coherence to convey information and a visceral sense of space. The interpretation of films depends on two interrelated spatial cognition capacities, including perception, representing the individual shot's interpretation and the process of constructing a cognitive image (Golden, 2017).

##### 5. Spatial Semantics

As a theory and method, spatial semiotics analyses and interprets messages encased within sign systems. Semiotics is a way of observing the world, explaining how meaning is formed and conveyed through signs, symbols, language, images and objects. Semiotic analysis represents the interrelationship between the individual, the image or the object, including factors such as culture and society. Semiotics theory refers to the study of signs and symbols in communicating meaning, helping to understand how people create and interpret meaning and how signs can shape the perceptions of reality (Fei, 2007). Visual semiotics is a sub-set of semiotics that provides a theoretical and methodological stance that has been used across disciplines. It distinguishes figurative and plastic meanings, whereas figurative meaning represents things and human beings, concerning the visual traits that enable viewers to recognise objects or subjects and the associated narratives. Plastic refers to visual cues such as line, colour, light, shape, texture, and layout (Aiello, 2020).

Visual semiotics revolves around meaning generation through images and exploring their specific mechanisms. It significantly reconfigures historicity to establish a symbiosis between history and theory. The semiotic approach stresses that images are collections of signs the viewer links together. It is a logical process of creating inferences and making sense of things (Mengoni, 2021). In films, visual interpretation occurs through two processes, including montage and decoupage, where montage is how an individual makes sense of relationships, internal composition, and sequencing between objects. Decoupage is editing images together to convey the story's narrative (Bulut & Yurdaaisik, 2005).

Film theory considers cinematography as the creative use of reality, where reality and its mechanical reproduction refer to the essential effect of cinema. The ontology and philosophy of cinema include the reproduction of reality and space-time dimension mechanically, providing this art form authority, credibility and existence that other art forms lack. A cinematic experience is the sequencing of images intuitively emerging, creating perceptions of truth (Menarini, 2020). From the aesthetic perspective, graphic language portrays the film's characters. According to cognitive theories, visual cognition is knowing visuals to create meaningful ideas, where the visual expression of this knowledge depends on the architectonics of the medium, narrative content and social context (Al-Abbas, Al-Aloum, Alsaggar, & Abu-Hammad, 2014).

## 6. Methodology

This study focuses on three films representing three different genres, decades and visual patterns: *Bajirao Mastani* (2015), *Black* (2005), and *Khamoshi: The Musical* (1996). Films are collections of static images, known as frames, stitched together chronologically. In cinematography, framing refers to how elements are arranged in the frame. It plays a significant role in telling a visual story where a frame is defined by its colour palette, materiality, scale, characters and symbols or props. This research adopts frame-by-frame analysis, which involves examining the selected frames to obtain valuable information. The coherence is examined based on three aspects observed: spatial character, material finishes and elements. It is followed by observing the scales and sizes of the elements in the setting, investigating the material's authenticity and looking at the various architectural details. The frames are selected based on visual features, as Goodwin (2000b) suggested, including 24 frames for each selected film. Each frame is analysed for coherence in terms of spatial characteristics, material and finishes and authenticity.

## 7. Data Analysis

### Case I: *Bajirao Mastani* (2015)

This film portrays the life story of the glorious warrior Bajirao Peshwa (1720 – 1740 CE). The period described in the film is the early 18th century when Maratha Emperor Chhatrapati Shahu assigned Bajirao as the new Peshwa. The sets showcase the grandeur of Bajirao's Darbar, with intricate detailing (figure 2). "Wada", a typical Maratha residence, is recreated with a central courtyard (figure 3). A frame-to-frame analysis of 24 frames, including the interiors and exteriors of Diwankhana, Aina Mahal and the residential part, was performed, the analysis of which is presented in the next section (figure 4).



Figure 2: Bajirao's Darbar

Source: <https://www.reddit.com/r/CineShots/>



Figure 3: Maratha Wada

Source: <https://www.re-thinkingthefuture.com/>



Figure 4: Frames from film Bajirao Mastani

Source: Author

**Spatial Coherence:** The mezzanine floor with a parallel staircase is only seen in a frame that has no specific connection with other frames. The size and scale, particularly the heights of rooms, differ in each frame, and the spaces are not proportionate with other surrounding spaces. The leading spaces appear much larger than a typical Maratha wada. Too many types of arches are used in a single frame. Different types of material palettes are observed on the floors of the rooms, varying from wooden panel flooring to reflective concrete flooring. The wall finishes are also different, including plastered walls, wooden paneled walls, random, un-coursed rubble masonry, lustre paint, and wallpaper. The mirrored ceiling with a metallic finish looks exotic. Hence, no consistency is observed in the structure's wall finishes. Designer marble flooring has a contemporary look, not reflecting the historic period. The roofing system i.e. the clay tile sloping roof, is seen in most frames.

**Authenticity:** The film showcases an understanding of schemata for the eighteenth-century architecture of the Peshwa region that emerged from the period's socio-linguistic or anthropological study. The typical dwelling unit i.e. the wada begins with verandahs, followed by front courts which were considered as public spaces. These were primarily male-dominated areas, which holds for the frames studied, while more private spaces were placed in the interiors. Spaces where women were allowed and not allowed were marked. Various architectural elements and details represent a realistic representation of eighteenth-century Maratha architecture. These elements include a sloping roof with 'u' shaped clay tiles, simple woodwork representing a typical 'divankhana' type of woodwork, and wooden columns with base stone. The design and detailing of openings with double shutters are impressive and represent old Maratha architecture. The use of pointed arches with brackets is well presented. However, the ornamentation on cornices and niches on the walls was different. Extravagant window sizes and detailing appear ahead of time and in context. Analysis indicated that material and finishes lack coherence; besides, the authenticity of spatial character is questionable. The film presented a glamorous version of the Maratha wada, which had massive chandeliers, gigantic royal durbars, or "divankhana", and was flanked by water bodies. The opulent *Aina Mahal* created with 22,000 mirrors exhibits the filmmaker's preference for grandeur over reality.

### Case II: *Khamoshi, the Musical* (1996)

The film is about a deaf and dumb Christian couple living in a Goan village, and their daughter, the

only hearing member of a deaf family, tries to help her family while pursuing her dream of becoming a singer (figure 5). The film dates back to the '90s, showcasing a humble dwelling with a typical Goan character (figure 6). The frames selected for analysis are presented in figure 7.

**Spatial Coherence:** The frames describe a blurred image of a typical Goan-style farmhouse. The pattern of arrangement of spaces includes a covered verandah, a hallway with a staircase, a kitchen and a backyard. Plastered walls in shades of purple, orange, and yellow are observed in all frames with concrete



Figure 5: The village setting

Source: <http://www.zulm.net/forums/>



Figure 6: Interior of house in Goa

Source: <http://www.zulm.net/forums/>



Figure 7: Frames from film *Khamoshi*

Source: Author

flooring and clay-shingled roofing. Typical Goan-style openings with glass panel fittings and four-paneled windows are primarily seen in the frames. Most elements do not change in the frames, making a coherent composition. Different types of material palettes are observed on the floors of the rooms, varying from wooden panel flooring to reflective concrete flooring that remains consistent throughout the frames. The wall finishes vary from standard plastered, wooden paneling to random rubble masonry. Lustre paints and wallpapers randomly used show a lack of consistency in the wall finishes, while glass-paneled windows remain consistent throughout all frames. The position of fireplaces in the interior and the chimneys observed in the exterior frame match and are considered consistent.

**Authenticity:** The filmmaker successfully created attractive frames by maintaining simplicity in the space settings. Elements such as differing masonry styles, wallpapers, finishes and extravagant window sizes were used in a few frames to create visual appeal. A traditional Goan house representing a fusion of Konkani and Portuguese styles is well-presented with features like wooden window frames with latticework, ornate carvings and traditional tiles. Antique furniture in different rooms represented the lifestyle of the period depicted. The cinematography is simply brilliant, effectively creating the carnival-like atmosphere of Goa that compliments the dark complexity of the characters. The film is an example of an Indian art film combined with commercial entertainment without big scales or sets.

### Case III: *Black* (2004)

The film is based on Helen Keller's autobiography titled "The Story of My Life". Helen Keller was a renowned American author, advocate, political activist and lecturer. The story is about the struggle of Michelle, a blind, deaf and dumb Anglo-Indian girl born in a rich family. It showcases Shimla, Himachal Pradesh, from the post-independence period and focuses on some selected locations including the university campus and streets (figure 8) with a colonial look. The protagonist lives in a palatial mansion with big rooms and high ceilings, inspired by Christian imagery, where the colour scheme features black and grey colours (figure 9). Significant film frames were selected which showed exteriors and interiors to convey the storyline (figure 10), followed by an analysis about coherence and authenticity.

**Spatial Coherence:** The different spaces identified throughout the film were the double-height living room, double-height dining room, restrooms, study rooms, lobby crossing and many others. The



Figure 8: Street view

Source: <https://www.imdb.com/title/tt0375611/>



Figure 9: Interior of the mansion

Source: <https://www.imdb.com/title/tt0375611/>



Figure 10: Frames from film Black

Source: Author

observations were that similar buffer spaces were created repeatedly in many frames. Similar types of openings (doors) remain constant throughout the frames. The large-style Gothic windows appear reasonably consistent; however, they are much more prominent in two frames, changing the overall spatial character of the frame. Other elements used consistently include glass paneled windows, wooden flooring, old-style standing lamps, a big clock and a typical bed inspired by the colonial period.

Authenticity: In a few frames, the elements noticed, such as differing masonry styles and extravagant window sizes, are overpowering. The sets and colors are emphasised, but the costumes and other interior elements are ingeniously authentic. Each scene is given the utmost sincerity and each frame is etched with the finest detailing overall. The university premises and neo-Gothic style church showcase colonial charm, representing the architectural style of architecture of Shimla with a rich colonial history. However, the palatial mansion and the teacher's darkened room resemble stages rather than authentic places in pre-independent India, creating a lingering sense of unreality.

## 8. Discussion

Films represent a technical means to reproduce reality and the potential of a film to portray reality authentically depends on the filmmaker's sense of factuality and objectivity. Many renowned Indian filmmakers are known for their exceptional figurative or metaphorical sense, where frames are used as a resource for expression rather than a repository reproducing reality. Given the limited time available to engrain a character and setting, set design becomes the most significant aspect of the story's perception. It establishes the characters' history and sets the mood, providing the opportunity for various emotions. However, the role of set design in attempting a historically accurate recreation of the period conveying the essence or spirit of the time is a matter of concern. From an aesthetic perspective, the film *Bajirao Mastani* by Sanjay Leela Bhansali focuses on the social construction of the historic Peshwa period through visual language. It is an effort to transform the filmmaker's narrative into a communicational oeuvre representing the social semiotics and visual language representing the characteristics of the historic period. The analysis revealed that filmmakers often exaggerate characters and situations by foreshadowing a significant historical event. In the film, the actors' position in the scene relative to the architectural space around them is overshadowed to a certain extent. In many instances, it is in stark contrast to their surroundings. The set design showcases power and superiority over the actual dialogue and context. The filmmaker predominantly observed the pursuit of accuracy in recreating the past, facilitating the viewers to re-visit the history. Although a conscious commitment to accurately depicting the past is visible, his ambition to make a landmark film resulted in grand set designs and details full of extremities. This aspect makes the film spectacular but needs more authenticity and is likely unable to evoke the viewer's historical

consciousness. In many frames, authenticity is a persuasion associated with impressive but predominantly incomplete historical details. *Black* and *Khamoshi* are considered brilliantly researched films with an authentic representation but are sometimes dull and visually inert. To overcome this aspect, the filmmaker created a passable impression of reality through illusion, exhibiting that realism does not limit the representation of truthfulness or authenticity.

## 9. Conclusion

Authenticity is the engine of films with a historical context that comprises an aesthetic strategy, a presentation and a marketing discourse. Market capitalism associated with the film industry film's authenticity is often neglected as it influences the filmmaker's financial success. Authenticity results from the filmmaker's inclination and choices; however, it also depends on the audience. Indian cinema witnessed many bloopers concerning set design and costumes where a successful film was ridiculed because the set depicted an image not authentic to the period. It is established that Indian viewers value authenticity, signifying a realistic historical experience. The anxious filmmakers struggling to create an authentic, believable cinematic product often indulged in contradictory decision-making, using different strategies at work within a single film. As the popular belief about historical events becomes a basis for authenticity, the viewers accept a portrayal of history as probably accurate if the depiction reflects a common presupposition about the past period. Filmmakers often achieve convincing authenticity beyond accurate and accurately researched historical details.

The experience of watching films is an intense activity where viewers share an experience with the rest of the audience. Films facilitate viewing large images, allowing closeness to the people and places on the screen and often seeing the things that a lay person cannot afford in everyday life. Although filmmaking allows the creator or auteur to aesthetically transform reality, presenting a new narrative to the viewers and manipulating the presented reality should be limited so that the original reality remains recognisable. It is stressed that the filmmakers should exploit the film's unique ability to engage viewers with the knowledge, values and objective authority of reality that they attach to the presented reality. The semiotics of the cinematographic representation of history or a socio-cultural context need the film to be a faithful reconstruction conforming to the reality where the role of architectural space is significant.

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# A Guru's Legacy

## Remembering Christopher Charles Benninger (1942-2024)

By Sarbjit Singh Bahga

Christopher Charles Benninger (23.11.1942–02.10.2024) (Fig.1) was an American-born Indian architect. His contribution is significant to the field of critical regionalism and sustainable planning in India. He studied urban planning at MIT and architecture at Harvard University, where he later taught. Despite his illustrious career in the USA, Benninger chose India as his *karmbhumi*. He worked here for over five decades. He founded the School of Planning at CEPT University and the Centre for Development Planning and Activities in Pune. Christopher Benninger left for his heavenly abode on October 2, 2024, at 82. His untimely demise has left a massive void in architecture and planning, which will be challenging to fill.

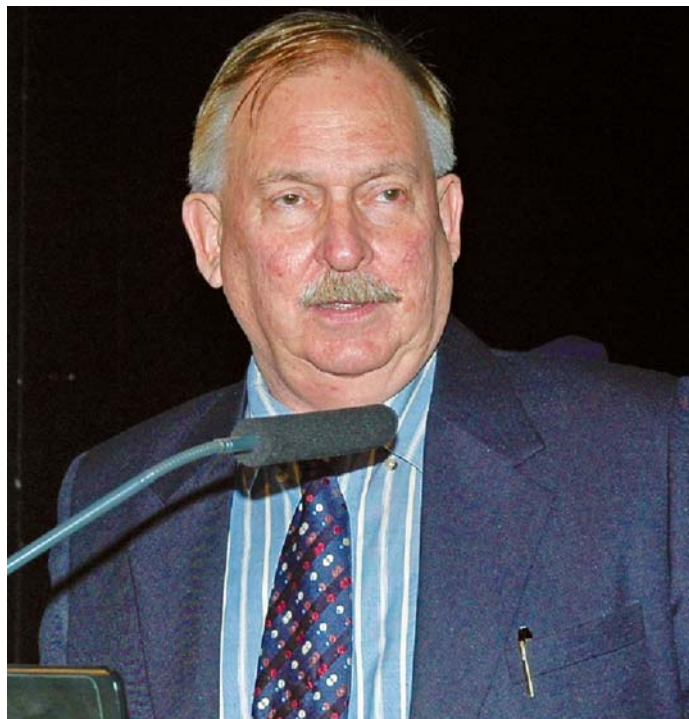


Figure 1: Christopher Charles Benninger (23 Nov. 1942 - 2 Oct. 2024).

The author and his family of architects – brother Surinder Bahga and cousin Yashinder Bahga are at a personal loss due to the absence of Christopher Benninger in this world. We had a *guru-shishya* relationship with him, of which he firmly believed. Our association with him started in 1991 when we were quite young and aspired to write a book, “*Modern Architecture in India: Post-Independence Perspective*,” later published in 1993.

At that time, there were no computers and social media. Thus, a need was felt for a large book on the contemporary architecture of India. With no prior experience in writing and publishing, we dreamt big and started contacting the ‘who’s who’ of Indian architecture for their contribution concerning their completed works. We also wrote to Christopher Benninger for the same. To our pleasant surprise, without asking for our credentials, he sent a large envelope containing drawings, photographs and a conceptual write-up of one of his projects - the Centre for Development Studies and Activities, Pune.

His promptness in sending the material, together with his blessings and best wishes for our endeavour, was a touching gesture and the beginning of our lasting relationship, which continued till his death. The project was featured elaborately in our book. When we sent a copy of this book to Christopher Benninger, he was pleased to see its quality, contents and the featured project. His humility can be seen from the fact that till recent times, he continued to appreciate our mundane effort to publish his work. After three decades of this publication, when he met my brother Surinder Bahga on February 3, 2024, he repeated, “You published my first project in your book, which was very encouraging for my career.”

The Centre for Development Studies and Activities is located on the fringe of Pune City on a ridge overlooking the Bavdhan village. It is a place for interaction between intellectuals from several disciplines and students at the School of Development Planning and Management. The complex has been conceived and planned on the concept of a classical Greek gymnasium, set in a suburban environment on a terraced hill slope. A podium, surrounded by a cluster of buildings, is the focus of this complex. This podium's level is raised to scale down the surrounding built form. It is punctuated with traditional Indian elements like *ottas*, steps, elevated platforms with sculptures and sizeable earthen pottery. The profoundness of Christopher Benninger's design for this marvellous complex is evident from the fact that after about four decades of its inception, the project still retains its grandeur.

We again interacted with Christopher Benninger in 1996 while working on our second book, *"New Indian Homes: An Architectural Renaissance,"* later published in 1997 (Fig.2). We approached Christopher Benninger to write the Foreword to this book. He not only agreed, but also helped us finalise the book's Subtitle. *"An Architectural Renaissance,"* was Benninger's suggestion. We were obliged for his loving and supporting gesture.

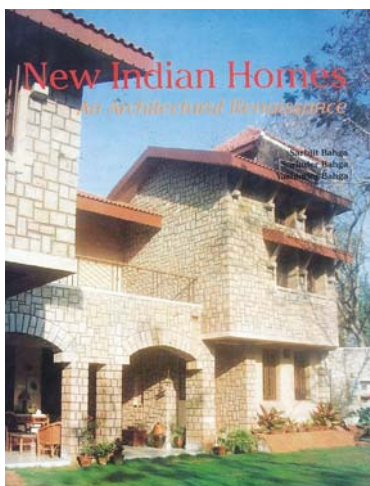


Figure 2: Christopher Benninger wrote Foreword to the book - *New Indian Homes - An Architectural Renaissance*.

Christopher Benninger wrote in the Foreword, "Building houses is the most civilizing activity of man, and it is through such endeavours that historians and archaeologists attempt to understand the very essence of culture. '*New Indian Homes*' is a document of our times which expresses the social and geo-climatic conditions of the subcontinent." About the new generations of architects, Benninger added, "I hope that the new and the younger architects take over the mantle from us, they will express creatively this greater vision of their miniature efforts. These

are not just homes of individuals; these are the dreams of a civilisation."

It is evident from his words, which he wrote about thirty years ago, that the idea and subject matter of his last book, *"Great Expectations"*, germinated in his mind decades ago. Benninger was very optimistic and always had high hopes from the younger generations of architects.

In October 2011, when the Chandigarh-Punjab chapter of the Indian Institute of Architects hosted the 'Young Architects' Festival' at Chandigarh, we invited Christopher Benninger as the keynote speaker. He readily obliged and gave a stunning presentation to almost 750 architects and students in the Tagore Theatre, Chandigarh. On this occasion, the first edition of his book, *"Letters to a Young Architect"* was also released. (Fig.3)



Figure 3: Christopher Benninger gave an autograph on his book *Letters to a Young Architect* during Young Architects' Festival at Chandigarh in October 2011.

Recalling an incident of 2011, architect Surinder Bahga says, "One day Christopher Benninger called me to send my CV. As usual, I sent a one-page. He again called to say he urgently needs an elaborate CV of at least 7-8 pages. It was immediately prepared and sent. After over 15 days, I got a call from the Chandigarh Administration to appoint me as a Nominated Councillor in Chandigarh Municipal Corporation for 2011-16. Later, I learned that Christopher Benninger had strongly recommended my name to the Administration and they agreed. He advised me to work to improve the city, which I did earnestly."

In 2016, Christopher Benninger again showered his blessings on us by writing the Foreword to our book, *"Modern Regionalism: The Architecture of Sarbjit Bahga"*. This book is a monograph on the author's selected works and was aimed at acting as an essential link between the past and future

developments in architecture in the Indian context. It was in tune with Benninger's thinking, who believed in 'the continuity in history'. He said, "The spirit of a piece of architecture is the spirit of continuity; each work is an answer to all the proceeding works; each contains all the previous experiences of the world of Architecture!"

In the Foreword to this book, Christopher Benninger wrote, "The designs of Sarbjit Bahga are laid out almost as an encyclopedia of his life's works, covering an amazing array of building types from offices, recreational structures, educational institutions, hospitals, residential complexes and agricultural buildings. In the narrative that emerges through his timeline of projects, the struggle between the internationalist global style and his artistic search for a unique regional ambience is inherent. The work of Sarbjit Bahga is the story of this struggle with discovery." With these lines, Christopher Benninger has treated my architectural work as a bead in the string of history for which I shall always remain obliged.

On February 15, 2018, Christopher Benninger gave an elaborate statement for Surinder Bahga's book, "Form Follows Roots: Architecture for India 1985-2021," published in 2023 (Fig.4). His statement is included in the Chapter "The Way Forward." He wrote, "The future of Indian architecture will find its roots in more inclusive, more efficient and democratic urban structures, centered on pedestrianizing urban systems, integrating strolling spaces and pedestrian corridors into the nodes of mass transit arteries, functional water supply, storm drainage, energy sharing, sewerage management and solid waste management while celebrating nature, integrated within these new forms of the urban fabric. Thus,

India can expect to see lineal cities growing along spine-like mass transit stems and urban utility corridors, serving high-density clusters around metro stations, with electric transit vehicles looping out of these modal split nodes into high-density, low-rise neighbourhoods, where the residents only purchase serviced house-plots, on which they build their shelters. 'High art' and more articulate pieces of architecture will be centered on public facilities like schools, colleges, auditoria, democratic councils and assembly halls, offices, courts, and universities. These, too, will be more sustainable and employ fewer and fewer energy-dependent systems. The architecture will be more closely linked to planning natural ecosystems, bio-sensitive parks and water bodies, where it will find its roots."

Though Christopher Benninger was not a frequent user of modern means of communication like WhatsApp, I had the privilege to chat with him occasionally. The subject matter of our chats was always related to architecture. From our communication, I could judge how deeply he was concerned about the upliftment of the profession.

I take the liberty (with an apology to Christopher's soul) to share with readers one of the personal messages he sent to me via WhatsApp on June 19, 2022. It reads:

"Dear Sarbjit:

I am creating a memory framework for young architects studying today. What: At least one or two memories of iconic buildings by architects who have built important works since about 2000 (could be in the 90's). Why: Every week, about 40 architecture students visit INDIA HOUSE, and I ask them, "Can you tell me the name of a building designed by Charles Correa? Doshi? Kanvinde? Rarely can they tell a Correa or a Doshi and never a Kanvinde. But then there is a large chorus of fans and relatives of these people, and every student is bound to cross these names and works in their school course! But few others! So, the new generation has no memory contact with the past! They don't carry memories of iconic buildings that tie them deeper into more information. What: I've made a list of younger architects (well below 80, down to, say, 40) who have created important works. How: I'd like you to share the names of one or two of your important works and maybe what you consider the "memorable, iconic image" for youngsters to remember. Request: I'm doing this with 30+ architects. I cannot get into an email conversation with you about who is on the list and what I will do with this. I will do something. Hopefully, I'll put these on my social media and write

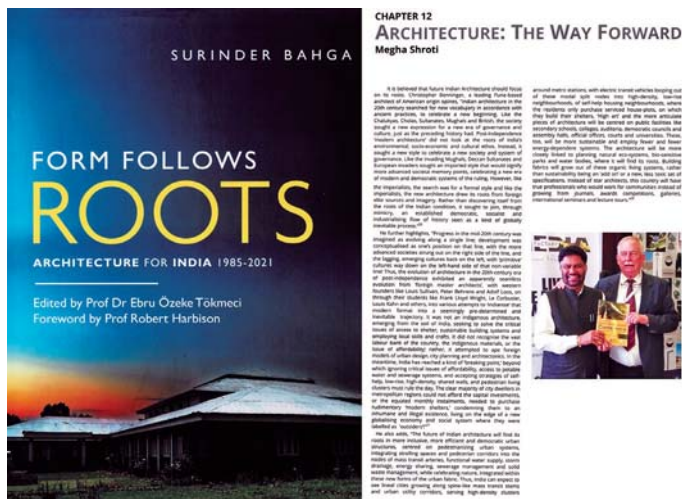


Figure 4: Christopher Benninger's statement about future of Indian architecture published in the book - Form Follows Roots: Architecture for India 1985-2021.

something. I've noted that the Mumbai-Ahmedabad-Delhi Axis controls who gets "known" and who purposefully "gets let out!" It may begin another voice. There are brilliant, creative architects working diligently across India whose names people know but whose work is left to fate.

Warm Regards, Christopher."

In response to Christopher Benninger's message, I shared with him details of two of my projects i.e., 1. Punjab Mandi Board Head Office building at Mohali, and 2. Sports Stadium, Badal, Punjab. Apart from these, I thought it appropriate to send him a copy of my book, *"New Indian Architecture: 1947-2020,"* published in 2022 (Fig.5). It features 104 projects designed by 66 Indian and 15 foreign architects. I thought that this book will be useful to Christopher Benninger for his noble cause. On receipt of this book, he wrote to me, "Wonderful! It is an important reference for all students who have lost touch with their roots! – Christopher."



Figure 5: Christopher Benninger's project featured in the book - New Indian Architecture 1947-2020.

As usual, I was thrilled to receive this message but later couldn't know how he had used the material he was collecting. But I can imagine that due to his untimely death, that project might have been left incomplete, mainly when he remained busy finalising another book in hand, *"Great Expectations: Notes to an Architect,"* which was published and released three weeks after his death.

Thereafter, I got a congratulatory message from him on November 12, 2023, when I shared the news of the launch of my latest book, *"Making of Chandigarh: A Vintage History"* published in 2023.

With Christopher Benninger's death on October 2, 2024, our long association of 33 years ended abruptly. But his legacy will continue to inspire the younger generations forever; as he said, "Just as the

Olympic Torch is passed from one runner to the next and is kept burning forever. A spark of inspiration is passed through teachers' and gurus' humanity and brilliance."

Christopher Charles Benninger's journey from an American architect to becoming one of India's most influential architectural minds exemplifies his belief in the continuity of architectural history. His dedication to nurturing young talent, championing regional identity, and building sustainable communities will continue to shape India's architectural landscape for generations. Benninger's vision of architecture as a civilizing force lives on through his buildings, writings, and most importantly, the countless architects he mentored and inspired. As we bid farewell to this remarkable architect, teacher and visionary, we are reminded that his most significant legacy lies not just in the structures he built, but in the wisdom that he shared and the dreams he inspired in others to create architecture deeply rooted in culture, sustainability, and human dignity.

### All Images Courtesy: Author



**Ar. Sarbjit Singh Bahga** (A-11822) is a Chandigarh-based architect and author. He has 44 years of experience designing various types of buildings, complexes and large campuses. A monograph on his selected works, *"MODERN REGIONALISM: The Architecture of Sarbjit Bahga"* has been published. Bahga is also a keen researcher and a prolific architectural writer, having 12 books to his credit.

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# Reinventing, Rationalising and Revitalising the Public Spaces to Make Cities more Vibrant, Liveable and Sustainable

By Ar. Jit Kumar Gupta

## 1. Introduction

Known for concentration of population in a limited space, cities are valued for enormous capacity and capability, productivity, employment, infrastructure, mobility, large built environment and being home to numerous institutions dealing with healthcare, education, leisure etc. In addition to having a large built volume, cities also include numerous typologies of public spaces such as major streets, bazaars, shopping precincts, community centres, parks, playgrounds and blue-green infrastructure created in the residential, commercial and institutional areas of the city. These public spaces play a vital role in shaping the social life of communities in cities and have been valued for their role, relevance and importance in making urban living socially, physically and environmentally, more qualitative and vibrant, besides making cities preferred places to live and work in (figure 1). These spaces act like a 'self-organising public service', a shared resource in which experiences and values are created (Mean and Tims, 2005). They are also recognized as spaces where people can display their culture, showcase identities and learn about diversity of culture, creating opportunities for children and young people to meet, play or simply 'hang out' besides helping to create local attachments which are at the heart of a sense of community (Worpole & Knox, 2007). However, with rapid population growth, massive urbanisation, rapid rural-urban migration and land prices rising sharply, public spaces have been subjected to a lot of developmental stress, strain and pain.



Figure 1: Redesigning people, pedestrian and bike friendly public places in Paris

Source: [www.pinterest.com](http://www.pinterest.com)

Pressure generated by urbanization and commercialization of urban spaces has not only led to large-scale encroachment on available public open spaces but has also put the provision of new public spaces at a premium. Reasons for marginalization and dilution of the provision of the public open spaces in the public domain, has genesis and can be largely attributed to the lack of understanding and appreciation on the part of the manpower deployed and agencies involved in urban planning, development and management about the role, relevance, importance and criticality of these spaces in making urban areas happier, healthier and meaningful, both socially and environmentally. In the absence of specified norms and standards, provision of public open spaces remains at the whims and fancies of the developers involved in developing

townships and agencies empowered to approve the real estate projects. In a majority of cases, it has been observed that majority of public open spaces provided at the local level, in housing townships, are spaced in the incidental/left over areas, having poor accessibility, limited visibility and minimal commercial value. Such marginalized public spaces are known to provide limited value and utility to the local communities and city in general.

With rapid increase in global population and concentration of population in urban centres, cities are becoming more and more crowded and congested. With 68% of global population projected to live in cities by the year 2050, while occupying merely 3% of global land, cities are likely to witness more congestion and concentration of population in defined urban areas. In the process, existing cities are likely to become more crowded having limited/minimal availability of public open spaces for the use of communities. All this calls for relooking at the entire context of population growth, pattern of urbanisation, mechanism and tools used for urban planning and development, in order to ensure that adequate quantity and quality of public places are made available at the local level to meet the essential requirement of outdoor living and socialization of communities in urban areas.

## 2. Role and Relevance of Public Spaces

Role, relevance and importance of public open spaces in making cities and urban communities safe, happy, healthy, more productive and climate-responsive, can be enumerated as given below:

- Value Addition to Cities

Public spaces remain at the core of the urban environment, offering residents and visitors areas to congregate, engage and connect. These spaces include parks, plazas, streets, recreational areas etc. remain integral to the social, economic and environmental health of cities. Looking holistically and objectively, urban spaces have been globally valued for their role and importance in defining urban living and making cities socially and culturally vibrant. Outdoor shared spaces are valued as lifelines of the urban communities and cities, shaping daily urban life and promoting higher order of social interaction. Outdoor shared spaces remain preferred places for promoting culture, leisure, entertainment, relaxation etc., making cities more inclusive and productive. All globally known vibrant cities offer a variety of attractive and interesting public spaces for local communities and visitors (figure 2).



Figure 2: Well-designed public spaces acting as vibrant community gathering – Whitefield Garden, London  
Source: [www.londonarchitecturemediary.org](http://www.londonarchitecturemediary.org)

- Making Cities Happy and Healthy Places

Known to connect human beings with nature, urban spaces have the capacity and ability to make urban living more natural and qualitative. Studies carried out have concluded that urban spaces make a valuable contribution to making cities healthy and residents happier and healthier by promoting and encouraging increased physical and social activities. As per World Health Organization, people living close to parks are found to be three times more physically active and healthy than people having no access to these spaces. Vibrant urban public spaces are known to make cities happy and healthy spaces to live and work in. These spaces are valued for busting mental stress, overcoming obesity, promoting walking and physical activities and optimizing health and well-being of urban communities (figure 3).



Figure 3: Pedestrian-friendly public spaces promoting sustainable mobility in Oxford Street, London  
Source: [www.theconstructionindex.co.uk](http://www.theconstructionindex.co.uk)

- Promoting Pedestrianisation and Reducing Carbon Emissions

Recognized for their distinct contribution in minimizing number of vehicles on urban roads, public spaces make cities free from noise and pollution by promoting pedestrianisation and walkability as the preferred mode of local travel. Well-planned and appropriately designed public open spaces enhance urban mobility by prioritizing pedestrianisation, cycling and public transport over personal automobiles. Making appropriate provision of wide sidewalks, creating pedestrian-only zones and providing shaded pathways encourage walking as a primary mode of transport, reducing reliance on cars. In addition, creating a network of public spaces, connecting different modes of transport can go a long way in making urban spaces more people-friendly and free from automobiles (figure 3). In majority of cases, plazas created near metro stations are known for its distinct advantages of enhancing accessibility and usability. In addition, these public spaces have also proved to be catalyst for promoting cycling by creating dedicated bike lanes and parking areas, contributing enormously to ushering an era of healthier lifestyles and reducing carbon emissions in urban setting (*The Role of Public Spaces in Urban Design, 2024*)

- Making Cities Safe against Disasters

In the face of rapid urbanization and climate change, cities are always evolving, devolving, never static and never finite. As consumers of large energy and resources, besides generating lot of waste, cities are primarily emerging as the hotbeds of climate change, rising temperatures and global warming, having large carbon footprints. Accordingly, majority of cities are facing natural and man-made disasters. Providing areas free from dense built environment, public spaces are valued to make cities safe and free from natural and man-made disasters. Green and blue public spaces, provided in cities, are known for capturing and storing not only the rain water but also making cities free from the curse of flooding. Green/open spaces are also known to make cities act like sponges by absorbing excess water, which can be used when cities remain water-deficient during summers.

- Connecting with Nature and Promoting Environmental Sustainability

Overcoming the challenges posed by dense and intense built environment, public open spaces bring green cover, trees, flora and fauna back to communities and cities. Open spaces in urban areas provide enormous options of creating urban

blue(water bodies, lakes, water reservoirs) and green infrastructure (open spaces, parks, gardens, play grounds etc.) in an urban setting. This blue-green infrastructure is known to moderate and modulate the local temperature and make value addition to local ecology and environment. In addition to making cities and communities more vibrant, public spaces, according to studies (*The Role of Public Spaces in Urban Design, 2024*) are also known to provide numerous environmental benefits while enhancing urban ecosystems. The environmental contributions made by parks and green spaces are reducing impact of urban heat island by providing shade and cooling through vegetation and improving the quality of air by filtering pollutants. In terms of biodiversity, the green public spaces serve as habitats for various species, fostering biodiversity within harsh urban landscapes (figure 4).



Figure 4: Green public spaces enhancing urban biodiversity and environmental sustainability – Dubai's public spaces  
Source: [www.inhabitat.com](http://www.inhabitat.com)

- Connecting Communities

According to studies (*The Role of Public Spaces in Urban Design, 2024*), "public spaces" are often described as "living rooms" of cities, where communities come together, play a vital role in fostering social cohesion and inclusivity besides acting as platforms for interaction across diverse demographics. Key aspects of their social function include community building and cultural expression, providing neutral grounds where individuals from varied backgrounds can connect. Local communities are also known to use parks for hosting picnics, festivals and sports events that strengthen community bonds besides using urban plazas and streets for hosting artistic performances and celebrations, reflecting the cultural identity of a city (figure 5).

- Adding Economic Value

The role, relevance and importance of public spaces is not merely limited and confined to physical, social



Figure 5: Public spaces fostering community connections through various activities – Madison Avenue

Source: [www.apops.mas.org](http://www.apops.mas.org)

and environmental contributions, but also in the economic value it brings to the city, communities and properties. Strategically designed public spaces attract businesses, promote tourism and generate investments, leading to a higher order of economic growth by enhancing values of the property, having location close to well-maintained parks and plazas. Well-planned and well-designed public markets and make-shift shops in public spaces boost local entrepreneurship and create vibrant urban economies. Iconic public spaces like Times Square in New York or Trafalgar Square in London are known globally to have branded these cities and helped in attracting millions of tourists annually, making value contribution in terms of attracting numerous typologies of businesses, promoting economy, generating large casual employment, making optimum use of available space and bringing recognition and vibrancy to such cities.

### 3. Challenges Faced in Public Spaces

Despite the value they bring to city and public life, the provision of public spaces in the urban context remains a challenging task. The major factors can be enumerated as:

- **Marginalizing Public Spaces**

In this era of rapid urbanisation, migration, globalization, liberalization and commercialization of urban spaces/ cities, coupled with unaffordable land prices, public spaces remain at premium. In planning and development of the residential neighbourhoods, community facilities, commercial complexes and new townships, provision of such valuable public spaces is largely ignored. In the absence of any norms and standards prescribed for the public open spaces, in the planning and legal framework, provision of such community spaces remains muted, diluted and largely marginalized.

- **According Low Priority**

Lack of adequate capacity and capability, coupled with lack of will and poor understanding of the context, role and importance of public spaces in urban planning, development and urban living, remains the root cause of such spaces being marginalized, diluted and muted in the urban context. Counted as non-commercial, such spaces are not valued in the planning process. In the absence of any specific guidelines defined for the public spaces and provision of public spaces being left out of the rule book, such spaces don't command priority and provision in the local area/city level plans.

- **Ignoring Urban Design**

Planning and designing of public spaces generally falls in the domain of urban designers. In the current practice of planning and designing local neighbourhoods, townships and cities, urban designers find no space and accordingly remain conspicuous by their absence. In the absence of urban planners, adequate and appropriate public spaces do not find space in the planning and designing options evolved at the local level. Limited availability of trained manpower in the domain of urban design in the authorities vested with the task of approving project land and their exclusion from the urban planning process are the prime reasons for not providing appropriate number and quality of such spaces at the local level.

- **Unplanned Development**

Planned development coupled with specified norms, standards and detailed guidelines remain at the core and the best option to make provision of public spaces a distinct reality in the urban areas. With large proportion of urban development remaining informal, created without any statutory approvals and ignoring all basic principles and norms of physical planning, it is known for its deficiency of the requisite public spaces. In the urban parlance, slums remain the major areas, where such spaces remain conspicuous by its absence.

- **Ignoring Communities**

Besides finding appropriate location, public open spaces involve lot of knowledge, understanding, expertise and financial and technical resources for planning, designing, developing and maintaining requisite spaces/infrastructures. Since these spaces are to be used by local communities, accordingly their involvement in defining, planning and designing options for these spaces remains valuable. Marginalization and misuse of majority of public spaces have genesis in ignoring and excluding the

local communities in the process of siting, planning and designing of such spaces in the urban areas.

- **Limitation of Resources**

Making adequate provision and maintenance of public spaces remains highly resource intensive. Due to high intensity of use, public spaces are being subjected to rapid wear and tear. For their optimization, such spaces require regular maintenance and upkeep, involving dedicated availability of financial resources and appropriate skill in managing such spaces. Due to high operational and maintenance cost involved in managing and non-availability or budgetary allocation of adequate resources earmarked at the local level, these spaces continue to deteriorate with the passage of time. Accordingly, many cities struggle to maintain quality of public spaces, due to budgetary constraints, leading to its neglect and disrepair. All this calls for creating a dedicated framework and financial resources, at the local level, for planning, development and management of these public spaces.

- **Increasing Privatisation of Public Spaces**

Studies made at the local level have concluded that in cities, the extent of public spaces has not decreased over a period of time. On the contrary, public spaces have shown an increase in area and numbers. But the trend witnessed has recorded marginalisation/reduction of public spaces provided by the public sector, whereas it has recorded a boom in the provision of privately-owned public spaces. If public sector owned public spaces provide free access to communities, privately-owned public spaces are known to limit the access of such public spaces to the community. This issue needs to be resolved on priority, for ensuring that privately owned public spaces must also be made accessible for the use of local communities.

- **Limited Accessibility**

Majority of public spaces in urban areas are known to suffer from the malaise of limited access to such spaces, which invariably limit the use and advantage of such public spaces. Numerous public spaces, despite having good infrastructure, are generally avoided and ignored by the communities, due to the reasons of safety and security. In addition, open spaces also face ongoing challenges of ensuring safety and security of maintenance, due to openness of public spaces. In the process, these spaces are used and abused by anti-social elements for crime and other prohibited activities. Accordingly, it will be essential that these spaces are appropriately designed based on the principle of visibility, safety and security.

- **Non-Involvement of Private Sector/Communities**

Unfortunately, in the Indian context, making provision, planning, designing and maintaining public spaces remains largely a government-led task. With limited resources and cities being largely owned by individuals and institutions, role of the public sector in providing public spaces remains limited. Limitations imposed by the newly enacted Land Acquisition Act - The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act of 2013, to source land for urban development through compulsory methods has practically marginalised the role of the public sector and development authorities as major players in the urban development process. Accordingly, availability of public spaces in cities has also reduced considerably. In addition, due to limited involvement of private sector in urban development, cities are facing the challenge of having adequate public spaces. Accordingly, it will be appropriate that providing appropriate level of public spaces in cities should be made a people/community/institutions-led programme by involving local institutions, communities, private and corporate sector.

#### **4. Options for Planning and Designing Public Spaces**

Looking at the dynamic and complex nature of cities, the role and relevance of public spaces in creating resilient cities cannot be undermined and overstated. Adaptive urban spaces are known for distinct advantages which make cities functional and orderly, under ever-changing physical and climatic conditions. Looking at the entire context of public spaces, it can be safely concluded that the process of shaping the physical environment in fostering inclusivity, sustainability and cultural vitality in cities, remain closely linked to the strategic planning and development of public spaces (*The Role of Public Spaces in Urban Design*, 2024). Accordingly, public spaces need to be planned and designed to take care of not only ever-changing urban dynamism but also ensuring that they are made safe and climate-responsive.

If providing appropriate level of public spaces in cities remains important, equally important will be the planning and design of such spaces. Accordingly, planning and designing of resilient and adaptive public spaces, performing multifaceted functions will have great role and relevance in making our cities and towns more rational, realistic, vibrant and liveable. However, there can never be uniform design

for various public spaces. For optimum utilisation, all public spaces will have to be carefully and thoughtfully planned and designed, keeping in view their location, context, purpose, nature and culture of community and people to be served. Design strategies for these public spaces must include and involve:

- **Making Public Spaces an Integral Part of Planning Process**

To ensure the provision of adequate public open spaces in urban areas and to make them productive and of good quality, it would require that these public spaces must be made integral part of urban planning, designing and development process. Accordingly, master plans, development plans, local area plans and zoning plans prepared for the cities must include and make provision for positioning, planning and development of public spaces under specified norms and standards.

- **Specifying Appropriate Norms and Standards**

As already stated, the genesis of inadequate public spaces in urban areas has roots in the absence of the norms and standards specified for such spaces in the planning, legislation and zoning regulations of the city. Accordingly, norms and standards for the public spaces need to be rationally defined and put in place, on priority, in all planning related legal framework in order to ensure that provision of such public spaces is made in both long and short-term plans prepared to cover different parts of the cities.

- **Involving Skilled Manpower**

Provision and planning of public spaces will require the involvement, expertise and services of professionals drawn from the field of Urban Design, Urban Planning, Architecture, Landscaping, Engineering and Sociology, which will be valuable to make public open spaces more dynamic, vibrant, flexible and community-focused. Creating a dedicated group of experts, at local level, to monitor and manage the public spaces will remain valuable for the city and communities.

- **Opting for Equity**

It must also be ensured that the provision of public spaces should invariably be made based on equity after rationally and realistically assessing the needs and requirements of the local communities, catering to the entire urban population, without discrimination based on age, gender, social, economic and physical status. Concentration of public spaces in a particular area or favouring few communities at the cost of others needs to be invariably avoided and excluded.

- **Promoting Flexibility**

Planning and designing for creating inbuilt flexibility in planning, designing and managing public spaces can help such spaces being put to multiple uses for accommodating various activities in the available spaces during different parts of the day, week, seasons and year. Creating different options for multiple uses includes the use of such spaces as markets by day and concerts by night, are known to maximise utility and relevance of such spaces in the urban context.

- **Opting for Climate Responsiveness**

These public spaces hold enormous capacity for being planned and designed to be climate-resilient and responsive by appropriate landscape incorporating shaded structures, adding water features, using drought-resistant local plants and using soft options for recreation and socialising, which have an inherent capacity and capability to make public spaces more resilient and responsive to extreme weather conditions.

- **Mitigating Disasters**

Public spaces offer enormous opportunities to use public spaces for preparedness and mitigating/managing disasters at community, local and city levels, by operating not only as evacuation zones during emergencies but also providing safe areas for temporary housing and rehabilitating local communities.

- **Community Focused**

For optimizing use, planning of available public spaces should be based on better understanding of community use of existing/proposed spaces and places. Accordingly, actively and appropriately involving local communities, users and other stakeholders in the planning, designing and maintenance of public open spaces will remain crucial and relevant. Public spaces, when planned and designed taking local communities on board have invariably been found to be more useful and offer better opportunities of utilisation of such spaces by supporting both physical and mental health, promoting social health of the users, higher order of social interaction, making communities close-knit, promoting urban sustainability, ensuring branding cities and making cities preferred tourist destinations, besides making cities more productive, qualitative, safe and liveable (figure 6).

- **Reinventing Traffic Nodes**

All travel and traffic nodes involving bus/rail-road traffic and transportation, invariably attract large



Figure 6: Principles of planning community-focused public spaces – USA Department of Transportation  
Source: [www.transportation.gov](http://www.transportation.gov)

concentration of locals and visitor population. In majority of cases, such public spaces remain ignored and are never planned to operate and be used as vibrant and user-friendly public spaces. Considering their use, role and importance, such spaces must be properly planned, designed and developed to operate as vibrant public spaces. Linking and integrating these travel nodes with public open spaces will help in making such areas more vibrant and safer.

- **Optimising Use of Land**

Public open spaces invariably remain large consumers of precious and valuable land resource and accordingly must be planned, designed, built and operated based on the principle of using such spaces on 24x7x365 basis. Adoption of this approach holds great relevance and importance for India for the reason that India remains the most land stressed country in the world, housing 17.6% population of the global population (1.41 billion), while having only 2.4% (3.2 million sq. km) of global land.

- **Planning for Accessibility and Visibility**

All public spaces must ensure having good accessibility for approaching the spaces without any physical and social handicap. Visibility should remain the guiding principle of locating and planning public spaces, in order to make them safe to use. Unsafe and lack of visibility have been discounted as major factors which have largely led to the misuse, abuse and limited use of such public spaces.

- **Leveraging Technology**

In this era of rapidly changing urban fabric and morphology, it will be important to make public spaces more qualitative, more productive and

operationally efficient. These objectives can be achieved by appropriately leveraging the strength and options made available by emerging and available technologies and soft skills offered by IT, ITES and artificial intelligence. These technologies hold enormous potential to make public spaces smart by providing appropriate information related to public spaces in the public domain by launching dedicated apps and focusing on detailing and defining the available public spaces in the city for making choices, promoting optimum usage and enhancing/enriching user experience.

- **Reinventing the Planning of Commercial/ Residential/ Institutional Areas**

Planning of commercial/residential/institutional spaces must be made to revolve around public spaces to ensure/promote appropriate level of social and community interaction besides improving shopping experience of the users and community.

- **Embedding Sustainability**

Considering the area available and the use of public spaces by a large number of residents/visitors, these spaces have large implications in terms of consumption of large materials and resources. When designed without caring and addressing sustainability, these spaces are known to be major source of urban heat islands and leading to the consumption of a large amount of energy. Accordingly, using renewable energy, opting for eco-friendly materials, using landscaping and incorporating sustainable water management systems in the planning, designing and construction of public spaces, will help in embedding sustainability in the public spaces (figure 7).



Figure 7: Design ideas and approach to building sustainable and eco-friendly public parks  
Source: [www.caddetailsblog.com](http://www.caddetailsblog.com)

- **Achieving Sustainable Development Goals**

As urban areas continue to grow, evolve and devolve, innovatively designed public spaces will not only empower and enrich local communities/residents but will also help in making cities more humane, sustainable, inclusive, safe and resilient, as ordained in SDG-11.

- **Leaving Nobody Behind**

Since public spaces are meant to serve and promote the welfare of the local communities, they must be planned and designed to promote inclusivity of all individuals. These spaces must be planned to create abilities, facilities and amenities for improving socio-economic status of all stakeholders including people with physical, mental disabilities and challenges, without any discrimination and preferences, so that nobody is left behind. In addition, these spaces must welcome everyone by well-defined and appropriate signage.

- **Involving Private Sector**

Given the existing challenges of ever increasing price of urban land, limited availability of resources with the public sector and ULBs to develop public spaces, it will be critical and valuable to rope in the strength of private and corporate sector, as a valued partner, in making the provision, planning, development, maintenance and management of public spaces. Involving private sector as a co-partner in public spaces has already globally demonstrated the advantage of making these public spaces more vibrant, high-quality and users friendly.

## 5. Conclusion

Considering the fact that public spaces play a vital role in the social and economic life of communities, ULBs and development authorities operating in planning, development and management of cities at local level must document and map all available public spaces in the cities and prepare a status report. Status report must include preparing an inventory of all usage, issues, infrastructures and facilities existing in public spaces. Based on the available data and studies, ULBs should involve communities and experts for planning, designing and reinventing these spaces, for making value addition to local communities and cities. In addition to retrofitting the existing spaces, study must involve and include identifying and quantifying the needs of creating additional public spaces which can work as an important social and economic resource for the town or city. This would help in enabling public spaces discharge their critical role in redefining /empowering cities and showcasing its communities/ culture.

To conclude, it needs to be understood and appreciated that considering the value additions made, public spaces will remain critical for the social, economic, environmental and sustainable growth of human settlements in general and urban centres in particular. In addition to providing numerous benefits, these spaces will remain relevant and important for making cities/communities economical, more productive, socially more interactive/ inclusive besides ensuring that cities become least consumers of resources, achievers of energy-efficiency and role model for sustainability and carbon-neutrality.

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## ARTICLE

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# Government-Aided Housing Scheme Contractor as an Agent of Change

by Ar. Meenakshi Karuppiah

Under the central government's PMAY-U scheme, Beneficiary Led Construction (BLC) in the EWS/LIG section is deemed to be the preferred choice for housing. In this aspect, the local mason/maistry becomes the most critical factor in the implementation. Due to the trend of non-existent design professionals and a shortage of trained masons and contractors in this space, there are many constructions with poor quality of workmanship and incorrect usage of materials, thus increasing the cost of construction. There is not enough data and research in this segment vis-à-vis the government housing schemes. Therefore, Nivasa, an architectural NGO, explored the possibility of the contractor as the impact creator by implementing a pilot project of housing in a fishermen's village in Sadras, near Mahabalipuram, Chennai. The design process and the construction were carried out, including aspects of financial planning and training, in an organized manner and documented thoroughly to understand the challenges and pitfalls. While our findings from this pilot exercise are mixed, it has shown the importance of a community NGO, design professionals and a trained and sensitized contractor in this sector. Additionally, the site location, the homeowners (beneficiaries of the scheme), the materials, market accessibility, labour force availability etc. are some of the tangible factors that affected the outcome. One of the surprising factors has been the social forces and interpersonal relationship within the small community, which could have been mitigated by a community NGO. Regarding the cost of construction, our finding is that GST on materials for this sector is pushing the cost into unaffordable realms.

## 1. Construction Practices in EWS and LIG: Current Scenario

In India, the demand for affordable housing remains at a much larger scale than the supply. The government-aided housing schemes for EWS and LIG segments have been in existence since 1980s. Beneficiary Led Construction (BLC) is one of the most used schemes as it allows the beneficiary to plan the construction based on his financial affordability. This is a segment where there is complete absence of design and construction professionals. The government subsidy is not sufficient to cover the construction cost, let alone be able to factor in design and construction fees. The beneficiary is reliant on themselves or on the local mason or *maistry* for construction. This impacts the quality and cost of construction, in most cases. So how does one bridge the gap on quality issues in this segment?

Nivasa team worked on the premise that if one can fund a professional contractor's services externally, it should be possible to bridge the gap of quality and timely construction issues. Nivasa is a design social venture, specializing in contextual design of various building typologies for the below poverty line segment in urban and rural areas. The design team's focus is on designing humane and dignified living spaces for this segment. The team has derived a Nivasa way, a process through research, ideate, design and help implement.

## 2. Aim and Objectives

Can the role of the contractor be redefined for the BLC in EWS and LIG constructions? To bridge the gap in the quality of design and construction, the

services of design and construction professionals are required. While the financials must be worked out for such a scenario, the questions to be addressed in this study are:

1. Can the role of the contractor be re-imagined in this segment, where the government subsidy is limited and unable to cover the cost of the construction of minimal area house in total?
2. Can a group of BLC houses be planned together so that the cost of a contractor's services can be covered with the volume of work?
3. Can a partnership of government scheme, private philanthropic organizations and the contribution of the homeowner themselves help bridge the financial gap?

The study is limited to PMAY-Urban scheme under the Beneficiary Led Construction scheme in the peri-urban areas of Chennai district.

### 3. Literature Review

As this scheme is relatively new, there is limited research and publications on the BLC in PMAY-Urban. There are studies that focus on the beneficiaries of PMAY-Urban scheme rather than on the other stakeholders. A blog written by Mahila housing trust emphasizes the role of NGOs in implementing BLC (*Role of NGOs in Implementation of BLC Is Inevitable*, 2021).

### 4. Methodology

To work with the idea of a contractor as the agent of change, Nivasa collaborated with IHF (Indian Housing Federation) and Rotary Club of Chennai Sun City. A series of criteria were fixed to create the optimum conditions for the study.

The criteria were:

1. Location: Within 50 to 60 km from Chennai center, to enable ease of supervision for the design and implementation team.
2. Homeowners: The criteria for selection of 5 homes was as given below.
  - a. All 5 homeowners to be in the same village (for ease of operation for the contractor), have viable work order (eligibility for PMAY-Urban subsidy)
  - b. They should not be the poorest of the poor (as the homeowners were expected to contribute INR 1,12,000/- towards the construction)

c. They should agree to apply for reimbursement of INR 12,000/- from the *panchayat* towards the Swachh Bharat scheme.

d. They should agree to sign individual tripartite agreements with the contractor and Nivasa.

e. They must have empty plots.

3. Contractor: He must be based in Chennai in proximity to the village, be willing to adhere to Nivasa road map of work schedules, checklist and reporting, communicating with the community, include worker safety and dignity in the site and most of all, be willing to be a partner in this work.

### Pre-selection of Location, Homeowners and the Contractor

1. A survey of contractors in the lower middle class and middle-class group was done to arrive at an optimal area for construction. Based on the survey, the team shortlisted a group of 5 houses (30 sq.m approx. x 5) would be agreeable for a contractor to be involved in the BLC in PMAY-Urban scheme.
2. The criteria for the location, the homeowners (eligible beneficiaries of PMAY-Urban scheme as derived by TNUHDB) and the contractor were jointly created.
3. Based on the criteria, the team met with officials of TNUHDB to understand the challenges and possibilities of various jurisdictions to identify the village and the eligible homeowners.
4. In each case, discussions were held with the local councilor and the community to understand their willingness to be a part of this exercise.
5. Once the village was identified, a series of meetings were held to select 5 homeowners. The roles and responsibilities of each of the stakeholders were discussed. These meetings were also used to understand the homeowners' requirements and their aspirations for their new houses. Drawings and models were created to explain the layouts and the house design to the homeowners.
6. In parallel, meetings with contractors were held, emphasis on social impact, some flexibility on the approach to construction, and funding was discussed. Worker safety and dignity aspects were discussed.

7. Tripartite MoUs were drawn up outlining all the aspects of the project. The 3 parties were the homeowners, Nivasa and the contractor.
8. The location finalized was the village of Meiyyur in Kanchipuram district. This hamlet was located right next to the Kalpakkam atomic energy plant, adjacent to the historic Dutch Fort at Sadras. The community here were the fisherfolk who went fishing on daily basis in fiberglass boats.
9. This village had been impacted severely in the 2004 tsunami, after which some of the houses developed vertical cracks due to settling of the walls. Under the PMAY-Urban scheme, demolition of old derelict houses and reconstruction of new houses in the same site are allowed.

### Funding

1. Under the PMAY-Urban scheme, the eligible homeowner can avail a subsidy of INR 2,10,000 towards the building of his/her home. Under this scheme, a minimum area of 30 sq.m is allowed to be built.
2. At the current rate of construction, this subsidy is not enough to cover the cost of construction. Hence the proposal was to supplement the cost with homeowner contribution and private donations from a philanthropic organization.
3. Based on the design deliberations and the homeowners' spatial requirements, it was derived that the living spaces would be 420 sq ft + 100 sq ft of covered verandah.
4. Keeping a cost of INR 1000 per sq ft, the cost of construction was derived to be INR 5,50,000.
5. Based on the occupation of the homeowners, it was derived that they should contribute INR 1,12,000 towards the house construction.
6. The Rotary Club of Chennai Sun City supplemented the remaining amount of INR 2,28,000 per house towards the construction.
7. The RCI Sun City also contributed towards the administrative costs, coordination, travel, training for the homeowners and the contractor, as well as safety and dignity of the workers. The sum was INR 72,000 per house.
8. The homeowners took care of the demolition and debris management.

### Implementation

1. The village of Meiyyurkuppam, a fisherfolk settlement, as shown in figure 1 was finally selected, based on the criteria.

2. Once the village and homeowners were identified, documents were verified by IHF. Patta papers were scrutinized and verified by the Village Administrative officer.
3. Homeowners took responsibility for demolishing their existing houses and keeping the debris out of the way safely to be used later for the plinth filling.
4. Homeowners performed their *bhoomi puja* and then the line-out work was carried out. Adjustments as per site conditions were marked on the drawings and then the foundation work was started.
5. One of the first challenges was the sandy soil of this village. Hard ground was not available at even 5 feet depth. Hence the decision was taken to bring in JCB, dig the entire footprint of the house, cast the raft foundation and then to do soil filling. Usually the masons here will dig the foundation pit to around 3 feet depth and then quickly lay the raft foundation before the soil dries up.
6. Once the excavation work started, it became clear that the houses had been built on sites where earlier there had been structures, foundations of which had not been cleared. Clearing that completely added to the time and cost of the project.
7. All 5 houses were started around the same time, with the expectation that construction will progress reasonably quickly. The basic structure was ready in 11 months, including the slab.
8. After this point, work progressed very slowly due to various reasons such as rains, cyclone, workers sickness, material delay and holidays due to festivals.
9. The contractor abandoned the project 14 months after the construction work started.
10. The team had to regroup, identify new contractors and sub-contractors, purchase new materials and rework the financials. With the gap of many months, there was a cost escalation for certain materials.
11. With the new team of contractors, work was carried out within 2 months and the completed houses were handed over to the homeowners.

### Data Analysis and Findings

The entire process was documented diligently, from the initial reconnaissance trips to the handover of the completed units. Some of the findings were:

## Time Adherence

Table 1 shows the schedule with stage-wise completion, both planned and actual.

1. The partnerships between organizations did not exceed in the time allotted.
2. However, the time for survey and research exceeded the time allotted, due to various reasons including not identifying optimum conditions for the project (village location, homeowner eligibility, contribution factor etc).
3. Design stage, as expected, did not exceed time, as this was totally within Nivasa's control. Pre-construction stage again exceeded time, as homeowners took time to go through the MoU and confirm.
4. Construction stage took more than double the time allocated, as apart from a cyclone, there were days of extreme rainfall, which made it difficult to work on site. The contractor was unable to work on site, however he did not indicate that clearly for nearly 3 months. Once it was confirmed that he was not going to be able to complete the work, new contractors and vendors were hired to finish the remaining work. That took a total of 7 weeks.

## Cost of Construction

Table 2 shows the cost for a unit of 425 sq ft area and 100 sq ft covered verandah. The cost was projected as INR 5,50,000. However, due to various delays, the work stopped on site for a few months. With the new vendors and contractors in place, the cost of each unit escalated by nearly INR 2,50,000.

## PMAY-Urban Disbursements

With the involvement of IHF as the government interface for PMAY-Urban disbursements, the funds were expected to be credited to the homeowners'

Table 1: Schedule for stage-wise completion

Source: Nivasa Team Proposal

| Sr.no. | Activity            | Duration  | Actual    |
|--------|---------------------|-----------|-----------|
| 1      | Partnerships        | 0.5 month | 0.5 month |
| 2      | Survey and research | 1 month   | 3 months  |
| 3      | Design stage        | 2 months  | 2 months  |
| 4      | Pre-construction    | 0.5 month | 1 month   |
| 5      | Construction stage  | 8 months  | 16 months |

Table 2: Construction cost per unit: breakup

Source: Nivasa Team Proposal

| Sr.no. | Project Cost   | Homeowner | PMAY-U   | RCI      | Admin  | Additional | Total    |
|--------|----------------|-----------|----------|----------|--------|------------|----------|
| 1      | Cost of 1 Unit | 1,12,000  | 2,10,000 | 2,28,000 | 72,000 | 2,50,000   | 8,00,000 |



Meiyur Kuppam, Kalpakkam. The highlighted parts show the 5 sites.

Source: Nivasa Project Photos

bank accounts within 5 to 10 days after geo-tagging of the stage of construction. Actual times were as follows:

- a. Plinth geo-tagging: 7 days for credit
- b. Lintel geo-tagging: 21 days for credit
- c. Roof slab geo-tagging: 3 days for credit
- d. Finishes geo-tagging: 10 days for credit

## Findings and Observations

1. In terms of community engagement, it has been a practice to collaborate with a community NGO which can resolve issues within the community with ease. However, in this village, no NGOs were operational. The onus of handling community issues fell on the design team, thus shifting the focus from the team's area of expertise.
2. The contractor relied on workers from other states. This did not work well for this site, as they would not stay for long. Continuity of work at the site suffered because of this.

3. Funds from the government were credited to the accounts of the homeowners very efficiently, thus showing that collaboration with agencies with specific expertise can help the cause.
4. Cost escalation and GST place a heavy burden on such projects, which are already functioning on tight budgets. If the BLC can be supported with specific subsidised outlets, it will help gain access to good quality materials.

### So, is there a place for the contractor in BLC?

- a. Can the role of the contractor be re-imagined in this segment, where the government subsidy is limited and unable to cover the cost of the construction of minimal area house in total?

Housing is a technical subject that involves several professionals: design, construction, government interface, etc. It needs architects, structural and civil engineers, contractors, etc. While large projects have the scope and funds to engage many or all of them, self-built housing specially in the EWS and LIG category find it impossible to afford even one of the professionals. The local mason/maistry/contractor who executes the project plays a very crucial role for and on behalf of all the professionals. He has the local advantage of awareness of local soil conditions, climate patterns, cultural preferences and practices, local materials availability, etc. The local eco-system has to be strengthened and fortified with upskilling, access to materials without the burden of heavy taxes and access to government subsidies in related areas (rainwater harvesting, solar energy subsidies, climate change strategies, green building strategies, etc). The need of hour is sustainable housing for every segment of the society, especially the vulnerable population, as the segment comprises a large percentage of India's population. Access to design services has to be made available to this vast population, either through not-for-profit organisations, or through CSR funding or through philanthropic organisations or through consultant panels in educational institutions. Because good spatial design has the potential to create a massive impact through better natural lighting and ventilation, it results in better mental and physical health.

- b. Can a group of BLC houses be planned together, so that the cost of a contractor's services can be covered with the volume of work?

While the pilot project does not, at first glance, look promising, a deeper analysis will show that some of the factors can be controlled through a collaboration of government and non- governmental organizations in order to achieve the goal of better habitats for most of the population.

- c. Can a partnership of government scheme, private philanthropic organizations and the contribution of the homeowner themselves help bridge the financial gap?

It has been demonstrated that collaborations between various types of organizations is the way forward. While these are some of the types of organizations, other organizations such as micro finance companies, cooperative banks specializing in construction loans, etc. are needed to strengthen the ecosystem. Homeowners' contributions are vital in such projects, irrespective of the amount as this works towards creating a sense of ownership and retaining their dignity.

### Conclusions and Recommendations

The role of the contractor is crucial to sustainable and affordable housing, especially in the BLC segment of PMAY-Urban scheme. However, certain systemic upgradation must happen to empower the local mason/contractor to become the agent of positive change. Apart from access to skill training, relevant information regarding sustainable and green practices, systemic access to remote areas, developing local solutions to local conditions is critical. This will enable us to preserve some of the vernacular elements that are otherwise fast disappearing into a homogenous mass of concrete houses. The need of the hour is to develop simple effective systems of knowledge and skills to enable sustainable development in the vulnerable sections of society.

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# Environmental Jurisprudence and Nature Saviours for Ecosystem Restoration

By Maithily Velangi

## 1. UNDERSTANDING ECOSYSTEM

An ecosystem (or ecological system) is a system in which environment and their organisms co-exist through interaction. The biotic and abiotic components of the system are linked through nutrient cycles and energy flows. Simplistically, an ecosystem is that part of the geographic area where plants, animals, and other organisms, including the climate and landscapes they thrive in, work together to form various interconnected worlds. The biosphere is a series of connected ecosystems forming a large biome. Biomes are vast regions of land, sea, or atmosphere.

A healthy ecosystem consists of both biological and physical elements interacting harmoniously. The well-being of the ecosystem is essential for the optimum operation of our planet. For thousands of years, people have interacted with ecosystems and many cultures have developed around the natural systems determined by geographical settings, climate, human understanding of nature, habits, and other beliefs. This interdependent relationship has, for hundreds of years, nurtured civilisations, allowing resources to be extracted for human use. With the increase in human population and urban growth, the human interventions in the natural landscapes has also grown exponentially, threatening the ecological systems that are the very reasons of our being.

## 2. THREATS TO THE ECOSYSTEM

The ecosystem services namely, Provisioning, Regulating, Supporting & Cultural Services entail all the benefits that humans get from the nature, directly or indirectly. These services comprise of some of the critical natural processes such as carbon

sequestration, pollination, climate regulation, replenishment, and healing of degraded areas, etc. These significantly contribute to the well-being of urban residents and are integral to the liveability quotient of cities. All these services are very crucial for the health and sustenance of the environment and hence of the human race. But the expanding population, urbanisation and continuous exploitation has far overpassed the carrying capacity of the nature. Due to rapid growth of cities and unplanned urbanisation, the natural landscapes are replaced with grey and/or manicured landscapes. Urbanisation is inevitable aspect of development of the civilisation. While promoting economic, technological, and social development, it also brings about land degradation, resource depletion, environmental pollution, and other problems, intensifying and accelerating the conversions of natural ecosystems into semi-natural and manicured ecosystems, eventually leading to the loss of ecosystem services and diminishing their values.

The impacts of these are grave. Today the world is faced with consequences of climate change with global warming, intense rainfalls and flooding, and many such, resulting in economic, cultural and population loss, to name a few. These extremities are directly linked to the imbalance caused in the ecosystem processes due to human actions. Interestingly, nature and its services have the power to restore and replenish itself post any disturbances. But the human activities have intensified and frequented so much that the time required for self-healing by nature also gets compromised, not allowing it the time to recoup.

The developing south Asian countries are the most impacted and vulnerable to these events, India among few others. Indian subcontinent is the most diverse of all in its geography. It is impacted by events of the coast and inland, the mountains and the valleys. The overpopulation with density of 481 per sq.km makes it even worse since these events directly put the human lives under threat.

Hence, it is crucial to establish a balance where mutual coexistence is achievable to promote the overall growth and benefit of the country and in turn, the planet. As we derive resources from nature, we must also contribute back to it, accommodating its presence alongside ours and adopting eco-centric approaches instead of solely anthropocentric ones.

### 3. UN DECADE OF ECOSYSTEM RESTORATION

The UNEP declared the United Nations Decade on Ecosystem restoration from 2021-2030 to promote the United Nation's environmental goals to create a global platform for cooperation and collaboration from various states for the restoration of degraded and destroyed ecosystems. The intention is to unite the world with a common goal: preventing, halting, and reversing the degradation of ecosystems worldwide. As part of its goals towards climate change, the United Nations uses specific days, sometimes weeks & years, or decades as occasions to mark particular activities, events, or topics to create awareness among the public regarding the objectives of the Organisation.

Usually, one or more Member States propose these observances, and the General Assembly establishes them with a resolution. Such declarations encourage the various states to adapt measures to address these issues in their region by implementing policies, creating frameworks, and facilitating local-level initiatives towards the larger goals.

The idea of ecological restoration was initiated in 2011 when Germany joined forces with the International Union for Conservation of Nature (IUCN) to initiate the 'Bonn Challenge'. The goal was to rejuvenate depleted forests worldwide to restore 350 million hectares of forest landscapes by 2030. The activities outlined for the Bonn Challenge underscored that ecosystem restoration plays a pivotal role in combatting climate change and safeguarding biodiversity. Recognised globally as a nature-based solution (NBS), it would set a precedent for emulation. With the launch of the UN Decade in 2021, the international community was urged to fulfil their pledges by 2030, with the Decade offering support towards meeting these objectives.



Figure 1: The Golden Kayarolam apartment at Maradu being demolished in January 2020  
Source: *The Hindu*, September 26, 2021



Figure 2: Rao Jodha ecological Park, Jodhpur  
Source: Author

### 4. ROLE OF INDIA IN THE ECOLOGICAL RESTORATION EFFORTS

One of the biggest challenges for India is restoring its degraded and damaged ecosystems. It is important to not only decelerate this process of degradation but also reverse it to balance the system.

The Indian constitution has given provision of Right to Life in its Article 21, which has been interpreted by the judiciary in upholding the right of humans to clean air, water and environment, stating that these are the necessities for good life. To facilitate this equilibrium, the judiciary has enacted numerous laws aimed at safeguarding the environment. Putting this info into effect allows restoration activities to be prioritised to maintain this right given.

The Indian Government, in 2008, launched the NAPCC (National Action Plan on Climate Change), comprising eight main missions that form the core of this Action Plan, representing multi-layered, long term and integrated strategies for achieving its goals in the context of climate change. Five out of these eight adapted missions contribute towards Ecological restoration, namely, the National Mission on Sustainable Habitat, the National Water Mission, the National Mission for Sustaining the Himalayan Ecosystem, the National Mission for Green India,

and the National Mission for Sustainable Agriculture. For example, the National Afforestation Programme (NAP) is launched under the umbrella of National Mission for Green India (GIM) under the NAPCC, focussing on the rehabilitation of degraded forests, afforestation on wastelands and buffer areas around forests. The National Biodiversity Action Plan is another important initiative under the missions to implement strategies for the reduction in rates of degradation, fragmentation, and loss of natural habitats. Important schemes like the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) and the National Rural Livelihood Mission (NRLM) are intrinsically linked to the relationship between natural resources and rural livelihoods.

Furthermore, India joined the Bonn Challenge in 2015, with a pledge to restore, initially, 13 million hectares of degraded and deforested land by 2020 and later added another additional 26 million hectares by 2030 during the Conference of Parties (CoP) of the United Nations Convention on Combating Desertification (UNCCD) held in Delhi in September 2019. Moreover, as one of its three Nationally Determined Contributions (NDCs), India has committed to the creation of a carbon sink of 2.5-3 billion tonnes of carbon dioxide equivalent (CO<sub>2</sub>e) from additional forest and tree cover by 2030. Recognising the importance of restoration to the socio-economic well-being of the country, as well as to the attainment of Sustainable Development Goals, India has made substantial commitments to restoration.

## 5. ROLE OF JUDICIARY IN HOLDING UP THE EFFORTS OF ECOLOGICAL RESTORATION

While it's important to protect the environment during anthropogenic activities through policies, it is equally necessary to be aware of these provisions, schemes, and the legal bindings for human actions. As discussed earlier, the constitutional provision of Right to Life is for human well-being, but ironically, it's important to keep check on the same humans and their actions to uphold this right. That's the dilemma of the human race: most of our actions have led to the state of the environment we are in while our own efforts are needed with good intent to rectify it now.

Hence, in the process of restorative measures, it is also necessary to penalise and question the human actions. Due to unplanned and unmonitored developments, we have already caused a lot of harm to the environment. Identifying such cases and rectifying them, setting up precedents for future developments becomes very critical and

this can be done majorly through judicial activism. Indian judiciary, in recent past has known to have set examples and made pioneering decisions in this regard and in certain instances introduced tenets such as the Public Trust Doctrine, the Principle of Absolute Liability, the Polluter Pays Principle, the Precautionary Principle, concept of Sustainable Development, inter-generational equity, thus giving birth to a novel face to environmental jurisprudence and setting up 'eco-centric' approaches. One such case is discussed below.

### 5.1 The Kerala State Coastal Zone Management Authority Member Secretary Versus Maradu Municipality & Ors

The compelling judgement of the Supreme court in demolishing the four out of five apartments (one of which had not yet started construction) in the case of illegal construction on the CRZ-III earmarked areas on the banks of Vembanad lake, Kochi, which was recognised as a Ramsar site (a wetland site designated to be of international importance as per Ramsar Convention) in November 2002, in Maradu Municipality sets a high precedent of the consequences of encroaching and damaging ecological networks. The area in which the respondents have carried out construction activities is part of the tidally influenced water body. The construction activities in those areas are strictly restricted under the provisions of the CRZ Notifications.

Indian peninsula, with 7,516.6 km of coastline, is one the most biodiverse and ecologically sensitive landscapes. Under the section 3 of Environment Protection Act, 1986 of India, the first Coastal Regulation Zone notification was issued in February 1991 in order to regularise human-centric activities in the coastal area by the Ministry of Environment and Forests (MoEF). As per the notification, the coastal land up to 500m from the High Tide Line (HTL) and distance of 100m along banks of creeks, lagoons, estuaries, backwater, and rivers subject to tidal fluctuations, is called the Coastal Regulation Zone (CRZ). CRZ along the country has been placed in four categories, CRZ-1, CRZ-2, CRZ-3, CRZ-4, each one with its own values of identification and regulations.

The builders claimed the 5 apartments to be part of CRZ-II, but the court upheld that the during the sanction stage the Maradu area was a Gram panchayat, and the area was under CRZ-III and hence permission granted by the Panchayat was illegal and void. No such development activity should have taken place in prohibited zone. In due course of proceedings, the inquiry committee ordered the removal of all structures (refer figure 1).



Figure 3: Thol Lake, Gujarat  
Source: Wiki commons

Finally, over 300 families were evicted as four waterfront apartment buildings in Kochi's Maradu were demolished on January 11-12, 2020.

### Impacts of the violations & demolition on the environment

"The Maradu-Panangad-Nettoor areas were blessed with thick and lush mangrove forests," reminisced biodiversity expert C. M. Joy. A recent study by IIT-Madras revealed that mangrove destruction at Maradu between 2002 and 2014 was a significant reason for the water pollution, depletion of marine wealth, and adverse biodiversity in the area.

"Irrespective of the technique used for demolition, it will cause a huge environmental impact, incidentally, on the very element that the SC is trying to protect through its Order - the Vembanad Lake," mentioned Shiba Kurian in an article in 'the news minute'. In spite of the complexities of eviction, compensation, etc. involved, the decision of demolition of the construction that had faulted the environmental regulations, has brought in a strong message from the judiciary that we need to be careful and informed about what we are doing. It has set a strong precedent undoubtedly. However, it has left many loose ends with respect to environmental protection. The clearance of debris and restoring the ecosystem to its original state needs a detailed plan of action in place to avoid another series of violations causing threats to the environment and collateral victims of this process.

### Who is to be blamed?

At the onset, the accountability and responsibility falls on the builders who encroached on the land and the government officials who sanctioned the layouts for construction in this case, without a doubt. However, if we look through the process of any new construction, various stakeholders are at play. From buying the land to developing layouts and

designing the buildings by planners and architects to home buyers who come from various backgrounds, a tribe of educated and qualified citizens is a part of this entire process. The awareness of environmental protection, the consequences of unsustainable developments, and the impacts of climate change is not something that any of today's citizens is unaware of. We are constantly, at all realms of life, are made aware of this crisis and come face to face regarding the environment and its state. Considering this, it seems implausible that none of the learned stakeholders who would have come in association with this entire process at any stage questioned this development. Even if we argue that a layman, a normal citizen is generally unaware of the layouts, sanctions, etc, or legal matters, we cannot ignore the fact that there have been designers/ architects / civil engineers who, by virtue of their education are aware of the laws that govern our work, especially when we deal with eco-sensitive zones. It is alarming as to how the ethics of such professionals did not supersede their conduct.

### Setting a precedent

After the successful demolition of the residential high-rises in Maradu municipality, the 54 villas of Kapico Kerala Resorts (Private) Limited on Nediyaathuruthu Island in Vembanad Lake at Panavally panchayat of Alappuzha is heading towards similar fate. The various other constructions along the lake are being scrutinised for the violations. This rigour and inspection may lead to awakening of the wrong doers and at least initiate some restorative measures in place as compensation.

Moreover, the awareness created among the citizens is enormous. The news report by Neethu Joseph published on 30 Jan 2021 on 'thenewsminute' mentions that there has been a considerable change in attitude among the buyers, who are now cautious. This indicates that such strong judgements, though faced with lot of criticism, has in a larger way helped in creating awareness. The questioning of the probable investors & buyers in land and property is making the real estate industry a bit uncomfortable but this attitude of the informed public will go on in a long way to instil the habit of advocacy for the environment by general layman too.

### 6. ROLE OF CITIZENS TOWARDS ECOLOGICAL RESTORATION EFFORTS:

In a country like India, which is, on one hand, dealing with multiple complex issues of population, poverty, crime, corruption and on other, desiring to achieve set SDG's and targets to contribute positively

towards climate change, having the citizens on vigilance and with zero tolerance regarding environmental injustice is a must. The judiciary too, through its various active approaches and laws, are facing challenges to keep up with the cases. In such condition, or even otherwise, it becomes the responsibility of mass population to become the saviours of nature.

With the right capacity and knowledge, every individual and community has the power to become change makers in their own domains. While some organisations, NGO's or individuals engage through raising concerns and filing PIL's against environmental injustice, some others work towards these goals through their profession and some, through self-driven initiatives.

### 6.1 Case study 01: Ecological restoration of Rao Jodha Park, Jodhpur

The Rao Jodha Desert Park in Jodhpur, Rajasthan lies at the foot of the grand Mehrangarh Fort. This place is a good example of the rich natural heritage in the area. It combines historical curiosity and environmental restoration efforts over the years, covering about 72 hectares. Previously, this area was dry and abandoned because of the dominance of *Prosopis Juliflora*. It was introduced around the 1900s to stop further desertification. Instead of helping, it did more harm by discouraging the growth of other native plants. Mehrangarh Museum Trust (MMT) in collaboration with a team guided by the environmentalist, Pradip Krishen, sought involvement of local people for implementation of traditionally tested knowledge to deal with the tough rocky strata and uproot the invasive *Baavlia* species. Through 7 years of careful replacing of this species with native desert species, the wasteland was converted into a geo-park, restoring the natural ecology of this area. In addition, the project has created a sense of ownership among the communities involved, providing income generation & growth opportunities, and set a pioneering example to evolve a self-sustaining ecological model (refer figure 2).

### 6.2 Case study 02: Restoration of the Thol Lake Ecosystem: A Wetland Revival Story, Gujarat

Thol Lake, located near Ahmedabad, Gujarat, is an essential wetland ecosystem. It is a critical resting and feeding ground for migratory birds. Over the years, pollution and urban sprawl have threatened its ecological health. The restorative measures broadly included cleaning up of the Wetland and water, adopting bird conservation techniques and

community involvement in the process. Adapting nature-based solutions of cleaning water through bio remedial measures has improved the balance in biodiversity and enhanced the eco-tourism in the area (refer figure 3).

## 7. CONCLUSION:

Ecosystems in nature are designed to last centuries. Ecosystems continuously adapt to their environment through principles like self-regulation, biodiversity and interconnection. This allows them to sustain themselves and survive. Any adverse human intervention will collapse this system. For wellbeing of our planet, health of the ecosystems is critical. Understanding this need, the UN has declared the UN ecological restoration decade. The onus to stand by this declaration and contribute to this noble cause is not only the prerogative of the states and governments but each individual and our actions. Because ultimately, our own actions will lead us to our destination in future.

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## ARTICLE

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# Evaluating Interdisciplinary Approaches in Redefining Architectural Pedagogy to Address Contemporary Challenges.

By Shanthala V

## 1. Introduction

Globally the world is transforming, and these changes are more evident in the Global South with increasing urbanization levels, concentration of population and hence creating high densities, exhausting natural resources, resulting in green challenges. With the profession evolving from creating aesthetically pleasing buildings to creating responsible built environments, theoretical comprehension transcends various disciplines and the practical abilities bridges technologies. Human interaction with the surrounding environment is through a series of relations. In the present context, the environment is transforming and so also these relations. Architecture is an endeavour to evolve appropriate physical environment for human use in the context of these relationships. These relations may be read as juxtaposition of multiple knowledge domains.

Architecture inherently assimilates the knowledge from multiple disciplines and expresses it by synthesizing the relevant knowledge from these different allied domains. As Vitruvius enumerates in the first chapter of his book "The Ten Books on Architecture", an architect needs to be equipped with knowledge of many branches of study and it is the judgement of the architect which aids in realizing the strength of these related knowledge base. Further, both scholarship and practical skills are equally important for an architect to perform. Architectural problems are connected to multiple components of the habitat, and these cannot be examined through the lens of one discipline, but it requires multiple

perspectives from the related disciplines. These perspectives when evaluated and synthesized result in the most relevant solutions than viewing the problem with a single lens and imposing a condition which may not be the most appropriate scenario. Architectural problem solving is a participatory symbiotic process between disciplines where every knowledge base benefits from each other through critical thinking and evaluation of the scenarios generated. The transforming physical environment depends on the nature of architecture itself and the society which produces it (Hillier, 1972).

### 1.1 Aim and Objectives

The study intends to evaluate the relationship between various disciplines presently inculcated in the architecture curriculum and attempts to assess the relevance of the same in addressing contemporary challenges. The study also attempts to formulate pedagogical approaches which may be inculcated in architecture education. The intent of the paper is to propose methods to navigate the challenges posed presently by the human interactions with the contextual environment to arrive at more relevant architectural pedagogy.

## 2. Literature Review

Advances in technology is transforming the world by setting in new patterns for people to work, live, and play. These kinds of changes have a direct impact on their physical environment. Advances in other disciplines, materials sciences, technological systems, data driven approaches, digital medium are creating

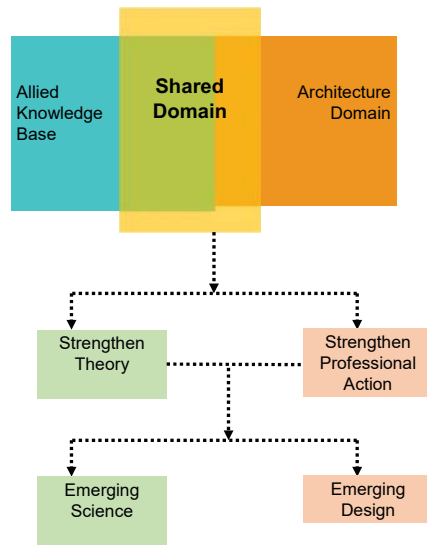


Figure 1: Translation of Bill Hillier's concept of related knowledge domains

Source: Author

profound impact on the way one approaches solution to any problem from any discipline. This in turn has radically changed the context for architectural design. Deeply interrelated systems of knowledge and complex systems thinking make collaboration and cross disciplinary communication imperative (Charalambous & Christou, 2016).

Choi and Pak differentiate the multiple ways in which different disciplines collaborate in providing comprehensive health services as multi-disciplinary, inter-disciplinary, trans-disciplinary approaches.

### 2.1 Multiple disciplinary approaches

Multiple disciplinary approaches have become imperative to solve complex real-world problems that always span between disciplines (Awomele, 2019) but boundaries between disciplines cause artificial impediments to work with other disciplines. Disciplines converge to find solutions in multiple formats.

Multidisciplinary and interdisciplinary is interchangeably used but it is not the same (Choi & Pak, 2006). The multidisciplinary team brings in specialists in various domains and each individual team member contributes from the perspective of his/her domain towards the project. An interdisciplinary team weaves a common thread, and the team members take collective position by contributing their expertise in evolving a theme synthesized from the contributions of various disciplines. Trans-disciplinarity integrates knowledge domains and transcends boundaries between disciplines. Multidisciplinary, interdisciplinary and transdisciplinary are additive, interactive, and holistic, respectively (Choi & Pak, 2006). Hillier

states that presently there are two conditions that are confronted- one where there is extreme differentiation and specialization (Hillier, Architecture and Engineering in Environmental Education, 1972) where the domains are explicitly defined and regimented. Second condition is of extreme generalization where skills and roles are unified into a single entity or a functional system. Both situations result in lack of collaboration between disciplines in true sense.

### 2.2 The nature of Architecture problem

Architecture problems have multiple layers which involve aspects of human use, structure and materiality, environmental parameters, social situations, economic factors, the regulatory determinants which make the problem complex. Additional complexity is contributed by globalization, extensive industrialization which has raised the benchmarks of service delivery. The perspective of only one discipline may not justify addressing the complexities inherent to an architectural problem. Hence the nature of an architectural problem dictates the need for an interdisciplinary approach. Realising the extent to which the architectural studio imbibes from the allied knowledge domains makes the outcome more relevant to address the architectural problem.

### 2.3. Evolving pedagogical approach

Evolution of research and theory from the related domains of knowledge in relevance with the nature of architecture and the society that produces it becomes important (Hillier & Leaman, 1976). Bill Hillier goes on to identify 'science' and 'design' (as illustrated in Figure 1), which emerge as the outcome of an enquiry for knowledge (theory) or professional action (practice) respectively. Pedagogical differences between the knowledge domains offer challenges in evolving the pedagogy for the architectural design studio. Interdisciplinary learning establishes a democratic environment for multiple disciplines to converge by dismantling the hierarchies amongst disciplines (Sánchez & Dundjerovic, 2022). Problem-based learning approach and project-based learning approach carried out in the design studio, are valuable methods (Badawi & Abdullah, 2021). Experiential learning as proposed in the Kolb cycle emphasise on concrete experience, reflecting observation, abstract conceptualisation and active experimentation (Sánchez & Dundjerovic, 2022).

## 3. Methodology

Architecture pedagogy observes the architecture studio is the crucial platform where the student

synthesizes the learning from various courses which are taught as part of the curriculum. Many courses are drawn from allied disciplines which directly or indirectly contribute to the architectural outcome. Further, with the advancement seen in many disciplines and evolution of specialisations, it becomes important to identify relevant disciplines in the context of the architectural project in question.

### 3.1 Linkages with the knowledge domains

Two factors become crucial in finding relevant knowledge in the inter-disciplinary knowledge base which an architect can apply in his profession and practice. First identifying the relationships between the dissimilar domains and establishing their relevance in recognizing the solution. Second, identifying the intensity of shared domain knowledge and mapping between domains. It has to transform into a methodology, endowed with skills and arriving at tools for application.

Hence in this study, sample courses are identified from the curriculum and evaluated across four parameters. The courses from allied fields in both humanities and technology stream are considered for evaluation. First, intensity/ breadth of shared domain knowledge with relevance to architectural outcome is considered. The other parameters for evaluation include the tools in the curriculum for application of knowledge gained, significance of content in the studio and relation to current trends in the allied domain. All four parameters are evaluated on a scale of low, moderate or high.

## 4. Data Analysis and Findings

The curriculum from a typical architecture course is considered for the study. The intensity of shared domain knowledge is always moderate and a deeper penetration in the allied domain may give a better perspective. The domain knowledge is limited in the case of certain disciplines such as Economics. Considering the second parameter: tools for application of knowledge; some courses offer tools such as social research tool in sociology, applicability of detailing in building construction course. But the economics course only exposes students to certain laws and terminology related to the discipline but restrains from giving a comprehensive picture of the knowledge base and its relation to architecture. Considering the third parameter: significance of the content in the studio; there is very limited content from these courses which find direct applicability in the studio. This creates a gap between the two knowledge domains and hence the designs may lack synthesis with respect to these identified aspects.

Considering the fourth parameter: recognizing the present day relevance of the content, and updation of the current progress in these domains; most courses fail in this aspect.

## 5. Results and Discussion

The intent of incorporating multiple disciplines in the architecture curriculum is to assist students to gain a holistic understanding of real-life situations and equip students to generate solutions for these real time situations. As referred to in Table-1, the interdisciplinary courses which should be contributing to the important dimensions of the studio remain as fact based theory courses. These offer minimal tools for applicability in the studio. Further these allied knowledge bases do not keep abreast with the latest contemporary situations.

### 5.1 Role of student and instructor in the studio

Multiple disciplines play a role in the studio through instructors/ educators from multiple backgrounds who collaborate to guide the students to transcend between disciplines. The pedagogical approach may also consider situations where student expertise/ background from different disciplines contribute to team efforts for the studio projects. Collaboration and team learning needs to be imbibed as the studio temperament from the perspective of students and educators.

### 5.2 Recognising disciplines through case Studies

Case studies have been an integral part of architectural learning. Reverse engineering is a technique applied to realise the mechanism of functionality in many domains. Architecture discipline finds case studies contributing significant inputs to projects but rarely is it analysed through related disciplines. These perspectives will inbuilt the inter-disciplinary perspectives more strongly in the pedagogy. This will offer better insights in realizing the role played by other disciplines in realizing the solution which is built.

## 6. Conclusion

In the context of the changes that are transforming the contextual conditions where the physical environment is emerging, it is crucial that architectural pedagogy takes cognizance of these developments and adapt to make the knowledge stream relevant and hence contribute to the needs of the society. Remaining in silos and adopting a less collaborative approach in integrating disciplines of knowledge may pose greater challenges to the young architects to keep abreast with the developments in these allied fields. So, it is important to strengthen the

Table 1: Evaluation of inter-disciplinary courses against identified parameters (Compiled by: Author)

| SI No | Inter-disciplinary Course                      | Syllabus Excerpt                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Intensity of shared domain knowledge | Tools for application of knowledge | Significance of content in the Studio | Relating to current trends in the allied domain |
|-------|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|------------------------------------|---------------------------------------|-------------------------------------------------|
| 1     | Sociology                                      | <p><b>MODULE 1</b></p> <p>1. <b>Introduction to Sociology:</b> Definition of sociology: Nature, Scope and Utility of Sociology; Branches of Sociology; Relation of Sociology and its branches to architecture and the built environment.</p> <p>2. <b>Elements of Society:</b> Biocultural and Sociocultural associations; Definitions of sociological terms: society, community, family, culture; Difference between society and community; Different family structures and architectural responses to different family types in and outside India (examines of different housing typologies responding to different family types – traditional and contemporary); Relation between culture and built form (exploration of architectural examples).</p> <p><b>MODULE 2</b></p> <p>3. <b>Communities:</b> Origin, growth and nature of settlements and communities; Their characteristics and spatial patterns.</p> <p>4. <b>Urban and Rural Communities:</b> Definitions of the terms 'urban' and 'rural'; The social, economic and spatial characteristics associated with urban and rural settlements; Isolation and interdependencies between urban and rural settlements; Urban sociology and rural sociology.</p> <p>5. <b>Cities and Society:</b> Urbanization – definition, causes; Effects of urbanization on rural areas; Impact of growing urbanization on urban life, viz. health, housing, transportation; Different types of migration; The impact of migration on urban form; The origins and characteristics of slums in European, American and Indian cities; Official definition of slums as per Census of India; Governmental and non-governmental approaches to engaging with issues regarding slums in Indian cities.</p> <p>6. <b>Social Research:</b> The need for research; the research process; ethics of social research; scope of social research; Difference between methodology and methods; Types of research methods: qualitative, quantitative, mixed research methods; Sources of research data: primary and secondary sources; secondary data sources include literature review, official and statistical documents; Primary data sources use methods such as field surveys, questionnaires, different types of interviews (open-ended / closed / structured / semi-structured), and case study approach.</p> | Moderate                             | Moderate                           | Moderate                              | Low                                             |
| 2     | Economics                                      | <p><b>MODULE 3</b></p> <p>7. <b>Economics:</b> Definition of economics; Definitions of terms: Goods, Utility, Value, Price and Wealth; The relationship of economics with the built environment and land use.</p> <p>8. <b>Economic organization of society:</b> Different economic systems: capitalism, socialism, communism, mixed-economies; Primary, secondary and tertiary sectors of economy: agriculture, mining, manufacturing, banking, marketing, transport and service sectors; Factors of production: land, labour, capital and entrepreneurship; Relevance of factors of production to architecture and construction practice.</p> <p><b>MODULE 4</b></p> <p>9. <b>Economics and the market:</b> Consumption, wants and needs and their characteristics; Concepts of economics: Opportunity cost; Laws of supply and demand; Laws of increasing, diminishing and constant returns; Standard of living; Analysis of the housing market in Indian cities to understand the dynamics of urban housing supply and demand.</p> <p><b>MODULE 5</b></p> <p>10. <b>Urban land values:</b> Various factors affecting the value of urban land; Difference between land use and land cover; The characteristics of developed land in the city; The Bid Rent theory that defines relationship between location and land value; Theoretical city models based on land use and land value – Burgess's Concentric Zone Theory; Hoyt's Sector Theory; Urban and Harris's Multiple Nuclei Theory.</p> <p>11. <b>Building Costs:</b> Cost and cost indices; Life cycle costs; Total cost of construction; Time value of money; Different sources of financing buildings.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Low                                  | Low                                | Low                                   | Low                                             |
| 3     | Electrical Services                            | <p><b>MODULE 2</b></p> <p>4. <b>ROC filler slabs:</b> Principles and methods of construction; Introduction to different filler materials; Mangalore tiles, Burnt Clay Bricks, Hollow Concrete blocks, Stabilized Hollow Mud Blocks, Clay pots, Coconut shells etc.</p> <p>5. <b>ROC Waffle slabs:</b> Principles and methods of construction.</p> <p><b>MODULE 3</b></p> <p>6. <b>Structural steel as a building material:</b> Types, properties, uses and manufacturing methods.</p> <p>7. <b>Steel construction:</b> Steel columns/beam construction; Principles and methods of construction.</p> <p><b>MODULE 4</b></p> <p>8. <b>Steel doors and windows:</b> Study of primary details.</p> <p>9. <b>Steel doors for garages and workshops:</b> uses and manufacturing methods.</p> <p>10. <b>Collapsible gate and rolling shutters:</b> uses and manufacturing methods.</p> <p><b>MODULE 5</b></p> <p>11. <b>Aluminium as a building material:</b> Types, properties, uses and manufacturing methods; Detailing of aluminium partitions.</p> <p>12. <b>Aluminium doors and windows:</b> Casements, Pivot, Sliding type: Study of primary details.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Moderate                             | Low                                | Low                                   | Moderate                                        |
| 4     | Materials and Methods in Building Construction | <p><b>MODULE 1</b></p> <p><b>Electrical Services - Electricity Generation, Transmission and Distribution</b></p> <p>1. <b>Introduction to Electrical Services:</b> Introduction to commonly used terminology – Voltage, Current, Power, Connected Load, Max. Demand, Load Factor, Diversity Factor Etc; Importance of Electrical Services and its implications on building design; Introduction to Codes and Standards like National Building Code, National Electrical Code, IE Rules, State Electricity Board and Chief Electrical Inspectorate Guidelines.</p> <p>2. <b>Supply and distribution of electricity to buildings:</b> Brief introduction to various Sources for Electricity generation; Introduction to Transmission and Distribution system (from generation to Building's main) – Cables-HV/CT, Voltage Levels, Sub-Stations, Ring Main Units, Metering Panels, HT Panel, Transformers.</p> <p><b>MODULE 2</b></p> <p><b>Electrical Services - Internal Electrical distribution systems and Renewable Energy Systems</b></p> <p>3. <b>Residential building internal electrical distribution system &amp; Commercial building internal electrical distribution systems:</b> Power Requirements, Incoming Power Source Voltage, RMC, Transformers, HT Metering &amp; Sub-Metering Panels, LT Panels, Ring Mains, Sub-Mains, Circuit Mains, Generators, UPS requirements, Server power requirements, Point Wiring, Power Meters, Utility Loads, Wiring Systems, Wiring Installation systems.</p> <p>4. <b>Introduction to Renewable Energy Systems (On-site and Off-site):</b> Solar, Wind, Bio-Mass, Achieving Net Zero Building design through utilization of above natural resources; Energy Conservation techniques in Electrical systems.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Moderate                             | Moderate                           | Low                                   | Moderate                                        |

inter-disciplinary knowledge base through intense research and strengthen the resources necessary for the architecture profession.

This strong inter-disciplinary knowledge base should support the academia and practice in their architectural endeavours. This will also assist the profession to further adapt to the changing conditions and make positive contributions in shaping our physical environment. Hence there is a two-pronged approach that is necessary in the current scenario. One is to strengthen the research and strengthen the knowledge system bridging all those disciplines which connect to the architectural enquiry. So also, secondly,

it is equally important to nurture young professionals to face the challenges and develop problem solving skills. It is important that these young architecture professionals should make meaningful contributions to society, to the local communities and strengthen their cultural heritage. Hence arriving at an adaptive, interdisciplinary approach in architectural pedagogy is the need of the hour.

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**Shanthala V** is a practicing architect and researcher, presently pursuing her doctoral research at *Institute for Social and Economic Change, Bengaluru*. With an experience of over 13 years in academics and over 10 years in industry, she is an advocate of inter-disciplinary pedagogical approaches to achieve effective problem solving. Her research interests include habitat issues concerning the built environment, their social, economic, environmental dimensions and also investigating architectural pedagogy.

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# Design for Sustainability

## Exploring the Intersection of SDGs and Design Thinking

By Jaya Verma and Ar. Vivek Sehgal

### 1. Introduction

A convention centre is a large venue designed to host various types of events, particularly conferences, conventions, trade shows, exhibitions and other gatherings. These facilities are purposely built to accommodate large groups of people and provide the necessary infrastructure and services for hosting such events. Additionally, convention centres serve as hubs for networking, knowledge sharing and collaboration among professionals and enthusiasts in various fields. The scope of this project includes the proposal of a commercial complex cum convention centre as per Punjab Infrastructure Development Board and Department of Housing and Urban Development, Government of Punjab.

### 2. About the site

The site of the project is spread across 15 acres and is owned and managed by Greater Mohali Area Development Authority (GMADA). The site lies within the under-development IT City and is located on the 200-ft IT City Road, Sector 82A, Mohali which directly connects it to the Chandigarh International Airport (~7.5 km). The SAS Nagar Mohali Railway station is located at a distance of ~8.5 km.

### 3. Concept and ideology

The aim is to achieve sustainability in all three of its aspects i.e. environmentally, economically and socially through the design proposal of the thesis. Thus, the thrust area of the concept revolves around sustainable development. Moreover, the context has also been taken from the site location and need (Refer Figure 1) Sustainable development (SD) emphasises the integration of environmental, economic and social considerations to create a balanced and equitable society. These are often also referred to as the planet, profit and people. The three pillars of sustainable development are:

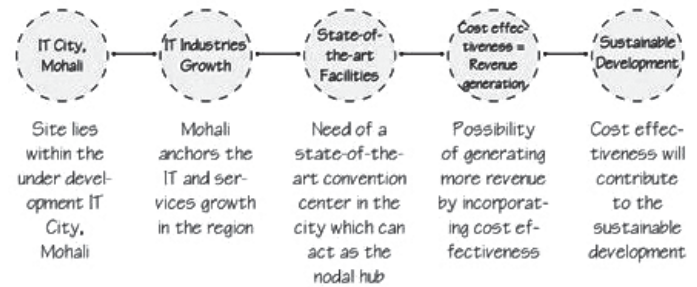


Figure 1: Ideology behind the design concept

- Environment Sustainability** – It can be achieved by passive design strategies which provide thermal comfort to the users in addition to its contribution to sustainability.
- Economic Sustainability** – It can be achieved by using cost-effective construction techniques and recyclable materials. It can also be achieved by designing flexible layouts and adaptable spaces to accommodate changing needs over time. This may involve optimising floor plans to minimise wasted space and selecting durable materials that require minimal maintenance.
- Social Sustainability** – It can be achieved by designing designated spaces for small business outlets/ local handicrafts/ informal markets to be utilised by local residents, village populations and farmers; social equity can be attained.

Sustainable development goals have been incorporated in the concept of this thesis proposal and categorised based on three pillars of sustainability (Refer Figure 2).

- Environmental Sustainability

**[12] Responsible Consumption and Production** – To achieve sustainable management by efficiently using sustainable materials and construction practices and by designing STP on site for effective treatment of wastewater.



Figure 2: Proposed 3D view of project showing achieved sustainability goals

**[13] Climate Action** – To improve adaptability to climate-related hazards by adhering to solar architecture while designing and planning and improving thermal comfort.

**[15] Life On Land** – To effectively increase afforestation through landscaping with plantation and water body.

b. Social Sustainability

**[4] Quality Education** – To ensure equitable access to all levels of education and vocational training for all irrespective of gender by designing vocational training workshops, accessible to all and by delineating open exhibition areas nearby workshops.

**[5] Gender Equality** – To eliminate all forms of discrimination against all women and girls throughout everywhere by providing equal job opportunities and participation for all, eliminating discrimination.

**[6] Clean Water and Sanitation** – To achieve universal accessibility to safe and clean drinking water and equitable access for sanitation and hygiene by providing appropriate drinking water tanks in public spaces and by designing hygienic public toilets. Also, by providing rainwater harvesting tanks to reuse water effectively.

**[10] Reduced Inequality** – To ensure equal job/employment opportunities for all and to achieve progressive income growth by designing

dedicated informal markets and kiosks to promote small businesses and local handicrafts.

c. Economic Sustainability

**[7] Affordable and Clean Energy** – To achieve improvement in energy efficiency by adopting sustainable measures of improving energy efficiency. Also, by using solar panels to generate energy and supply modern services.

**[8] Decent Work and Economic Growth** – To achieve higher levels of economic productivity and to promote sustainable economic growth by encouraging job creation through delineation spaces for enhancing job opportunities. Also, by designing state-of-the-art commercial outlets to increase economic growth.

**[9] Industry, Innovation and Infrastructure** – To develop sustainable and resilient infrastructure and to reduce waste generation by means of reduction, treatment and reuse by using sustainable materials and construction practices.

4. Zoning on site

The spaces have been zoned according to the public and private zones as well as the inter-connectivity of the spaces. The commercial complex consists of retail spaces on lower floors and business hub/office spaces on top floors, is in direct access to the site, defining its functionality as per public use. The convention centre and hotel are high-rise in comparison to the low-rise commercial complex,

due to which zoning at the back of the site with secondary entry-exit provides a clear skyline.

This site zoning allows all the buildings to function independently whereas the central open space unites all the spaces together via a pathway at ground level allowing the users to access all the spaces from anywhere.

## 5. Site planning

The site is accessible from two adjacent roads while the site has one major and one minor entry. Major entry/exit has been provided separately for the commercial complex and convention centre with segregated entries for VIPs and public, whereas the minor entry/exit has been planned for the hotel for conflict free circulation of public and service vehicles. Refer Table 1 for the proposed site parameters.

Central open space has been provided with OAT and recreational space along with vocational training workshops and kiosks for open exhibitions in a trial to achieve several sustainable development goals (Refer Figure 3).

Parking has been provided in two basements, out of which the first basement offers parking spaces for users of all the buildings and the second basement is dedicated for users of commercial complex only in case of high footfall. Refer Table 2 for the proposed area as well as ECS.

## 6. Floor Planning

### a. Ground floor plan

**Commercial Complex:** Entry is through the curved glazing facade designed to attract customers. The ground floor involves 8 - 90sqm and 5 - 54sqm shops and 960 sqm double-height anchor stores offering multiple outlets for users to shop as per their utilities. Moreover, a variety of kiosks have been provided centrally around the escalators for ease of access (Refer Figure 4).

**Convention Centre:** It involves a grand VIP Foyer with lavish VIP seating area, large public seating area and two large banquet halls to be utilised for any kind of formal or informal gathering with separate VIP dining hall. Both banquet halls have service access from basement (Refer Figure 4).

### b. First floor plan

**Commercial Complex:** It also involves 8 - 90sqm and 3 - 54sqm shops and 960 sqm shops and double-height anchor stores offering variety of stuff to the users. Moreover, massing is being done in order to create an activity area on terrace. Two bridges in the atrium have been proposed to allow easy access to all the shops (Refer Figure 5).

**Convention Centre:** It involves various galleries like exhibit gallery, sculpture gallery and visual art gallery along with a grand VIP lounge. Capsule lifts are

Table 1: Site parameters

Source: Authors

| Site Parameters |                                                |       |          |
|-----------------|------------------------------------------------|-------|----------|
| S.No.           | Item                                           | Acres | sqm      |
| 1               | Plot Area                                      | 15.0  | 60702.9  |
| 2               | Permissible Ground Coverage @ 50%              | 7.5   | 30351.5  |
|                 | Proposed Ground Coverage                       | 3.8   | 15545.7  |
|                 | Proposed Ground Coverage of Convention Centre  | 1.0   | 4132.5   |
|                 | Proposed Ground Coverage of Hotel              | 1.1   | 4572.6   |
|                 | Proposed Ground Coverage of Commercial Complex | 1.7   | 6840.6   |
| 3               | Permissible Built up Area @ 1:2 F.A.R.         | 30.0  | 121405.8 |
|                 | Proposed Total Built up Area                   | 16.2  | 70772.0  |
|                 | Proposed Built up Area of Convention Centre    | 6.8   | 27391    |
|                 | Proposed Built up Area of Hotel                | 6.6   | 26520    |
|                 | Proposed Built up Area of Commercial Complex   | 4.2   | 16861.0  |

Table 2: Parking requirement

Source: Authors

| Parking Requirement                                                          |              |      |
|------------------------------------------------------------------------------|--------------|------|
|                                                                              | Area in Sqm. | ECS  |
| Parking requirement for commercial@3ECS per 100sqm of proposed FAR           | 16861        | 506  |
| Parking requirement for convention and hotel@2ECS per 100sqm of proposed FAR | 53911        | 1078 |
| Total Parking Required                                                       |              | 1584 |
| Basement Area of commercial complex                                          | 33722        | 1054 |
| Basement Area of convention and hotel                                        | 22550        | 705  |



Figure 3: Site Plan

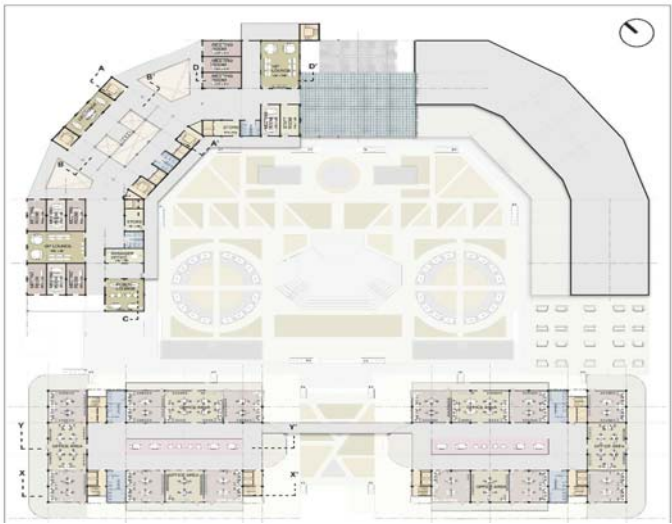


Figure 6: Second Floor Plan

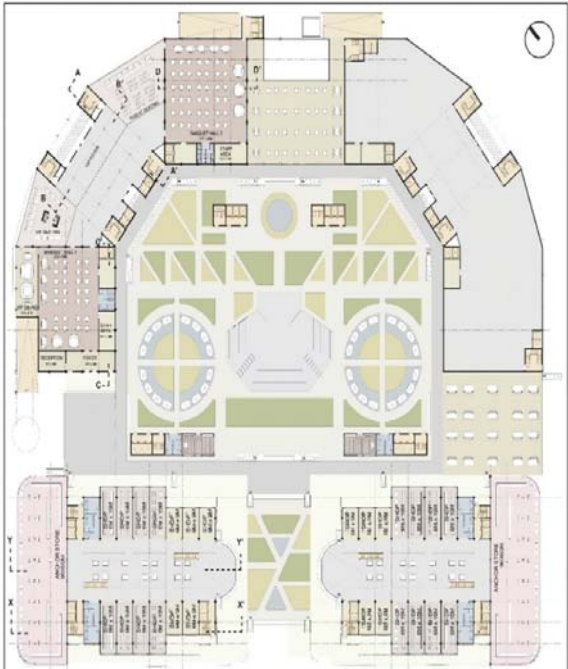


Figure 4: Ground Floor Plan

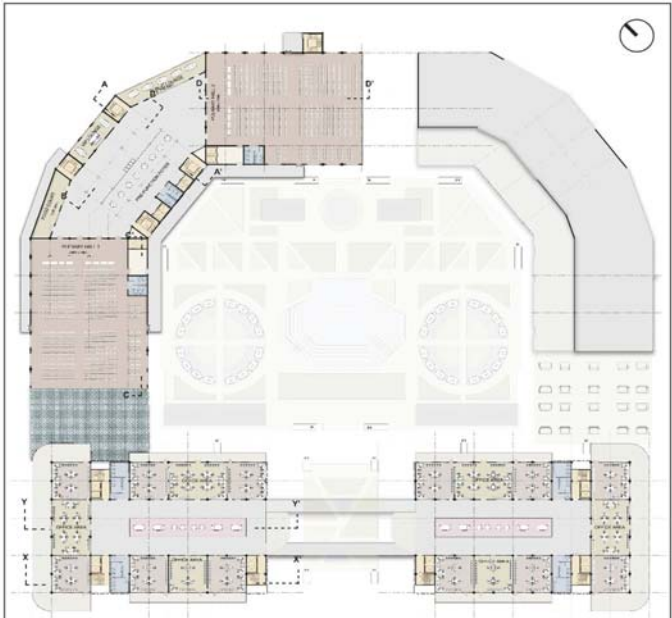


Figure 7: Third Floor Plan

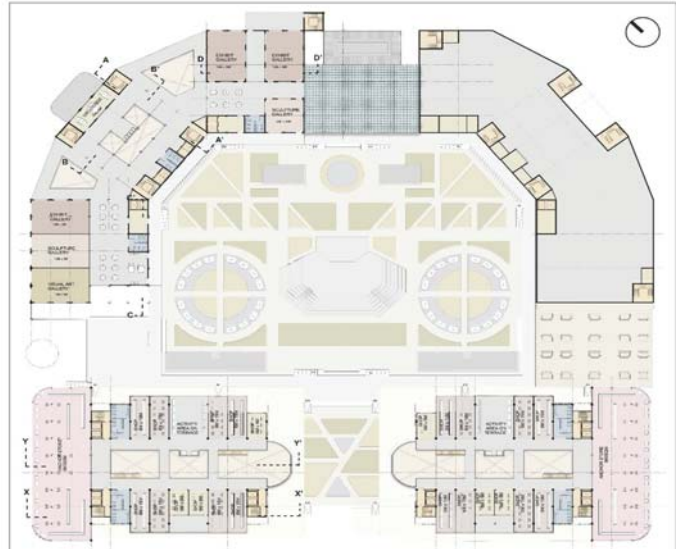


Figure 5: First Floor Plan

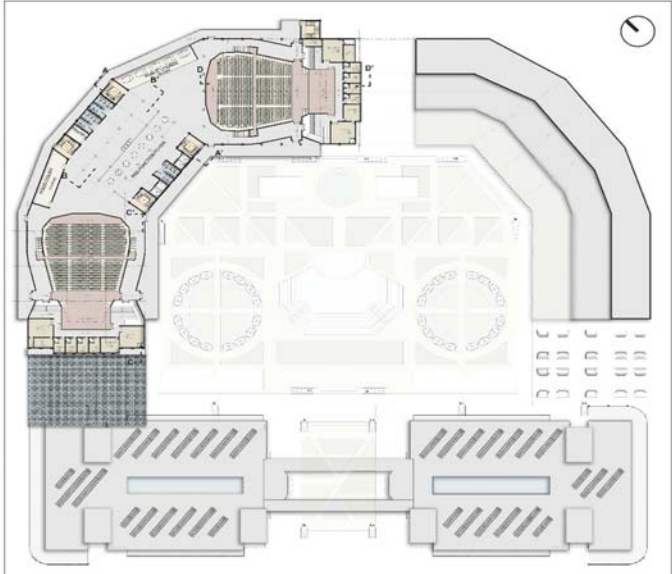


Figure 8: Fourth Floor Plan

provided within the atrium for VIPs to cherish the interiors while travelling to above floors. Semi-open seating areas have been provided for the public. Service access has also been provided from the basement to import exhibits and sculptures (Refer Figure 5).

c. Second floor plan

*Commercial Complex:* Office spaces have been provided on the second floor to create a noise-free and segregated work environment. Open office plan is inculcated to allow open discussion and breathing space within the offices. Moreover, semi-open seating spaces have been provided centrally to relax and interact. A 4m high glass bridge is also provided to connect the office spaces of both the buildings (Refer Figure 6).

*Convention Centre:* It involves formal meeting rooms along with the grand VIP and public lounges. A cantilever has also been provided towards the central open space to act as a refuge area in case of fire (Refer Figure 6).

d. Third floor plan

*Commercial Complex:* Third floor also offers office spaces, creating a noise-free and segregated work environment. On this level also, an open office plan is inculcated and semi-open seating spaces have been provided centrally to relax and interact. Another 4m high glass bridge on the alternate side is provided to connect the office spaces on the third floor also (Refer Figure 7).

*Convention Centre:* It involves two large column-less plenary halls offering sufficient space for large-scale meetings or conventions. A central pre-function foyer has also been provided for the public to gather prior to the event. A food court and VIP and public lounges are also provided centrally (Refer Figure 7).

e. Fourth floor plan

*Convention Centre:* Two large auditoriums have been provided on the top floor of the convention centre offering enough space for the large audience to attend the event. The capacity of one auditorium is 1200 people having balcony seating whereas the other auditorium is 800 people. A common food court has been provided centrally along with the pre-function foyer (Refer Figure 8).

f. Basement plan

Separate entry/exit ramps have been provided for the public of commercial complex, convention centre and hotel. Moreover, a kitchen for the servicing of banquet halls of convention centre has also been provided in the basement along with the parking area (Refer Figure 9).



Figure 10: a) View of commercial complex connecting via bridges; b) View of convention centre showing drop-off covered with space frame; c) View of semi-open seating with brise soleil and space frame

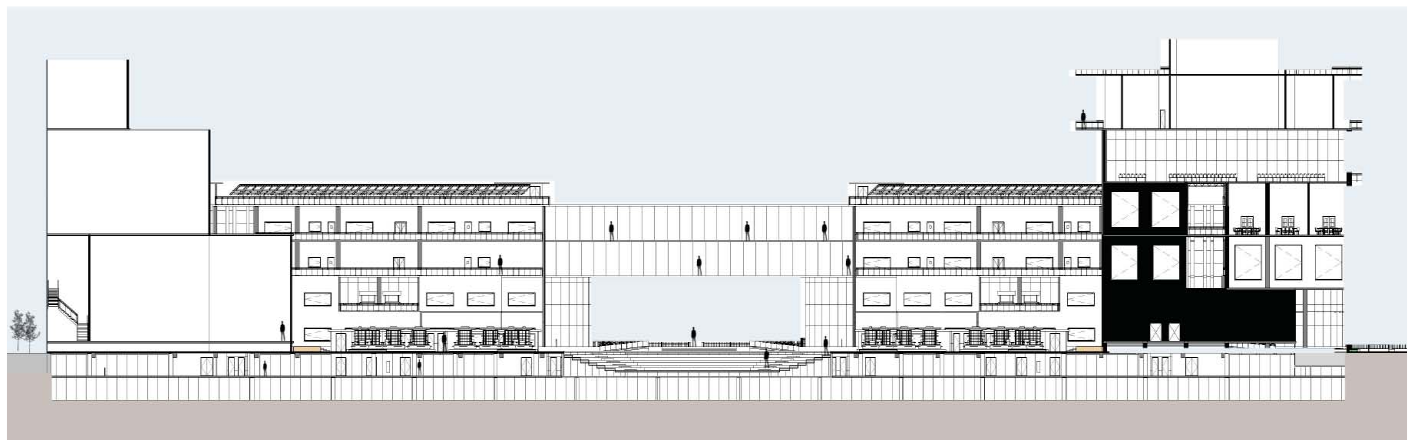


Figure 9: Site Section

## 7. Conclusion

In conclusion, the design proposal successfully integrates sustainability across environmental, economic and social dimensions. By prioritising eco-friendly construction methods, renewable energy systems and efficient resource management, the project minimises its environmental footprint. Economically, design ensures long-term viability through cost-effective operations, energy savings and adaptable spaces that accommodate diverse commercial activities (Refer Figure 10). Socially, the centre fosters community engagement, inclusivity and well-being by providing accessible public spaces and promoting local culture and businesses. This holistic approach demonstrates how thoughtful design can balance development with sustainability, serving as a model for future urban projects.

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*All images courtesy: Authors*



**Jaya Verma** completed her graduation from GNDEC School of Architecture, Ludhiana in June 2024, showcasing academic excellence while augmenting personal and professional skills. She has been placed at L&T Construction and is currently serving as a Graduate Architect Trainee in New Delhi. She tries to infuse innovative ideas and solutions to architectural projects while gaining valuable real-world experience.

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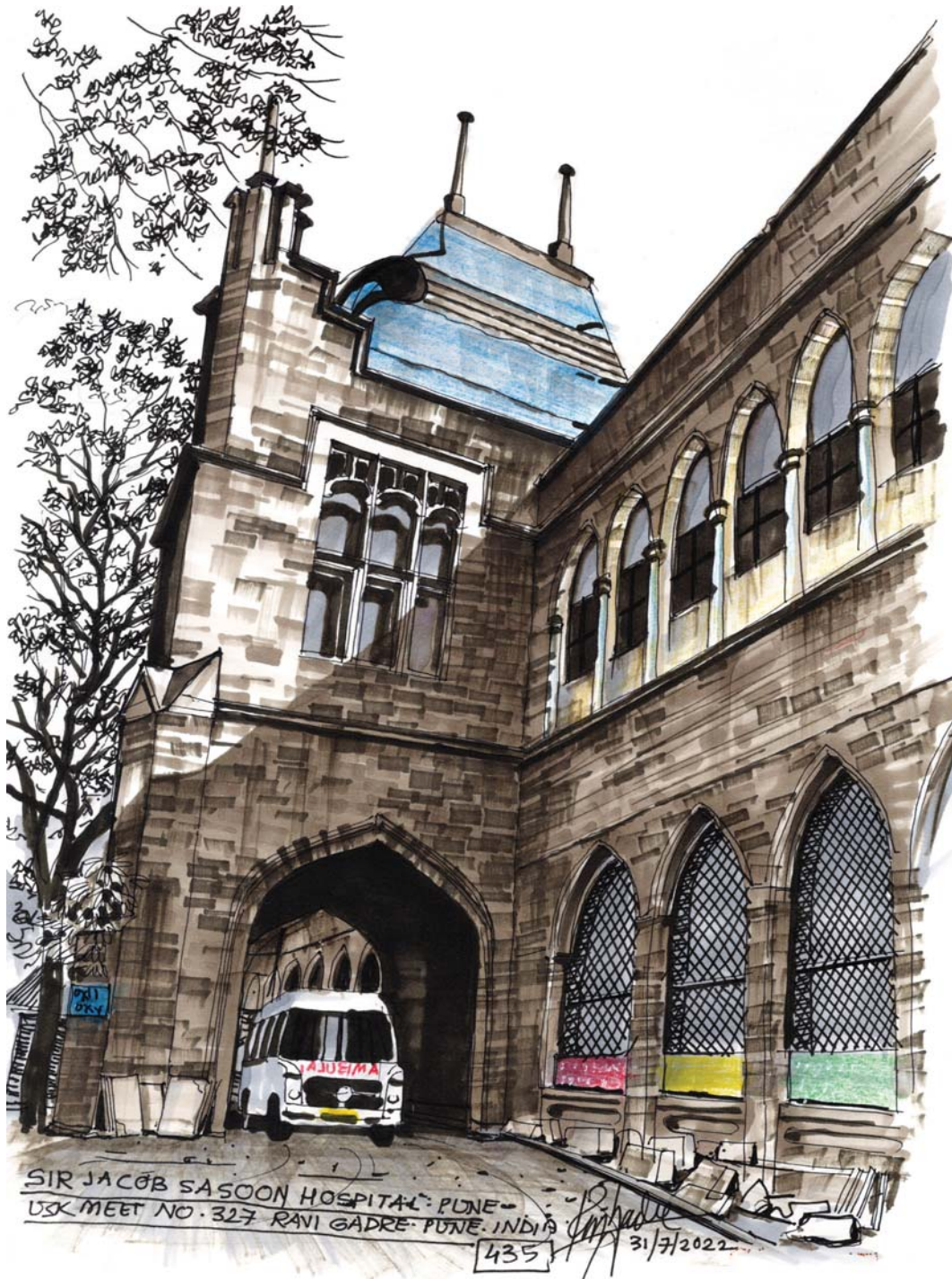


**Ar. Vivek Sehgal** (A23601) is currently serving at GNDEC School of Architecture, Ludhiana as an Associate Professor. He has vast professional and academic experience. He has a commendable research portfolio and has also conducted lectures and workshops in various architectural institutes as a resource person. His areas of interest are anthropology, heritage, smart cities and bioclimatic architecture.

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# Sketches of Maharashtra

By Ar. Ravi Gadre



Sir Jacob Sassoon Hospital, Pune (31 July 2022)



Ganpati Ghat, Wai (8 October 2022)



Laxmi Narasinha Mandir, Dhoni, Wai (9 October 2022)



Ghorpade Ghat, Pune (3 September 2023)



Central Building, Pune (3 March 2024)



Deshmukh Wada Mahal, Nagpur (17 March 2024)

*All Images Courtesy: Author*



**Ar. Ravi Gadre (F07871)** has completed his G.D. Arch from Abhinav Kala Mahavidyalaya of Architecture, Pune. He started a partnership practice in 1979 as *M/s. Gadre Limaye & Associates* and his own firm as *M/s. Ravi Gadre & Associates* in 1998. He has been a visiting professor at BKPS CoA, Pune and BVCoA, Pune. He is fond of photography, music, travelling and reading. He has been awarded several times for his architectural work, as well as for his sketching.  
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# MAHACON '25

## IIA Western Region Conference

Hosted by IIA Thane Centre

### Confluence . . . where Heritage meets Innovation

MAHACON '25 organised by the IIA Maharashtra Chapter and hosted by IIA Thane Centre with great pride, in association with IIA Goa Chapter, was successfully completed on 24-25 January 2025. The Conference theme *Confluence of Adaptive Reuse and Parametric Architecture* aimed at celebrating the glory of the past through adaptive reuse, while contemplating the future through the lens of parametric design. This Conference could bring together the industry partners with latest innovative solutions and sustainable materials along with architects from practice as well as academicians.

The event began with a grand inauguration of the Building Material exhibition on the Expo Ground near Dr. Kashinath Ghanekar Auditorium, which also had a display of cultural preservation through the exhibition, *Deulkathan: Temples of Konkan Region* presented by IES College of Architecture, Bandra. The inauguration of the Building Material Expo marked the commencement of MAHACON'25 with the presence of dignitaries from the IIA Office Bearers and National Council and members from IIA Maharashtra Chapter as well as from IIA Thane Centre. The Expo received a great response from visitors from across the MMR Region over the two days of the event to take benefit of the range of display of innovative material and design solutions by industry partners and sponsors like JK Cement, Enviro Analyst, Daiki Axis India, RR Parkon, Nerolac Paints, Kirloskar Brothers Ltd., Exxaro Tiles, Asian Paints, Parasnath and others.

The main event in the Dr. Kashinath Ghanekar Auditorium started with the invocation dance performance, to welcome the guests, by the young

architects Ar. Sanika Dhoble, Ar. Shefali Kulkarni, Ar. Pooja Jambekar, Ar. Siddhi Mahadik, Ar. Mayuri Dhanshetti, Ar. Shruti Kulkarni and Ar. Mayura Paranjpe of IIA Thane Centre.

For the inaugural function, the dignitaries present on the dais were Hon. Shri Pratap Sarnaik, Minister of Transport, Government of Maharashtra; Hon. Shri Jitendra Awhad, Ex-Minister and MLA; Hon. Shri Sanjay Kelkar, MLA; Hon. Shri Parag Soman IAS (CEO) MMR SRA. With them on stage were Ar. Vilas Avachat, President IIA; Ar. Tushar Sogani, Jr. Vice President; Ar. Sandeep Bawdekar, Hon. Joint Secretary; Ar. C.R. Raju, Imm. Past President; Ar. Sandeep Prabhu, Chairman, IIA Maharashtra Chapter, Ar. Sunil Bhale, Vice-Chairman, IIA Maharashtra Chapter, Ar. Makarand Toraskar, Chairman IIA Thane Centre and Ar. Anil Jagwani, Convener, MAHACON' 25.

The most heartwarming occasion of the event was the screening of the video message from Hon. Shri Devendra Fadnavis-ji, Chief Minister of Maharashtra state; wherein he congratulates IIA Maharashtra chapter and IIA Thane Centre for hosting the Conference with a pathbreaking theme, relevant to current times and which honours the past and looks beyond with an innovative approach to the future. Shri Fadnavis-ji also mentioned that he is confident that the Conference will have a truly potential-based outcome for all and he mentioned the Government of Maharashtra's unwavering support to the initiatives taken by the IIA in coming times.

Further to this, Shri Pratap Sarnaik-ji discussed briefly the overall transport and infrastructure vision and projects with a presentation about his vision on development of government land under the State Transport Department. He appealed to

all the architects in the state to participate in this drive of development of land belonging to the State Transport Department by encouraging developers of private companies to play a vital role in it. Shri Jitendra Awhad-ji mentioned his reverence to the masterpieces of heritage architecture that India has and the inspiration they harbour. Shri Sanjay Kelkar-ji extended his best wishes for the Conference and elaborated the overall development of Thane and its way forward, with new visions on the horizon.

Ar. Makarand Toraskar, Chairman, IIA Thane Centre, briefed about the theme of *Confluence* with respect to Parametric Architecture and Adaptive Reuse, its current context in sustainable urban transformation and further responsibilities to address critical challenges such as water scarcity, climate change and transport connectivity by making responsive designs of structures that adapt to solar patterns, reduce heat retention and enhance natural ventilation paving the path to a sustainable future.

Ar. Sandeep Prabhu, Chairman, IIA Maharashtra Chapter, emphasised the challenges architects are facing in daily practice. The most severe concerns he stated, were that Architects are being treated at par with contractors, they're made to submit tenders or bids for the government projects. He also mentioned a huge loss of opportunity to deserving architects since design competitions are not being held any more. He also added that software for online approval systems needs to correctly facilitate to reduce delays in permissions and in turn benefit the affordability of housing stock.

Ar. Vilas Avchat, IIA President gave a brief idea about IIA activities and future endeavours, especially the Conference, which IIA proposes to host for Union of International Architects UIA at Mumbai in 2027 and asserted government support for the same.

The inauguration of the MAHACON '25 Souvenir with the chief editor being Architect Trupti Biswas supported by the Editorial Team of Ar. Neha Soni and Ar. Urvi Khadakban. The souvenir *Confluence of Adaptive Reuse and Parametric Architecture* is an insightful compilation of articles which have touched upon a variety of possibilities of looking at these two approaches in today's context with preservation and innovation going hand in hand. The theme of the Conference has received a huge response from research scholars and architects from practice in varied perspectives from preservation of culture to application of digital tools, from resilience to sustainability, from environmental to socio-cultural impacts, from design hybridity to public policies and from revitalization to adaptability. Also the special feature on *Making of a Lake city –Thane* which has conversations with veteran architects of Thane which

successfully reflects the confluence of the glory of the past and the visions of the future of Thane.

Finally, Ar. Anil Jagwani, Convenor of MAHACON' 25, extended the Vote of Thanks to all the dignitaries present on the dais, delegates and the esteemed guests in the auditorium.

The Conference Speakers' line up, addressed the challenging times of today with presentations on varied sustainable approaches which catered to both cultural preservation and innovation. There were insightful thoughts on how we balance out climate change, net zero and environmental impacts of architecture on one hand and over-consumption on the other through adaptability, resilience and digital innovations.

**Day 1** opened with the session of Ar. Khushbu Davda, *Studio Emergence* who presented a few projects which explored nature, people and space in the same frame. She took the audience through the journey of conceptualizing ideas and how the design process can be assisted with algorithmic and parametric design strategies. She emphasized on use of technology and gave an example of a latest project inspired by Gaudi wherein her team has used a catenary structure for form optimization in a 60-storey building. She also presented the making of the sculpture at Matka Chowk, Chandigarh with *Flocking Birds* as the concept.

This was followed by Ar. Johannes Schafelner, *Zaha Hadid Architects*, who presented few of their projects live online like Leeza SOHO Tower, China, Central Hub -Sharjah UAE, BEEAH Headquarters -Sharjah UAE and gave crucial insights on how parametric approach-based ideas are executed successfully in reality. Ar. Schafelner delved into the transformative role of parametric architecture in shaping the future of the built environment. He very crisply explored the intersection of computational design, advanced technology and innovative forms, providing insights into how parametric methodologies enable the creation of dynamic, responsive and sustainable structures.

Architect Kirtida Unwalla, an acclaimed conservation architect presented her ideology and her work on the theme of *Adaptive Reuse: Sustainability in the Realm of Built Historic Environment* wherein she discussed about the fundamental concept of adaptive reuse and related terminologies, followed by few of her conservation projects like the Barr house at Matheran, the Cumballa hill precinct listing, Dahanukar Marg, the Elephanta Island World Heritage management and many more which shaped her journey as an conservation architect.

The day closed with Ar. Ishan Grover emphasizing the need to retain a built form and reduce

construction and the demolition waste wherever possible and advocated the adaptive reuse approach in architecture, sighting example of Gender's project wherein a telecom building was reused by changing its functional purpose. This approach honours past and provides for present needs maintaining architectural integrity. Overall, he summarized his talk on three key aspects- construction and demolition waste, embodied energy and cultural revitalization.

**Day 2** opened with Ar. Nandini Somaya Sampat's presentation which was extremely insightful about the core ideas and concepts of conservation and adaptive use approach and the actual challenges related to the execution of such projects. She cited the detailed journey of few of their key projects of adaptive reuse like the Cathedral and John Connon School in Mumbai, TCS Campus in Indore and the Textile Gallery at CSMVS in Mumbai.

Further to this Ar. Senthil Kumar Doss framed his presentation on two key perspectives on parametric ideology, *Parametric Thinking and Parametric Architecture* wherein he discussed further how it evolves around the analogue and digital as the main framework to develop ideas.

Dr. Shikha Jain, Founder-Director of *Dronah*, whose major forte is heritage-based development and museum planning of several projects of Government of India and state governments. She presented in detail The City Palace Museum and took the audience through the journey of miniature paintings which narrated the chronological events and the usage of space. This became the base of developing the concept for the adaptive reuse of the Museum with sensitive decisions of how the displays at the *zanana* and *mardana* palaces shaped into collection galleries and lifestyle galleries respectively, bringing an extremely sensitive touch to the subject how heritage demands reverence and hence the decorum needed in its reuse as well.

Ar. Badrinath Kaleru, in his presentation spoke about his projects like Martins at Panchkula Industrial Area, Pavilion Doaba Public School at Paroval, zero energy, ethical toilet, Vomiid's and Ribbon house at Mohali, all these projects looked at parametric architecture with different applications ranging from facade face-lift, form development to interiors.

The day ended with an engrossing panel discussion which delved deep into the possibilities of confluence of sustainable approaches and innovative design to arrive at optimization of design, functionality and building performance which are the most relevant challenges today. The panel discussion was initiated by Ar. Khushbu Davda, with a lineup of extremely interesting enquiries about how one approached a project for adaptive reuse; the challenges In a

city grappling with a crisis and the stakeholders interested in fast-paced construction, whether technology played a role in bridging the gaps between conservation and adaptive reuse, and as it moves towards having a common goal of sustainable design. Further the limitations of the current zoning laws in terms of practical implementation of parametric design and adaptable reuse were discussed. Given a dilapidated mill in the middle of the city, how was the resistance from stakeholders tackled, who might prefer demolition and new construction over adaptive reuse; what would an ideal project would look like. Ar. Brinda Somaya mentioned that the choice of how much and where a studio needs what amount of AI is a matter of choice and approach. Dr. Shikha Jain advocated for the minimum amount of technology needed for a project by a studio should be the logical way ahead while striking a balance between heritage and technology.

Ar. Senthil Doss focused on the core question of how we look at the transition between parametrics and adaptive reuse and what we consider as our base for our practices. He also emphasized that communication is the key between the two. Prof. Dhanashree Sardeshpande, an academician, advocated the use of digital media in design and production of architectural works. She acknowledged her belief in the increased significance of digital technology and its use in architectural curriculum. Ar. Khushbu summarized the panel discussion by stating that the collaborative approach will go a long way in getting the confluence of adaptive reuse and parametric architecture.

The audience surely had a strong takeaway from these thought-provoking sessions which went on for two days with eight speakers and an equally multi-faceted panel of experts to summarise the outcome of the two-day Conference. Truly MAHACON'25 proved to push the boundaries of architectural expression and functionality.

The Valedictory function was executed in the presence of honourable dignitaries on the dais, Ar. Vilas Avachat, President IIA; Ar. Sandeep Bawdekar, Hon. Joint Secretary; Ar. Dilip Chandra Chatterjee, Trustee; Ar. Sandeep Prabhu, Chairman IIA Maharashtra Chapter; Ar. Raviraj Sarvate, Treasurer, Maharashtra Chapter ; Ar. Upendra Pandit, Joint secretary Maharashtra Chapter, Ar. Shekhar Bagool, Joint secretary Maharashtra Chapter, Ar. Makarand Toraskar, Chairman IIAThane Centre; Ar. Prashant Thakkar, Vice Chairman IIA Thane Center, Ar. A.V. Desai Treasurer, IIA Thane Centre and Ar. Anil Jagwani, Secretary IIA Thane Centre.

Felicitations with merit Certificates for outstanding contribution in IIA activities were given to nominated

members from various centres. Certificates of Appreciation were also given for excellence in sports activities- in cricket to Ar. Aakash Patil, Ar. Sunil Bhale, Ar. Aditya Gupta, Ar. Nikhil Jain and Ar. Hitesh Gujar. Appreciation certificates were also given for outstanding contribution in publication of souvenirs of IIA Maharashtra Chapter during the year 2024 to Ar. Mrinalini Sane and Dr. Sampada Peshwe. Ar. Shripad Bhalerao was felicitated by the honourable dignitaries for designing the MAHACON' 25 memento and the curation of the *Fun at Upvan* event.

Ar. Trupti Biswas was felicitated by Ar. Vilas Avachat, IIA President and Ar. Sandeep Bawdekar Hon. Joint Secretary IIA for her valuable contribution as Editor of the souvenir MAHACON '25.

Special felicitations were done of IES College of Architecture, Bandra, Mumbai – Ar. Vinit Mirkar, Principal and Ar. Shripad Bhalerao, Professor along with student volunteers for the success of the *Deulkathan Exhibition* at the MAHACON '25 Expo. Students of VES College of Architecture, Chembur, Mumbai were applauded on stage for maximum student registrations for MAHACON' 25. IIA Kalyan Dombivli Centre was felicitated for maximum delegate registrations for MAHACON' 25. The entire young architects core team of IIA Thane Center was felicitated for their efforts and successful completion of MAHACON'25. The Atcreata Design team -Atul Joshi, Geeta and Radhika and for the valuable support of 4P Events team of Vaibhav Sane were felicitated. Publication of the book *Theory and Design of Structures* authored by Ajeya Kotkar, son of Ar. Vishwas Kotkar, Chairman IIA Lonavala Centre was released.

The early morning *Fun at Upvan* hosted at the Lake Ghats will stay in the memory of MAHACON '25 participants where confluence of art in the presence of tranquil natural setting of the water body with backdrop of Yeour hill witnessed. There were multilingual poetry recitals conducted by Ar. Trupti Biswas and Ar. Kshama Rane, photography competition conducted by Ar.Gaurav Joshi and Urban sketching conducted by Ar.Yatish Chavan. This was followed by a Drum Jam session conducted by Ar. Shripad Bhalerao which received wholehearted participation by all. Winners for poetry, sketching and photography competitions conducted during the *Fun at Upvan* event were felicitated:

Poetry Recitals: conducted by Ar.Trupti Biswas and Ar. Kshama Rane (@kaleidoscope a spectrum)

1<sup>st</sup> prize- Ar. Neeraj Deshpande

2<sup>nd</sup> prize- Mahek Pujara (student)

Urban sketching : conducted by Ar.Yatish Chavan

1<sup>st</sup> - Ar. Upendra Pandit

2<sup>nd</sup> - Ar. Pradyot Biswas

Photography competition : conducted by Ar.Gaurav Joshi

1<sup>st</sup> - Ar. Yadneshwar Pathak

2<sup>nd</sup> - Ar. Omkar Bhagat

### **Highlights of the MAHACON '25**

IIA Thane Centre hosted the 8<sup>th</sup> Executive Committee Meeting of IIA Maharashtra Chapter on 23 January 2025 at Hotel Ibis and also organized Meeting for Office Bearers of IIA National Council on 24 January 2025 .The Gala Dinner marked the happy moments and witnessed the announcement of the upcoming events of IIA to host the UIA 2027 at Mumbai as well as the upcoming ARCASIA Meet in 2026.

The building material exhibition wherein major industry Partners supporting MAHACON '25 added immense value by their latest innovative material displays and industry knowledge shared through meaningful presentations during the Conference. The highlight of the EXPO was the exhibition of temples of Konkan Region titled as *Deul Kathan* by IES College of Architecture, Bandra ,Mumbai. A small exhibition of *Heritage of Thane* was also put up in the Expo.

With 28 COA registrations and 21 Associates and 3 numbers for Fellowship registrations of IIA and the overall delegate registrations reaching a fabulous count of 416 numbers marks the success of MAHACON'25

The MAHACON was honoured with the presence of dignitaries like Ar. Jitendra Mehta, Vice President, IIA; Ar. B. Sudhir, Hon Treasurer IIA; Ar. Akshay Beuria Joint secretary; Ar. Shilpa Sharma National Council member; Ar.Yayati Tapale, National Council member; Ar. Prakash Deshmukh Trustee; Ar. Dilip Chandra Chatterjee Trustee, Ar. Sunil Degvekar, past Treasurer IIA; Ar. Satish Mane, past Secretary IIA.



**Ar. Trupti Biswas** (A 13185) has 25 years of work experience as a practicing architect, academician and researcher. She has keen interest in exploring various aspects related to Indian culture, Indian knowledge systems and works with heritage, craft communities and artisans along with her mainstream pursuits. She has a Master's in Urban Design (Mumbai University).

# MAHAACON '25

## IIA Western Region Conference

Hosted by IIA Thane Centre



1. Inauguration of Mahacon '25 Expo at TMC Grounds near Dr. Kashinath Ghanekar Sabagruh on 24th January 2025 at 10.00 am in the presence of Dignitaries, Industry partners and Delegates.



2. Mahacon 2025 Souvenir inauguration on dias during the inaugural function on 24th January 2025 (from left Ar. Anil Jagwani-Convenor, Ar. Trupti Biswas-Editor, Ar. Makarand Toraskar- Chairman Thane Centre IIA, Ar. Sandeep Prabhu Chairman Maharashtra Chapter IIA, Shri Pratap Sarnaik ji-Minister of Transport, Shri Jitendra Awhad - ex Minister MLA, Shri Sanjay Kelkar- MLA, Shri Parag Soman - IAS (CEO) MMR SRA, Ar. Vilas Avchat- President IIA; Ar. Tushar Sogani- Jr. Vice President IIA; Ar. Sandeep Bawdekar - Hon. Joint Secretary IIA; Ar. CR Raju- eminent past President IIA)



3. The 8th Executive committee meeting of Maharashtra chapter on 23rd January 2025 at hotel IBIS



4. Speakers presentation during Mahacon'25 – Ar. Ishan Grover presenting his projects on the theme of Adaptive Reuse.



5. Panel Discussion on Day2 in the presence of Ar. Brinda Somaya, Dr. Shikha Jain, Ar. Senthil Kumar Doss, Prof. Ar. Dhanashree Sardeshpande and Ar. Khushbu Davda (moderator of the session)



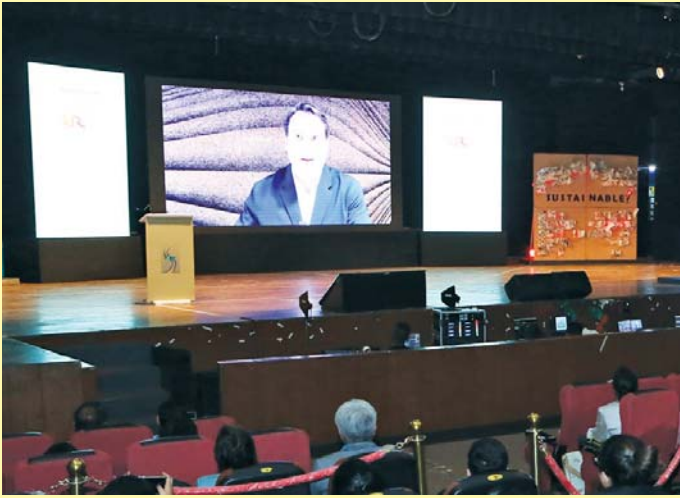
6. Fun at Upvan on 25th January 2025 - Drum Jam conducted by Ar. Shripad Bhalerao, Poetry Recitals conducted by Ar. Trupti Biswas and Ar. Kshama Rane, Photography competition conducted by Ar. Gaurav Joshi and Urban sketching conducted by Ar. Yatish Chavan



7. Team Mahacon' 25 of IIA Thane Centre with Dignitaries of IIA National committee and IIA Maharashtra Chapter



8. Invocation Dance performance by the young architects of IIA Thane Centre.



10. Speakers presentation during Mahacon'25 – Ar. Johannes Schafelner (ZHA) presenting his projects on the theme of Parametric Architecture.



9. Speakers presentation during Mahacon'25 – Ar. Kirtida Unwalla presenting her projects on the theme of Adaptive Reuse.



11. Speakers and IIA dignitaries visiting the Deulkathan Exhibition with the young architects.



12. Speakers presentation during Mahacon'25 – Ar. Nandini Somaya Sampat presenting her projects on the theme of Adaptive Reuse.



13. Felicitation of IIA Kalyan Dombivli Centre for maximum delegate registrations for Mahacon' 25.



14. Video message by Honourable Shri Devendra Fadnis ji, Chief Minister of Maharashtra state congratulating Maharashtra Chapter and Thane Center for hosting Mahacon' 25.



15. Venue of Confluence Mahacon' 25.



16. Presentation on Walkable Cities



17. Young Architects core team of IIA Thane Centre.



18. Inauguration of the Convention.



19. Dignitaries and Delegates attending the Convention.



20. Delegates taking benefit of the range of display of innovative material and design solutions by Industry partners and sponsors.



21. Gala Dinner & handing over of the ARCASIA Cricket Trophy— won by Team IIA—by Captain Ar. Jitendraji Mehta to the President & Trustees of IIA.

# Call for abstracts

**National Conference on Creative Economic Geography of Artisanal Crafts:**

***Investigating the Synergy between Place, Culture and Economy in India.***

Organized by: Department of Planning & Architecture, National Institute of Technology Rourkela, Odisha

Sponsors: Indian Council of Social Science Research (ICSSR)

Dates: 21-25 March 2025

Mode: Hybrid

Drawing from the symbiotic interrelationship shared by place, culture, and economy, the Conference is aimed at investigating how the growth of an artisanal craft and the place of its origin shape each other.

Contributions can be made in the following tracks:

1. *A Craft Placed* : How does a place propel the evolution of an artisanal craft?
2. *A Crafted Place* : How do craft-related practices shape a place?

Submit a 500-word abstract to: [nitr.craftresearch@gmail.com](mailto:nitr.craftresearch@gmail.com)

Post-conference, selected articles will be considered for publication as a book with ISBN by an internationally reputed publisher.

## Key dates

|                                         |                  |
|-----------------------------------------|------------------|
| Submission of abstract                  | 9 Feb. 2025      |
| Notification of acceptance of abstracts | 17 Feb. 2025     |
| Conference Registration                 | 17-28 Feb. 2025  |
| Submission of full-length papers        | 6 March 2025     |
| Submission of presentation              | 19 March 2025    |
| Conference activities                   | 21-22 March 2025 |

Further details at: <https://nitrkl.ac.in/Research/Conferences>

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