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Resilient Traditions and Changing Spaces: Vernacular Architecture and Livelihood Shifts in Assam's Handloom and Handicraft Settlements

Anashuiya Bhattacharya[1], Priyanka Mishra[2], Damodar Jena[3*], Rakesh Ranjan Thakur[4], Vishwanath Neelannavar[5] and Bandana Nayak[6]

[1] School of Planning and Architecture, Vijayawada, Andhra Pradesh, India
[2]KIIT School of Architecture & Planning, KIIT Deemed to be University, Bhubaneswar, Odisha, India
[3*]KIIT School of Rural Management, KIIT Deemed to be University, Bhubaneswar, Odisha, India
[4]Centre for Remote Sensing and Disaster Management, KIIT Deemed to be University, Bhubaneswar, India
[5]KIIT School of Rural Management, KIIT Deemed to be University, Bhubaneswar, Odisha, India
[6]Faculty of Management Sciences, Siksha 'O' Anusandhan Deemed to be University, Bhubaneswar, Odisha, India
E-mail: [1]anashuiya0898@gmail.com, [2]prof.priyankam@gmail.com, [3]damodarjena@gmail.com, [4]rakeshgeo@hotmail.com, [5]vishwanathifs@gmail.com, [6]bandananayak@gmail.com
ORCID: [1]https://orcid.org/0000-0002-2696-1585, [2]https://orcid.org/0009-0009-1235-7086, [3]https://orcid.org/0000-0002-5107-7572, [4]https://orcid.org/0000-0001-9648-0114, [5]https://orcid.org/0009-0001-6031-2626, [6] https://orcid.org/0000-0002-6836-464X
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Abstract - **The handloom and bell-metal craft sectors are integral to Assam's socio-economic fabric, reflecting its rich cultural heritage and economic identity, particularly in the traditional settlements of Sualkuchi and Sarthebari. However, these communities are undergoing a rapid transformation due to the growing influence of modernization, changing lifestyles, and shifting socio-economic conditions. This paper examines the transformations in vernacular architecture and its intrinsic connection to local artisanal livelihoods. Using a mixed-method approach comprising field surveys, interviews, focus group discussions, and spatial mapping, the research documents the production techniques, settlement patterns, and built forms in these craft-based communities. The study examines the transition from traditional Assam-type dwellings to reinforced concrete (RCC) structures, investigating how these changes impact spatial functionality, sustainability, and cultural continuity. Findings suggest that while contemporary materials improve structural durability, they often compromise climatic responsiveness and disrupt the historic integration of living and working spaces. This disruption threatens the long-standing artisanal traditions that are deeply tied to the built environment. The paper highlights the urgent need for sustainable, culturally rooted design strategies and recommends hybrid construction approaches, community participation in planning, and integration of traditional knowledge into rural development frameworks. These interventions are critical for reconciling heritage preservation with the demands of modern living in Assam's artisanal settlements.**

Keywords: **Handloom, Bell-metal Craft, Vernacular Architecture, Traditional Settlements, Socio-Cultural Dynamics, Livelihood Transformation, Sustainable Architecture**

I. INTRODUCTION

Globalization and rapid socio-economic development have brought transformative changes to traditional societies, including the built environments and production systems of artisanal communities. In particular, traditional manufacturing industries, especially those rooted in handloom and handicrafts, are experiencing significant shifts in both technique and spatial organization.

Modernization theorists such as Karl Marx and Daniel Bell view economic development as a driver of cultural transformation, while others, including Max Weber and Samuel Huntington, argue that enduring cultural values shape development independently (Barman et al., 2020; Inglehart & Baker, 2000; Tamannaeifar & Hesampour, 2016). Although the two contrasting schools of thought represent key aspects of modernization and remain subjects of ongoing debate, it is undeniable that modernization inevitably brings change, particularly in the traditional built environment and vernacular architectural practices (Ayoobi et al., 2024; Barman et al., 2020; Mathur et al., 2024).

Vernacular architecture has evolved over the centuries as an amalgamation of society and culture, tailored to the climatic, aesthetic, functional, and sociological needs of a society. It maintains a dynamic equilibrium between the natural landscape, the built form, and the social fabric (Brown & Maudlin, 2012; Choudhury & Chettry, 2023; Rong & Bahauddin, 2023; Srivastava et al., 2023; Miri, 2016; Rompuy & Wilde, 2025; Fakhari, 2014). Vernacular communities practiced sustainable living naturally, by adapting to their environment, local geography, and the social

and economic needs of the people, long before the idea of sustainability was formally defined. As noted by Paul Oliver (1977), vernacular settlements are place-specific and layered, reflecting the lifestyle, economy, and spatial identity of a people (Ahmer et al., 2010; Dayaratne, 2018; Shrivastava et al., 2023)

In India, each region has developed its architectural style, shaped by social influences, cultural traditions, climate responsiveness, and the use of locally available materials and resources (Mathur, 2024; Rana, 2024). These traditional settlements and dwellings serve as indispensable links between the vernacular and sustainable development (Srivastava et al., 2023). In Assam, vernacular architecture is closely linked to artisanal economies like handloom weaving and bell-metal craft (Khayat & Khaznadar, 2010). These integrated systems once supported both climate adaptability and occupational efficiency.

Unfortunately, the advent of industrialization, modernism, and large-scale transformation of the built environment has marginalized traditional settlements, often dismissing them as outdated and incompatible with modern lifestyles, thereby diminishing their relevance (Baghael et al., 2024; Dayaratne, 2018, Diwan & Kumar, 2024; Hu, 2023; Zong et al., 2024; Veerappan, 2023; Mejail et al., 2024). Additionally, the absence of public initiatives aligned with local needs, along with the disregard for traditional practices in historic neighbourhoods, has further accelerated the decline of these vernacular environments (Baghel et al., 2024). This deterioration continues despite their immense potential to reinforce community cohesion and strengthen local identity through their physical and cultural significance. These transitions threaten the cultural continuity (Jena, et al., 2025) and spatial synergy between homes and workplaces, particularly in settlements like Sualkuchi and Sarthebari (Foruzanmehr, 2013).

Assam boasts a unique tradition of crafting handloom and handicraft products since time immemorial. The art and dexterity of traditional products, coupled with their utility, make them an integral part of Assamese life and culture. The region has traditionally practiced sericulture, particularly of Mulberry, Muga, and Eri silk. While the number of sericulture villages declined from 11,411 (2014) to 8,722 (2023), families engaged in Eri silk increased from 191,566 to 240,350. Conversely, Muga and Mulberry silk-producing families declined from 57,966 to 32,353 and 32,541 to 28,473 respectively, during the same period (Table I) (Deka, & Kalita, 2021; Dhar, 2014).

TABLE I NUMBER OF VILLAGES AND FAMILIES ENGAGED IN SERICULTURE IN ASSAM (Deka, & Kalita, 2021; Dhar, 2014).

Year	No. of Sericulture Villages	Number of Families Engaged		
		Eri	Muga	Mulberry
2014	11411	191566	57966	32541
2023	8722	240350	32353	28473

The bell and brass metal industry of Assam is the second-largest handicraft sector in the state, closely linked to traditional techniques. Bell metal craftsmanship, dating back to ancient times, is deeply embedded in Assamese culture and religion. The intricately crafted utensils, revered for their medicinal properties and cultural significance, are also considered beneficial for cooking and serving food. Their demand extends internationally, highlighting their global appeal (Saloi & Barman, 2020). The Sarthebari cluster holds substantial economic and employment significance for the state, providing livelihoods to thousands of artisans and traders (Sahay, 2015). However, the growing availability of cheaper, machine-made alternatives has severely undermined its market competitiveness (Roy, 2014).

Sualkuchi and Sarthebari settlements in Assam function as both residential spaces and production hubs, offering significant insights into the complex relationship between built form and traditional livelihoods. This dynamic not only sustains local economies but also has a profound influence on the state's tourism sector and overall financial landscape.

The traditional architecture of dwellings in Assam is thoughtfully designed to provide thermal comfort, structural flexibility, and promote community cohesion. These dwellings feature adaptable structural systems made from lightweight materials such as bamboo, ikra (a locally available reed), and wood, with the absence of rigid joints enhancing their resilience to earthquakes. Elements like the insulating properties of ikra, high ceilings, sloped tin roofs for efficient rainwater drainage, and raised floor levels for flood protection contribute to natural thermal regulation. Flooring materials, ranging from wood and concrete to stone, further ensure durability and comfort (Das et al., 2022; Srivastava et al., 2023). However, these sustainable and contextually responsive practices are increasingly being replaced by modern construction materials that, while structurally robust, often lack climatic sensitivity and functional coherence. This shift not only threatens the region’s architectural heritage but also disrupts traditional livelihood systems that rely on the spatial integration of domestic and occupational spaces (Körner et al., 2015)

The traditional architecture of dwellings in Assam is thoughtfully designed to provide thermal comfort, structural flexibility, and promote community cohesion. Their flexible structural systems, characterized by lightweight components like bamboo, ikra (a locally available reed) and wood and the absence of rigid joints, enhance their resilience to earthquakes. Elements like ikra with the insulating properties, high ceilings, sloped tin roofs for efficient rainwater drainage, and elevated floor levels for flood protection contribute to natural thermal regulation. Flooring materials comprised of materials such as wood, concrete, or stone, further ensure durability and comfort (Das et al., 2022; Srivastava et al., 2023). However, these sustainable and contextually responsive practices are increasingly being replaced by contemporary materials for construction that, while structurally sound, often lack climatic sensitivity and functional integration. This architectural transformation not only threatens the region’s architectural heritage but also

disrupts traditional livelihood systems that rely on the spatial integration of domestic and occupational spaces.

In settlements like Sualkuchi and Sarthebari, vernacular architecture has historically supported the spatial requirements of cottage industries, allowing for a seamless integration of living and production spaces. However, technological advancements and changing lifestyle preferences are disrupting this traditional synergy. The adoption of RCC structures and compact spatial configurations has altered conventional spatial arrangements, disrupted artisanal production processes, and threatened cultural continuity.

Despite the growing urgency, research focusing on the spatial-occupational interdependence in craft-based vernacular settlements remains scarce. These dynamics raise critical questions about how built form influences artisanal sustainability and vice versa. Therefore, the study seeks to:(i) Understand how evolving architecture influences the operational efficiency of handloom and bell-metal industries; (ii) Assess how traditional spatial layouts have historically supported integrated livelihoods; and (iii) Identify opportunities for adaptive reuse, hybrid models, and community-driven strategies that balance modern needs with heritage preservation.

In light of these issues, the present study seeks to contribute meaningful insights into crafting development strategies that are culturally sensitive, spatially inclusive, and environmentally responsive, safeguarding both the tangible and intangible heritage of Assam's artisanal communities.

II. Materials And Methods

Study Area

Situated in the North-Eastern region of India, Assam's diverse geography and cultural heritage have fostered a strong tradition of handloom and handicrafts, forming a vital part of rural livelihoods and Assamese identity. Cottage industries, deeply embedded in the social fabric, also support tourism and the state economy, with knowledge and techniques passed down through generations and reflected in Assamese literature.

The North-Eastern region holds the largest concentration of handloom households in India, accounting for 58.35% (18.35 lakh), with Assam alone contributing 40.36% (12.69 lakh), making it the leading state in handloom worker households (Fig. 1).

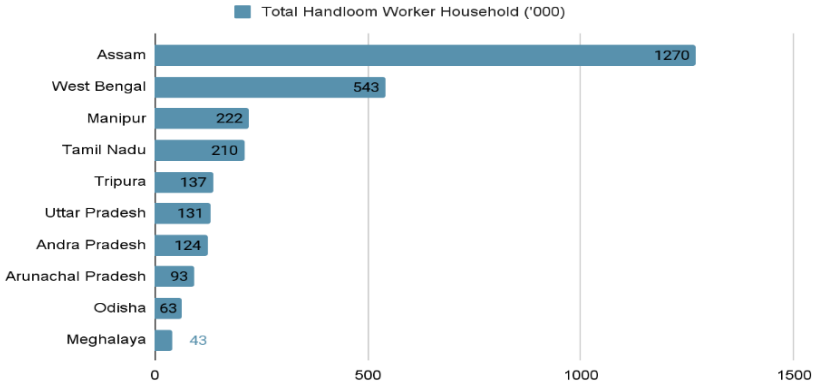


Fig. 1 Top 10 Indian states with the distribution of handloom worker households (Source: Fourth Handloom Census, Government of India)

Fig. 2 Location map of Sarthebari and Sualkuchi in Assam (Source: freeworldmaps.net)

Located in the Kamrup (Rural) district of Assam, Sualkuchi is one of the world's largest weaving villages and the textile hub of the state, often referred to as the "country of golden silk" and the "Manchester of Assam." Renowned for its indigenous Eri and Muga silk fabrics, the village has gained global recognition for commercial silk weaving. Out of approximately 6,000 handlooms in Kamrup (Rural), 4,478 are situated in Sualkuchi. Handloom Census, 2002 noted that 90% of households had looms, with 79% using traditional and 17% using modern looms. The village has 13,752 active commercial handlooms, and 73.78% of households are engaged in commercial weaving (Chakravartty & Basumatary, 2018).

In Barpeta district, Sarthebari is the primary center of bell-metal and brass-metal crafts, housing 280 bell-metal units and employing around 5,000 workers, including 1,465 artisans and numerous traders. This industry supports nearly 40% of the local population and is key to Assam's traditional metalwork production (Sarkar & Kakoty, 2021). The location of the study areas is shown in Fig. 2.

Methodology

Based on the objectives, the methodology of the study involved a study at two stages (Fig. 3):

a) Industry and Settlement Study: Primary case studies, focus group discussions, and secondary sources (government archives) were used to examine the influence of handloom and bell-metal industries on local architecture and settlement patterns.

b) Architectural Documentation and Analysis: Field surveys and interactions with artisans were carried out to document the vernacular architecture, materials, and construction techniques. This included mapping, condition assessment, and analysis of residential and workspace planning, materials used, and infrastructure development in the study areas.

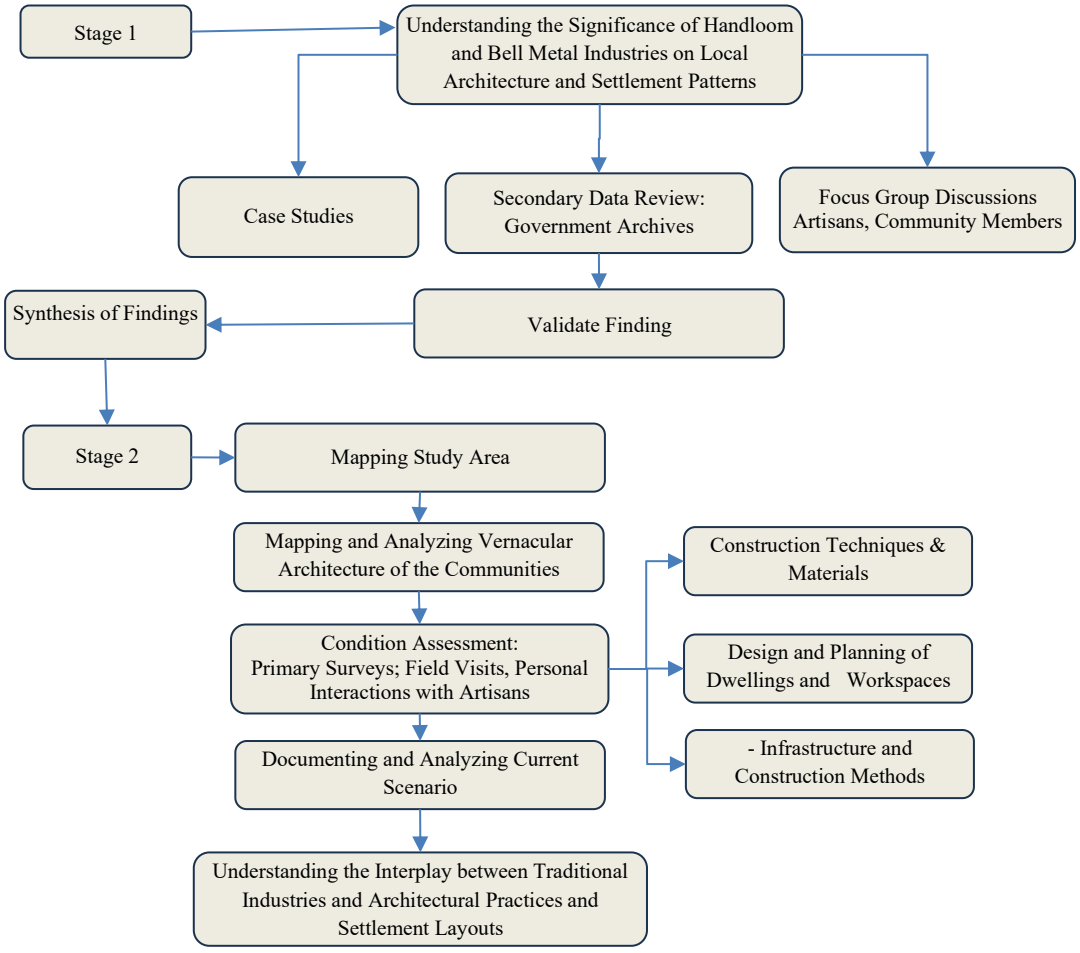


Fig. 3 Methodology Flowchart

III. Results And Discussions

In Sualkuchi and Sarthebari, traditional production techniques play a pivotal role in maintaining the cultural heritage and economic vitality of these regions. Sualkuchi specializes in handloom weaving, where artisans meticulously create exquisite silk fabrics using age-old techniques passed down through generations. In contrast, in Sarthebari, artisans employ traditional casting and hammering techniques to create a variety of metalware.

Handloom Industry in Sualkuchi: Traditionally, craftspeople used manually operated instruments, often crafted by the artisans themselves, in the production of handloom products involving a systematic series of processes. The initial step includes spinning and weaving the 'digh' (the vertically woven silk thread forming the garment base) around a 'Sereki,' a bamboo instrument designed to remove knots and uneven fibers from the thread. The spun thread is wound onto a smaller bamboo frame called the 'Lethai.' Following this, the thread is spun into smaller spools (Bobins) using a spinning wheel (Jotor). The threads wound onto the Bobins are then sequentially arranged on a large frame called the Ugha. From here, the threads are wound around a wooden wheel referred to as the 'Warping Drum,' which helps the weavers determine the required length of the silk garment to be produced. The measured threads are then transferred to the wooden bar of the loom, known as the thread Norosh. Simultaneously, the 'Bani' thread is wound onto spools placed within a wooden frame called the Mohura, which is fitted into a larger frame known as the Maku, attached to one side of the loom. During the weaving process, individual threads are carefully inserted into a threaded frame called the Boa, and then positioned into a comb-like structure known as the Rash, which facilitates the actual weaving of the fabric. Finally, the weavers use the loom to craft the garments (Fig. 4).

Fig. 4 Weaving Process (Source: Authors)

Bell-Metal Industry in Sarthebari: The raw materials, brass and bell metal, are imported from places such as Kolkata and countries like Pakistan and Bangladesh. Initially, these materials are hammered into small pieces. Subsequently,they are placed in an iron vessel and positioned in a fire vent, known as 'Kah goluwa apor.' Once the raw material reaches a completely molten state, it is poured over the flat round surface of an earthen cubicle called 'Aag,' which has been coated with mustard oil. The molten metal is then allowed to cool and solidify, forming small, round bell-metal ingots.

These ingots are reheated in a fire vent known as the 'Khara' to soften them for further processing. Once pliable, they are hammered into the desired shape and then refined using a smaller hammer to achieve the final form. Any rough edges are manually smoothed using a strong, flat iron filer called the 'Reti' or 'Ou'. Additionally, a sharp-edged iron rod is used to scrape off the darkened, burnt layers from the surface of the bell-metal item, ensuring a clean and finished appearance. Following this, carving imprints is meticulously done on the metal object (Fig. 5).

Fig. 5 Bell-metal Production (Source: Authors)

Infrastructure and Space Analysis of Workshop

Handloom Industry in Sualkuchi: The physical growth, traditional architecture, and planning of Sualkuchi have evolved in direct response to its natural environment, given the region's vulnerability to earthquakes and floods. Moreover, as a prominent silk production center, the architectural design has been shaped to effectively support and accommodate weaving-related activities (Shermin, 2017). The vernacular essence of Assam, characterized by its traditional architecture, is gradually being replaced by contemporary glass and concrete structures, where the ground floor serves as the residential area while the first and other upper floors are designated as the workshop area (Fig. 6 and Table II).

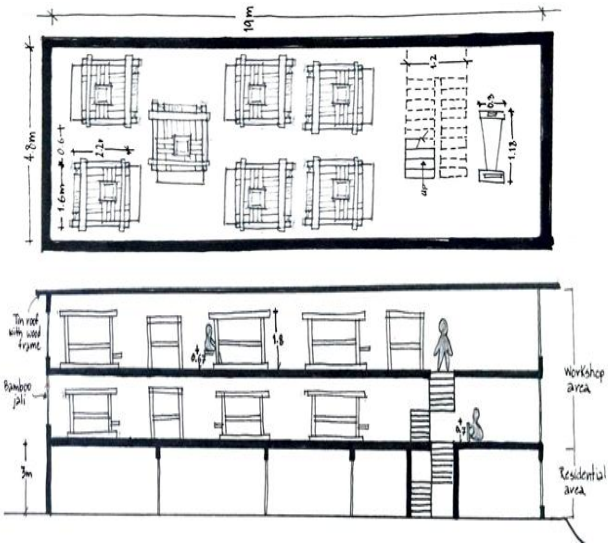


Fig. 6 Floor Plan and Section of Surveyed Workshop area (Source: Authors)

TABLE II WORKSHOP AREA DETAILS (SOURCE: AUTHORS)

Parameter	Description
Workshop area	Area occupied by one loom= 9.52 sq. m. Area occupied by one spinning machine= 2.2sq. m.
Area program	Open floor plan for the loom and other pieces of equipment
Architectural style	The building exhibits a contemporary architectural style, characterized by the use of reinforced cement concrete (RCC) for a modern and durable construction.
Material	The primary construction materials include concrete, bamboo, brick, and wood. Concrete provides strength and stability, brick and wood add traditional elements, and bamboo offers a sustainable and aesthetic touch.
Wall finish	The walls feature an exposed brick finish, giving a rustic and textured look, while bamboo jali (woven bamboo screens) are used for decorative and ventilation purposes.
Roof	The roof is made of tin sheets supported by a wooden frame, combining durability with a traditional construction method.
Height of walls	The walls are 3 meters high, ensuring ample space for comfortable living and effective ventilation.
Wall thickness	The walls have a thickness of 250mm, providing sufficient insulation and structural stability.
Flooring	The floors are made of bare concrete, offering a durable and low-maintenance surface suitable for various uses.
Number of storeys	The building is a G+2 structure, meaning it has a ground floor plus two additional floors, reflecting a more contemporary and vertical expansion compared to traditional single-story buildings.

Bell-Metal Industry in Sarthebari: The bell and brass metal units in Sarthebari typically consist of household garhxhals, where the owners or master craftsmen of the smithy units establish their work sheds and collect raw materials such as brass, bell metal, and charcoal (Fig. 7). The workshops in Sarthebari have the characteristics as depicted in Table III that reflect the traditional and functional architectural style of the region.

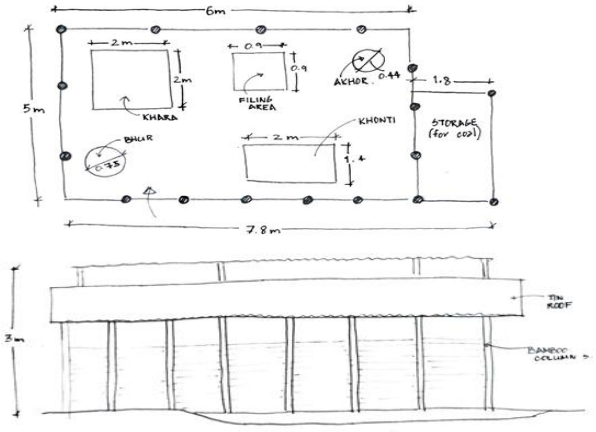


Fig. 7 (a) Floor plan and (b) front elevation of surveyed workshop area (Source: Authors)

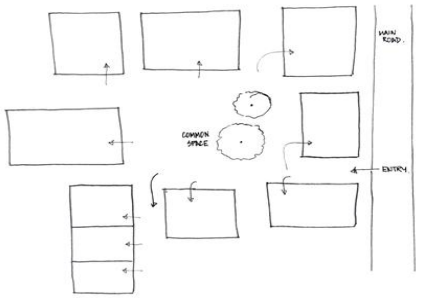
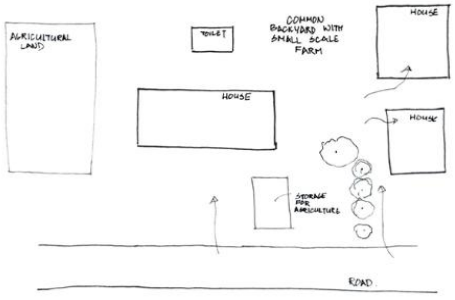
TABLE III WORKSHOP AREA DETAILS (SOURCE: AUTHORS)

Parameter	Description
Workshop area	Area of typical workshop: 46.8sq. m.
Area program	Different areas are designated for various processes in workshops, such as the metal hammering area, melting area, cooling area, fire vent area, filing area and storage area
Material	The primary construction materials used include bamboo columns, tin, and wood. These materials are chosen for their availability, cost-effectiveness, and suitability for the local climate and building practices.
Roof	The roof is made of tin sheets supported by a wooden frame. This combination provides durability and resistance to weather conditions, while the wood frame adds structural support.
Height of walls	The walls of the structure are 3 meters high, providing adequate space for comfortable living and ensuring proper ventilation.
Wall material	The walls are constructed from tin, which is a common material in the area due to its affordability and ease of installation
No. of storey	The building is single-storey, which is typical in these settlements, reflecting the traditional architectural style and functional requirements of the inhabitants.

Local Architectural Style and Settlement Patterns

Home to Assam's commercial handloom weaving and bell metal products, Sualkuchi and Sarthebari form a labyrinth of narrow streets full of houses and workshops. Although the production is primarily for commerce, these places maintain a rural ambience, characterized by vernacular houses that dominate the built environment. The households are predominantly joint families, resulting in clusters formed around open spaces that provide access to the dwellings (Fig. 8 and Table IV).

TABLE IV ANALYSIS OF SETTLEMENT PATTERNS (SOURCE: AUTHORS)

Settlement Patterns
 **Sualkuchi** Set within a very organic and community-inclined pattern, the vernacular dwellings are built with a similar approach with variations in sizes, orientation and details depending on the inhabitants. The dwellings are arranged around a central open space that functions as a communal area for social interaction and daily activities, along with areas for the cottage industry. In case of households with privately owned looms, the verandah is used for the weaving process.
 **Sarthebari** The interesting architectural feature in the vernacular settlement of Sarthebari is that most of the residences are self-sufficient with a poultry farm and farm land set within the residence site. Along with this, a shed, also known as garhxals, is constructed on the premises of the residence for the production of the bell metal items.

Through the documentation conducted in this study, it has been analyzed that, despite the predominantly Assam-type structures in the built environment, RCC buildings are gradually supplanting the fabric of both settlements. For example, along the primary spinal road of Sualkuchi, the commercial area of the settlement has been responsible for the demolition of Assam-type houses to make way for RCC buildings intended for commercial and mixed-use purposes.

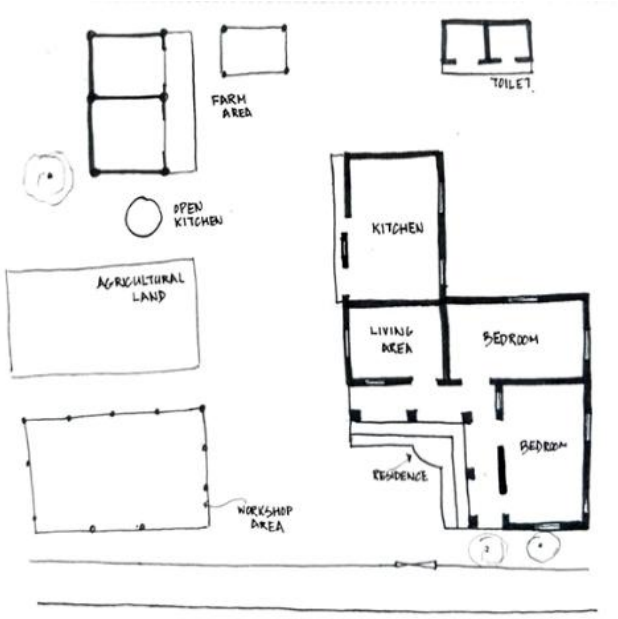


Fig. 8 Floor plan and front elevation of surveyed workshop area (Source: Authors)

Most vernacular dwellings, particularly the Assam-type houses, follow a characteristic layout that can be broadly divided into three zones: a public area (sutal or front yard), a semi-public space (the verandah) and a private area (ghor or inner rooms). These homes typically adopt a linear, C-shaped, or L-shaped floor plan, with rooms aligned along a central corridor and accessible from both front and rear verandahs. Consistent with traditional design practices, the kitchen and bathroom are usually constructed as separate units, located at the rear of the property for functional and climatic reasons.

In Sarthebari, it is observed that most dwellings feature backyards with small-scale farms situated around agricultural fields (Figs 9 and 10, Table V).

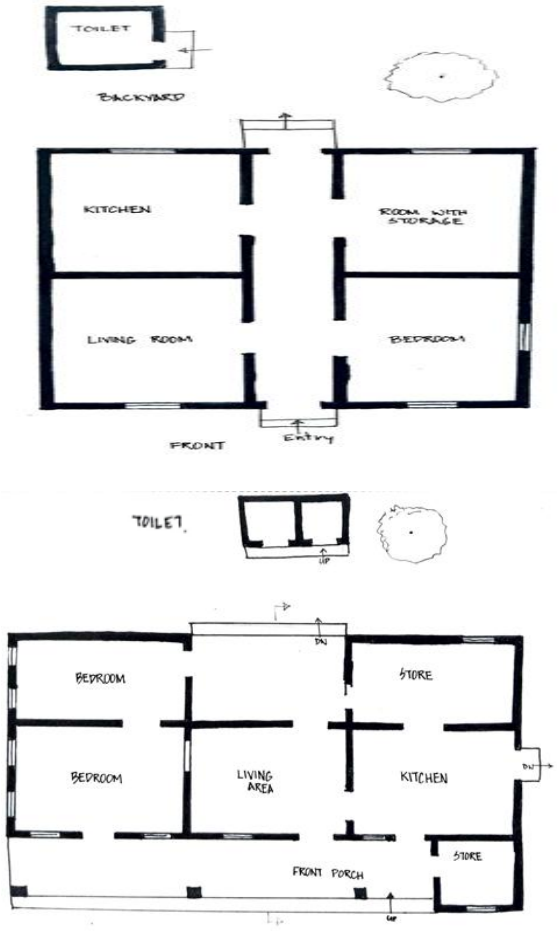


Fig. 9 Plans of typical vernacular dwellings (Source: Authors)

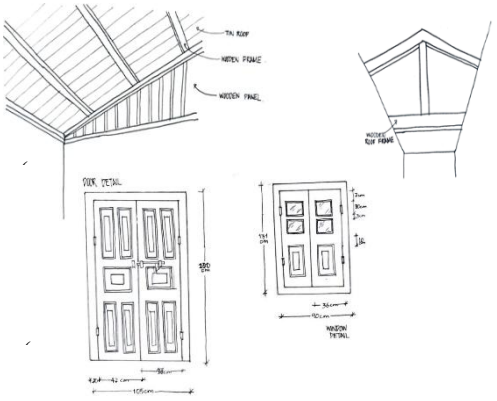


Fig. 10 Details of typical Roof (b) door and window (Source: Authors)

TABLE V ANALYSIS OF VERNACULAR DWELLINGS (SOURCE: AUTHORS)

Parameter	Description
Architectural aspects	The planning of traditional dwellings is largely shaped by the site conditions, the functional needs, and the economic capacity of the family. The typical layout includes a drawing room, bedrooms, a kitchen, and verandahs, arranged in a linear, C-shaped, or L-shaped configuration. These houses are generally built as single, self-contained units, with most being single-storey structures that reflect both cultural preferences and practical considerations.
Structural system	The structural system is primarily half timbering, wherein the main structure of the building is constructed with a network of timber frames. The walls are made of the Wattle and Daub Technique with Ikra, which is a locally available reed found in river beds.
Facade	The vernacular dwellings have a verandah in front, which connects the front lawn to the residence. The verandah is elongated and is between rooms on either side or one side due to the L or C plan of the dwelling, with the rooms having a door opening to the verandah in most cases. The verandah has a series of pillars, mostly wooden, to support the slanting roof above it.
Openings	The dwellings have ample windows and ventilators, which is in response to the climate of the state. The windows are placed at a regular sill level, usually at 600mm. The window opening size varies from 600-1500 mm in width and 900-1500mm in height.
Roofing system	The roof is sloped and made of tin with a wooden frame.

Appraisal of the Current Situation

There has been a noticeable decline in the number of vernacular dwellings in both Sualkuchi and Sarthebari, leading to changes in the rural fabric and the traditional settlement system, along with shifts in the production processes of age-old cottage industries. Although Assam-type structures still dominate the built environment, a gradual shift toward RCC buildings is increasingly altering the architectural fabric of both settlements. Along the primary spinal road of Sualkuchi (Fig. 11), as the commercial area of the settlement, Assam-type houses have been replaced by RCC buildings for commercial and mixed-use purposes. Similarly, in Sarthebari, which is comparatively less dense than Sualkuchi in terms of its built environment, new buildings are predominantly of RCC structures.

With the advent of social, economic, and lifestyle changes, there has been a transformation in the layout and design of dwellings and planning of settlements (Table VI). This transformation is driven by the increasing demand for contemporary structures that are perceived to be more durable and require less maintenance, with the added benefit of accommodating extra floors. However, this shift has not only led to a decrease in sustainability but also compromised the climate responsiveness of the architecture.

TABLE VI TRANSFORMATION IN THE VERNACULAR SETTLEMENT (SOURCE: AUTHORS)

Transformation	Effect
Change in the site plan of residences.	The recently constructed houses with more independent plans have altered the cluster planning of the settlements. These changes have disrupted the natural drainage, impacting not only the ecological balance but also the production of silk.
Reduction in the size of common courtyards	Unlike the vernacular houses, the modified homes are built inwards and upwards resulting in the shortage for weaving and bell metal production related activities. This has led to decrease in community and social interaction.
Sloping roof to flat roof and change in materials	Loss of vernacular character and a decrease in efficiency of handling the rainfall in the area has resulted in improper rainwater harvesting, drainage and waterlogging.
Ikra walls replaced by brick with cement plastering	The decrease in natural thermal comfort in the interior spaces has led to increased energy consumption and adversely affected weaving production

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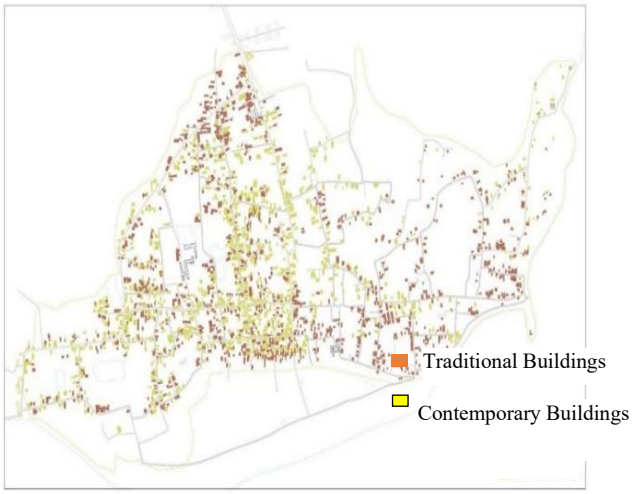
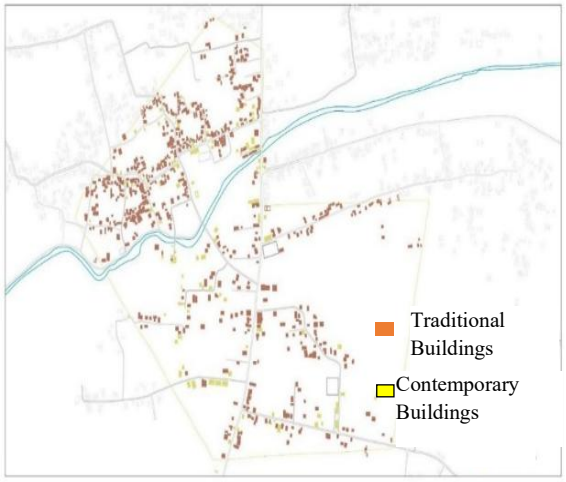
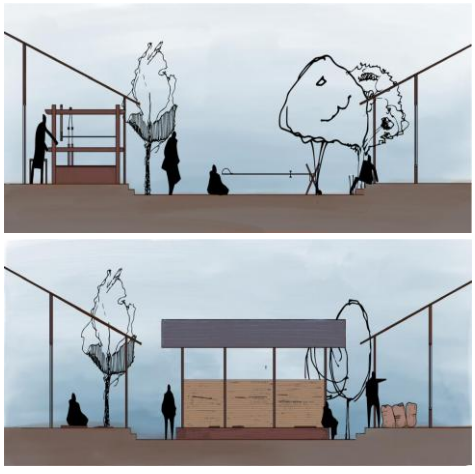


(a)



(b)

Fig. 11. Maps of (a) Sualkuchi, (b) Sarthebari showing Traditional and Contemporary buildings (Source: Authors)



(a) & (b)

Fig. 12 Streetscape in (a) Sualkuchi and (b) Sarthebari (Source: Authors)

While the transformation in the vernacular settlement is inevitable in most cases, it has led to the loss of vernacular characteristics in the settlements along with the reduction or some cases, complete removal of climate sensitivity, resilience and thermal comfort exhibited by the vernacular houses. Along with this, the transformation has impacted the weaving and bell metal production-related activities. In the case of various processes in the production of both industries, the utilization of the surrounding and traditional settlement and housing plan plays a major role.

Fig. 12 illustrates a typical streetscape of Sualkuchi and Sarthebari. In both areas, the production processes have historically integrated with the surroundings, with activities dispersed rather than confined. However, changes in traditional architectural practices have disrupted this dynamic. This transformation has not only affected the built environment but has also impacted industries in various ways. To preserve industries while ensuring a sustainable environment, design interventions should adopt a sensitive, sensible, and emotional approach in designing spaces, materials, and technology.

IV. Conclusion

This study set out to examine how transformations in vernacular architecture are influencing and being influenced by the evolving livelihoods of artisanal communities in Assam, specifically in the handloom hub of Sualkuchi and the bell-metal cluster of Sarthebari. The primary objectives were to understand the spatial-functional relationships between traditional dwellings and artisanal production, assess how architectural transitions are affecting occupational efficiency, and explore strategies for preserving cultural identity while accommodating modernization.

The findings from field surveys, interviews, and spatial analysis indicate that traditional Assam-type dwellings were deeply integrated with production processes, offering climate adaptability, spatial flexibility, and social cohesion. However, the increasing shift to reinforced concrete (RCC) structures, often driven by aspirations for modernity, has resulted in a spatial disconnect between work and living areas, reduced environmental responsiveness, and challenges to the continuity of artisanal practices. These changes are particularly visible in the decline of shared courtyards, linear spatial arrangements, and construction materials such as bamboo, ikra, and wood, which previously offered natural ventilation, flood resilience, and thermal comfort.

The study recommends the adoption of hybrid architectural approaches that retain traditional materials and construction methods with contemporary styles, while accommodating present needs. Sensitively designed spaces, ensuring climate resilience, promoting sustainable living, and also supporting artisanal production are essential for maintaining the integrity of these settlements. Furthermore, active community participation is recommended to be integrated into the planning and development process to ensure that interventions are culturally rooted and contextually suitable.

While the study offers valuable insights into two distinct settlements in Assam, its scope is inherently limited by the regional specificity and the dynamic nature of policy and market conditions. Despite these constraints, the findings underscore that the preservation of cultural heritage need not stand in opposition to modernization. Instead, it highlights the benefits of integrating vernacular principles into contemporary development. When rooted in local knowledge systems, architecture can contribute significantly to socio-economic resilience, environmental sustainability, and spatial coherence within communities. Such an approach not only supports the continuity of artisanal livelihoods but also strengthens local identity and fosters a sense of pride amidst the rapid transformation of rural landscapes.

Statements and Declarations

The authors declare they have no relevant financial or non-financial interests to disclose.

Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Consent for publication

All the authors have given their consent for this publication.

Conflict of interest

No conflict of interest was reported by the authors

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