

Research article

Conserving the Lost Identity of Uttarakhand: Hill Architecture

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ABSTRACT

This research paper focuses on the conservation of Uttarakhand's cultural identity through the preservation of its traditional hill architecture. The hill architecture of Uttarakhand reflects the region's culture, beliefs, and history. However, modernization and inappropriate construction practices are causing the gradual loss of this unique architecture and the disappearance of the region's cultural identity. To address this issue, efforts must be made to protect the region's natural resources, promote cultural significance through education and awareness campaigns, and implement government regulations on development and conservation. By finding a balance between development and preservation, Uttarakhand can retain its distinctiveness and continue to be a symbol of natural beauty and cultural heritage.

1. Introduction

The hill architecture of Uttarakhand holds great significance as it represents the unique culture, beliefs, and lifestyle of the region [1-5]. However, due to modernization and urbanization, this traditional architecture is gradually disappearing, along with the cultural identity it embodies. Vernacular architecture, characterized by its use of local materials and its awareness of the geographical and cultural context, plays a crucial role in reaffirming a sense of identity. Uttarakhand, known for its natural beauty, showcases exceptional architectural skills through the use of stones and wood, which are readily available in the area. This architecture not only reflects the harmonious relationship between the local community and nature but also holds socio-cultural historical value [6-10]. Uttarakhand has historically embraced an environmentally conscious approach, striving to develop technologies and innovations that align with local conditions. Unfortunately, the increasing prevalence of inappropriate construction practices poses a threat to the environment and further erodes the region's identity [11-15]. This research paper explores the impact of unsuitable construction practices on Uttarakhand's cultural identity and the environment. Preserving traditional hill architecture is crucial in mitigating environmental disasters and safeguarding the region's identity. Efforts should focus on promoting awareness, and education, and implementing regulations that strike a balance between development and preservation. By cherishing the architectural heritage and adopting responsible construction practices, Uttarakhand can maintain its unique identity as a place of natural beauty and cultural significance.

A. Need for Study

1. Traditional architecture gives a place its identity which makes them different from others & hence looks unique in this modern era.
2. Due to urbanization, population increases & a high influx of tourists in hilly areas converting them into hill towns & is a main source of economic growth in

the hilly region. So there is a need to control increased urbanization & inapt construction leading to a loss of the identity and beauty of Uttarakhand.

3. To prevent upcoming disasters as well.

Aim

Traditional Uttarakhand architecture is a tool to preserve the environment and its identity

Objective

1. To identify the vernacular materials of Uttarakhand.
2. To develop the comparison between vernacular materials and new materials used over there and which one is more suitable according to the context.
3. To analyze the sustainability of the available materials and to check whether these materials survive in all conditions in the region.
4. To study the vernacular architecture style and design.
5. To know the reason behind the lost identity of Uttarakhand

B. Hypothesis

The indigenous architecture of Uttarakhand preserves its individuality, is more environmentally friendly, and prevents disaster-related problems from occurring as a consequence of erroneous design.

C. Scope

1. The future resorts, hotels, and apartment constructions must abide by vernacular materials and design to preserve Uttarakhand's identity.
2. modify existing building guidelines to enable development that is relevant to the context.

D. Limitation

1. Traditional architecture is often passed down through generations orally, and the availability of written records is limited.
2. Traditional architecture is often diverse and has regional variations. It may not have a standardized format or style that can be easily studied or compared.
3. In terms of regional restriction i.e., Uttarakhand.



2. Identity of Place or City

While the concept of identity is often associated with individuals, it can also be applied to geographical areas. The identity of a location is shaped by its physical, cultural, and historical attributes, resulting in a unique and recognizable character.

A. How It Deteriorates with Time

1. **Loss of cultural heritage:** Cultural heritage can be eroded due to various reasons such as lack of interest or access to resources, neglect, destruction, or the replacement of traditional practices with commercial events.
2. **Environmental degradation:** The unique characteristics of a place often includes its ecological conditions. Environmental degradation, including pollution, deforestation, and the effects of climate change, can harm a location's environment and ecosystem, leading to a loss of biodiversity and alterations in the landscape.
3. **Migration and displacement:** Both migration and displacement can impact the identity of a place. When people move, they often carry their language, culture, and customs with them, which can result in the loss of identity for the place they leave behind.
4. **Economic changes:** Economic developments can also affect the identity of a place. The introduction of large corporations or the closure of traditional industries can lead to shifts in the local economy, loss of traditional jobs, and changes in the cultural fabric of a location.

B. Way to Revive the Identity of the Place

1. Preserving and enhancing the identity of a place requires strategic approaches that involve both the local community and physical elements. This research paper explores various strategies to conserve and promote a location's unique identity.
2. One important aspect is preserving historical landmarks, as they hold significant historical and cultural value. Efforts to protect and maintain these structures are crucial for maintaining the location's historical and cultural significance. Additionally, engaging the local community is essential. By organizing public gatherings, and workshops, and providing platforms for discussions, locals can actively participate in restoring and preserving their community's identity.
3. Investing in the public sector is another vital strategy. Creating well-designed public spaces such as parks, plazas, and streetscapes fosters a sense of neighborhood and enhances the location's unique identity. These areas serve as showcases for the distinctive characteristics of the place.
4. Promoting local traditions and culture plays a significant role in preserving a region's unique identity. Celebrating regional customs, festivals, and traditions helps maintain the authenticity and cultural heritage of the location. Showcasing regional music, cuisine, and art contributes to the preservation of local culture.

5. Encouraging local business development strengthens the community's identity and creates new growth opportunities. Supporting the growth of local businesses, nurturing a creative economy, promoting regional products, and providing assistance can help sustain the unique identity of the location.
6. Creating a sense of place involves designing public spaces and architecture that reflect the special qualities and history of the location. By incorporating local assets, creative works, and architectural designs, the unique characteristics of the place can be emphasized. Involving the local population in initiatives that maintain and promote these characteristics fosters a sense of ownership and pride in their community's identity.

C. Ways to Revive them

- **Preserve Historical Landmarks**

Historical structures, monuments, and locations play a fundamental role in defining the identity of a place. Initiatives focused on preservation are crucial for safeguarding a location's historical and cultural significance.

- **Engage the Local Community**

Involving the local community is essential for restoring and maintaining a place's identity. Organizing public gatherings, and workshops, and providing spaces for discussions enable community participation and allow locals to express their perspectives.

- **Invest in the Public Sector**

Developing public spaces such as parks, plazas, and streetscapes can foster a sense of community and enhance a location's distinct identity. These areas can be designed to showcase the unique characteristics of a place.

- **Promote Local Traditions and Culture**

Celebrating and promoting regional customs, festivals, and traditions contribute to the preservation of a region's unique identity. This may involve showcasing regional music, cuisine, and art forms.

- **Encourage Local Business Development**

Supporting the growth of local businesses helps communities shape their identity and create new opportunities. This can include fostering a local creative economy, promoting regional products, and providing assistance to local businesses.

- **Create a Sense of Place**

Designing public spaces and architecture that reflect a place's special qualities and history is essential for creating a distinct sense of place. Utilizing local assets, incorporating creative works, and employing architectural designs that emphasize the distinctive characteristics of the location are key to maintaining and promoting its identity.

3. Uttarakhand

Uttarakhand, often referred to as the paradise on earth, is renowned for its spiritual tourism. The state holds great significance both in mythology and historical context. The remarkable stone and wooden temples stand as a testament to the advanced architectural skills of the past. These temples, predominantly constructed during the rule of the Katyuri dynasty, are often found in clusters. They not only establish a connection between the local communities and nature but also

reflect the socio-cultural history of the region. In ancient times, wood and stone were the primary building materials used in Uttarakhand. Consequently, the traditional architecture of Uttarakhand provides a high level of comfort, allowing for extended periods of relaxation and tranquillity.

A. History

Most of the people in Uttarakhand are of Tibeto-Burman and Indo-Aryan ancestral background. The state has a vibrant cultural history, and its customs, celebrations, music, and dance styles highlight the distinctive culture of the area. The folk music of Uttarakhand also referred to as "Garhwali" and "Kumaoni" is popular and has a unique style.

B. Climate

1. As Uttarakhand has terrain topography which is the main factor in climate as temperature decreases with an increase in altitude.
2. Places like Uttarkashi, Chamoli, Pithoragarh, and some portions of Tehri-Garhwal, Bageshwar, and Rudraprayag have high altitude records- 16.8°C to 12.5°C
3. And famous and large places like Dehradun, Pauri-Garhwal, Tehri-Garhwal, Almora, Bageshwar, Nainital, Champawat, and some parts of Uttarkashi, Rudraprayag, Chamoli, and Pithoragarh has an average temperature range of 12.5 to 24.3°C
4. Districts like Udham Singh Nagar and Haridwar, have low altitudes, therefore the average temperature ranges from 24.3 to 30.2°C

D. Culture Significance

1. Uttarakhand is often called "Devbhoomi" which translates to "Land of the Gods," due to its abundance of Hindu temples and pilgrimage sites scattered across the region. According to Hindu mythology, it is considered a sacred place where many gods and goddesses reside.
2. The state is famous for its pristine beauty, awe-inspiring landscapes, and majestic Himalayan mountain ranges. It is home to several renowned hill destinations, such as Nainital, Mussoorie, and Dehradun. These locations are known for their captivating charm and natural splendor.

E. Flora and Fauna

Uttarakhand is highly recognized for its national parks and wildlife sanctuaries that provide a habitat for a diverse range of plant and animal species. Some prominent examples of these parks are Jim Corbett National Park, Rajaji National Park, and Valley of Flowers National Park. These protected areas serve as vital ecosystems, fostering the preservation of abundant flora and fauna.

4. Traditional Architecture of Uttarakhand

1. Settlements in Uttarakhand follow a linear pattern to maximize exposure to sunlight.
2. Structures are built along the contours of the land, using stepped terraces to minimize disruption to the terrain.
3. Stone is commonly used for walls, timber for structural purposes, and slates for roofing.

4. In some areas, cob, a type of sun-dried block, is used for load-bearing walls.
5. Houses have sloping roofs to facilitate rainwater drainage, and window chajjas protect against rain.
6. Floors are kept low to retain natural warmth, and doors and windows are small in size.
7. Clay and dung are extensively used for insulation, keeping rooms warm in winter and cool in summer.
8. Mud paste is used for plastering both internal and external walls.

A. Kumaon Region Style of Architecture

The buildings in the region are characterized by their use of stone and wood.

1. Stone is used for the walls, while wooden boards or mud are used for flooring to provide insulation.
2. The roofs are made of slate, and intricate wooden carvings add to the overall design.
3. The buildings have a central entry called Kholi, dividing the house into two sections on either side of the stairs.
4. The ground floor, known as goth, is used for cattle and storage.
5. The first floor is where people reside, and the kitchen is located on the top floor.
6. Access to the kitchen is through a wooden staircase, and ventilation is provided through holes in the slate roofs. However, these structures have limited ventilation due to their compact design. figure 1 showing Kumaoni traditional house



Figure 1. Kumaoni traditional house

B. Garhwal Region Style of Architecture

1. Traditional houses in Uttarakhand are strategically located near pilgrimage sites and water sources, while also being shielded from cold winds.
2. These houses typically have 2-3 stories and a rectangular shape.
3. The living and cooking areas are situated above the cattle and grain storage, providing warmth during winter.
4. A distinctive feature of the houses is a 750mm wide balcony at the front, while the staircase is located on the side.
5. Construction materials include stone and wood.
6. Wooden boards are used for floors and roofs, while beams and columns are intricately carved timber, adding aesthetic appeal to the interiors.
7. The grain storage area, known as the Kothar, represents the wealth and prosperity of the inhabitants.

8. In certain important areas, multi-story wooden constructions with timber frames, reaching heights of 7-8 stories, serve as emergency shelters and watchtowers for the region. figure 2 presents the Garhwali traditional house Source: Author



Figure 2. Garhwali traditional house
Source: Author

C. The Earthquake-Resistant Architecture of Uttarakhand

1. Uttarkashi in Uttarakhand, India, is known for its seismic activity, prompting residents to construct earthquake-resistant multi-story buildings called "Koti Banal" over centuries.
2. The Koti-Banal architectural style, developed around 9,000 years ago, demonstrates exemplary earthquake-resistant design.
3. Local materials such as stone and wood are utilized in construction, offering enhanced resilience during seismic events.
4. Houses are built on raised platforms, featuring sturdy wooden beams and pillars spaced throughout the structure's height.
5. Wood is preferred for its ability to absorb the impact of earthquakes due to its elastoplastic properties.
6. These homes prioritize safety over comfort, leading to the abandonment of many similar structures in recent years. Figure 3 shows Koti Banal style, Uttarkashi



Fig.3 Koti Banal style, Uttarkashi

5. Materials Used in Uttarakhand

5.1 Vernacular Material

Stone

Slate, sandstone, and granite. Stone is widely used in the construction of houses, temples, and other structures.

Wood

The state is blessed with dense forests, making wood an essential vernacular material. Deodar, oak, and pine are commonly used for construction and furniture-making. Wooden beams, pillars, and intricate carvings can be seen in traditional houses and temples.

1. Stone blocks
2. Rubble stone

Metal

The state is renowned for its metalwork, particularly copper and brass. Metal is used to create utensils, decorative items, and religious artifacts.

5.2 Modern Material

1. Cement
2. Bricks
3. Reinforced concrete
4. Steel
5. Glass
6. Composite material

6. Construction Technique

6.1 Vernacular Style Construction

1. The Koti Banal architecture prioritized inhabitant comfort less, leading to a lesser emphasis on comfort in design and construction.
2. To improve ventilation and enhance comfort, larger doors, and windows were incorporated into the design.
3. Modified versions of Koti Banal architecture can be found, such as in Gona village, where design principles were not strictly followed, resulting in compromised seismic safety, higher roofs, and varied internal wall layouts.
4. Due to timber scarcity, construction techniques transitioned to increased use of stones instead of closely spaced timber logs.
5. Challenges faced by Koti Banal structures include unplanned construction, encroachment, partial demolition, lack of maintenance, and preservation issues, which negatively impact their structural integrity during earthquakes.

6.2 Modern Construction Style

1. Cut and fill excavation is commonly used for embankments and surface works, but it can lead to soil degradation due to the removal of soil from surrounding lands.
2. Construction typology in Uttarakhand is divided into three zones: foothills, low-level hilly regions, and mountainous regions.
3. In the foothills, locally available materials like mud, thatched roofs, and cob bricks are traditionally used, but in recent years, kiln-burnt bricks, GI sheets, and RCC flat slab roofs have become more common.
4. In the low-level hilly region, coursed random rubble masonry and flat RCC roofs are commonly used, with stone roofs preferred. However, modern materials like cement, CGI sheets, and steel RCC roofs are increasingly being used.
5. In the mountainous region, coursed or uncoursed random rubble masonry with mud mortar is commonly used, along with pitched stone roofs

covered with slate. However, some areas have started using alternatives like CGI sheets, which are not preferred in cold winters.

7. Factors Affecting the Identity of Uttarakhand

1. Uttarakhand experiences rapid urbanization driven by tourism, attracting migrants from neighboring areas. This has led to inappropriate construction practices, including the construction of modern multi-story buildings for residential, commercial, and tourism purposes.
2. Inapt construction has resulted in environmental degradation, disrupting the natural topography, vegetation, and drainage patterns in Uttarakhand.
3. The increase in population density due to migration and construction has led to issues such as congestion, water scarcity, landslides, pollution of lakes and streams, and the destruction of natural beauty in Uttarakhand.
4. The inappropriate construction practices in Uttarakhand make the region vulnerable to landslides, earthquakes, floods, cloud bursts, and fires. Buildings often do not adhere to safety provisions, leading to significant damage during disasters.
5. The proliferation of concrete structures and mining activities in hilly areas has contributed to the depletion of forest areas and the construction of narrow and accident-prone roads for public transit development, affecting the natural beauty and accessibility of Uttarakhand.

8. Case study-1, Majhera village, Nainital, Uttarakhand

1. Majhera village is located in the Nainital District of Uttarakhand, in the Kumaon division of the lesser Himalayan belt. Figure 4 have a semi-open room on the ground floor,



Figure 4. In place of daan (semi-open room on the ground floor) closed rooms are constructed

2. The village is located on a hill ridge near the Khaima River, covering an area of approximately 2 km. It falls within seismic zone IV, indicating the need for earthquake-resistant construction. The village showcases a blend of vernacular and traditional architecture, with most houses facing southeast.
3. Each housing unit consists of an open interacting space called "agan," a two-story structure, and a cattle house. Local materials such as river stones, slate, and timber (Kedar, pine, Sal) are used for construction, along with cow dung and black cables for binding.

4. The vernacular design strategy focuses on optimizing daylighting, with living rooms positioned in front of windows to ensure ample natural light during the day. Walls and floors are coated with a mixture of mud and cow dung, which helps keep the interiors cool in the summer, while slate roofs are designed to retain heat during the winter. Additionally, the houses feature long verandas that capture sunlight during the winter season. (Pandey, 2018)

9. Case study-2, Gallagoan village, Champawat, Uttarakhand

1. Gallagoan village, comprising Gallagoan Upper and Gallagoan Lower, is a hamlet located 7 kilometers north of Lohaghat in the Champawat district. The village is characterized by two main types of houses.
2. The first type is a row house-style building, which holds a central position surrounded by smaller vernacular houses with pitched roofs.
3. The second type is an independent single house with two levels. The lower floor is used for storage and housing animals, while the upper floors serve as living space, including a kitchen with a direct connection to a staircase at the entrance. (Indigenous Building Practices of Kumaon, Uttarakhand, n.d.)

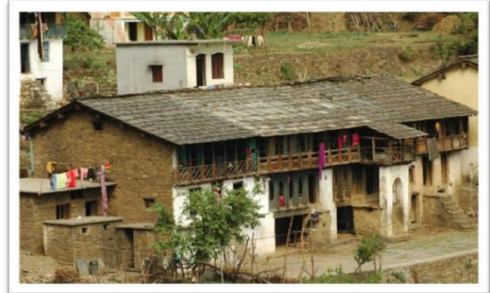


Figure 5. 2-story house

4. These houses are constructed using local stone and wood, and the walls are covered with mud without mortar. The roofs are made of slate stone supported by wooden beams.
5. One notable feature of these houses is the paved porch in front, which serves as a central space for social activities and daily household work.
6. The village exhibits linear settlements, where families or individuals of the same caste share structural walls, common rooms, and forecourts. The orientation of the houses is designed to maximize sun exposure.
7. The house foundations are made of stone, typically two feet deep, and the interiors are plastered with mud and cow dung for insulation purposes. (Indigenous Building Practices of Kumaon, Uttarakhand, n.d.)

10. Case study-3, Munsiyari village, Pithoragarh, Uttarakhand

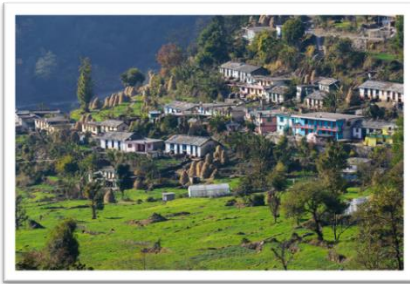


Figure 6. Munsyari village

To ensure the preservation of the unique architectural heritage and traditional knowledge system, the following steps should be taken:

1. Implementation of a monitoring strategy: A monitoring system should be put in place to oversee future development activities in the region. This strategy will ensure that these activities draw from the traditional knowledge system and contribute to the preservation of the architectural heritage.
2. Conduct comprehensive studies: It is crucial to conduct in-depth studies to understand the seismic performance and thermal insulation properties of traditional dwellings. These studies should specifically focus on identifying modern building materials that can replicate or enhance these qualities, thus providing sustainable alternatives for future construction.
3. Promote retrofitting approaches: Instead of demolishing and reconstructing traditional houses, retrofitting approaches should be encouraged. This involves integrating modern amenities into the existing structures while preserving their original character. The use of locally sourced materials should be prioritized, as it supports the local economy, fosters skill development, and generates revenue for the community.
4. By implementing these measures, the region can ensure the preservation of its unique architectural heritage while benefiting from modern advancements and supporting sustainable development practices. (Yadav & Chattopadhyay, n.d.)

11. Conclusions

Uttarakhand possesses natural features like the Nanda Devi range, rivers, forests, and wildlife, which complement the unique traditional houses. Preserving this traditional architecture is essential to protect against the adverse effects of development and inappropriate construction, which harm the environment in Uttarakhand.

Conserving the lost identity of Uttarakhand involves safeguarding the cultural elements, topography, climate, and architectural style that contribute to the place's identity. It is crucial to make efforts in preserving the region's traditional natural resources and cultural heritage in the face of modernization. Striking a balance between development and preservation is necessary to maintain Uttarakhand's uniqueness.

Promoting the culture, raising awareness through education, advertising, and slogans, as well as implementing government

regulations and policies on development and conservation, are key to preserving Uttarakhand's identity. Architectural style and planning also play a role in reviving the identity of Uttarakhand, showcasing its rich cultural heritage and harmonious coexistence with nature.

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