

The Significance of Materials in Heritage Conservation: Exploring Materiality, Authenticity, and Cultural value

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Abstract

This study investigates the critical role of materials in heritage conservation through the lens of two iconic heritage sites, Kasthamandap and Nyatapola, situated in Kathmandu. By observation and analyzing expert interviews, the research highlights the intricate relationship between materiality, authenticity, and cultural value in the preservation of these sites. The study emphasizes the importance of selecting replacement materials that closely resemble the original ones in nature, characteristics, and dimensions. Kasthamandap's woodwork and Nyatapola's brick architecture exemplify this connection, preserving both structural integrity and cultural essence. Innovative approaches to material identification and sourcing are explored, showcasing how traditional techniques and meticulous research contribute to the authenticity of the sites. Expert insights emphasize the interplay of cultural, social, religious, and architectural significance in assessing the value of heritage materials. The preservation of traditional architectural techniques, such as Kasthamandap's load-bearing structure, exemplifies the comprehensive approach of heritage conservation. In conclusion, this research underscores the pivotal role of materials in heritage preservation. By examining Kasthamandap and Nyatapola, the study provides a nuanced understanding of how materials, authenticity, and cultural value intersect, shaping the collective identity of Kathmandu. Through expert perspectives, the study reveals the intricate dynamics that underpin the holistic process of heritage conservation.

Keywords

Heritage, Conservation, Material and cultural value, Authenticity

1. Introduction

Material selection profoundly influences design success. Considering geography, history, culture, and politics in material choices cultivates a positive atmosphere. Prioritizing thoughtful material selection ensures project longevity [1]. Repurposing existing buildings raises debates. Some favor replacing them with profit-generating commercial spaces for economic gain, while others advocate conserving heritage sites for cultural identity [2]. Heritage means employing elements of the past in the present. Crucial to conserving heritage is using durable, historically accurate materials.

In religious architecture, materials define styles. Mosques reflect Islamic architecture, while temples evoke historical grandeur. Materials reflect eras, craftsmanship, and design philosophy. In sacred architecture, materials define styles, symbolize eras, and showcase societal values. Building materials serve as historical records, bridging past and present. Material selection, availability during construction, and craftsmanship celebrate eras. Materials maintain authenticity, functionality, and aesthetics, offering unique experiences [3].

2. Statement of Problem

Preserving history in developing nations often centers around tourism revenue rather than intrinsic value. Public agencies and citizens might not prioritize heritage preservation due to perceived conflicts with modernization [4]. Reconstructing heritage buildings anew can lead to loss of authenticity rather than enrichment [5]. Nepal's Dharahara reconstruction

exemplifies this challenge. Initially planning to rebuild the original, authorities opted for an entirely new structure, disappointing heritage activists. The new building lacks historical and cultural significance, prompting activists' criticism. Despite objections, construction advances rapidly with completion expected soon [6].

The core challenge revolves around preserving authentic materials, ensuring structural stability, and maintaining cultural significance in heritage conservation. Sourcing, replicating, and utilizing traditional materials like wood, bricks, and mud mortar while upholding structural integrity is a complex task. Striking a balance between historical authenticity and essential improvements for longevity adds intricacy to the dilemma. The challenge is compounded by diverse cultural, social, and economic values tied to heritage structures, demanding a comprehensive approach. The evolving understanding of traditional craftsmanship and the dynamic relationship with conservation norms further complicates the preservation process.

3. Rationale of Research

Preserving historic buildings necessitates a comprehensive approach encompassing their original structure, materials, and aesthetics. This involves safeguarding their historical significance, restoring traditional techniques, and reversible enhancements to surrounding environments [7]. Successful conservation demands community engagement, care, and protection. Authentic restoration mandates careful handling of original materials, preserving them instead of opting for

modern substitutes. Historical materials, characteristics, and construction methods testify to craftsmanship of the era and should be maintained in genuine restoration efforts [8]. Developed regions preserve the past for diverse reasons like tourism promotion, aesthetics, education, research, and community well-being.

4. Research Question

The research will explore the following question: 1. How can the integration of materiality and authenticity in heritage conservation contribute to the preservation and sustainable future of architectural heritage?

5. Research Methodology

The research's ontology embraced a constructivist view, acknowledging the subjective and context-dependent nature of material significance in heritage conservation. It recognized diverse interpretations influenced by culture, history, and society. The research aimed to uncover these perspectives and contribute to a comprehensive understanding of conservation practices. The epistemology acknowledged knowledge construction through subjective interpretation and societal context. It engaged stakeholders, employed qualitative interviews, and studied cultural contexts to explore diverse viewpoints. The research also questioned power dynamics and ideologies in conservation, using both interpretivism and critical inquiry to challenge existing paradigms.

The study employed a qualitative approach, using methods like interviews and case studies to explore people's perspectives on materials. It aimed to gather practical information about material qualities and their impact on authenticity and cultural value. This thorough approach aimed to enhance our understanding of how materials contribute significantly to heritage preservation.

6. Research Methods

Research methods encompassed strategies employed to gather data and enhance understanding of the subject. This study employed the following methods: a. Case Studies: Diverse heritage structures representing various materials, eras, and contexts were selected. The research analyzed material significance in their conservation. b. Interviews and Surveys: The researcher engaged heritage experts, architects, and stakeholders, collecting insights on materials' role in conservation. c. Comparative Analysis: Different material selection and conservation approaches were compared to assess their impact on materiality, authenticity, and cultural value. d. Field Visits and Documentation: Visiting heritage sites, the research visually documented materials' role in their condition and overall heritage value.

7. Limitation

There are several limitations that need to be considered when undertaking this research. The study will focus on a selected

number of case studies to provide insights into the role of materiality in conservation projects. Therefore, the results may not be generalizable to other conservation projects. The research will be limited by the availability of data on the selected case studies, which may affect the depth and accuracy of the analysis. There may be other factors that influence the perception and preservation of heritage value in architectural conservation, which may not be addressed in this thesis.

8. Literature Review

In the context of conservation concepts, adaptation involves making controlled changes to a building to accommodate new functions while preserving its cultural value. Conservation encompasses various approaches, including maintenance, preservation, restoration, reconstruction, and adaptation, all aimed at retaining a place's cultural significance. Preservation focuses on sustaining a historic property's form and materials to prevent deterioration, while restoration entails returning a structure to its original state using authentic components and techniques.

Overall, these concepts collectively aim to safeguard the cultural and natural importance of a place while ensuring its meaningful and sustainable use over time [9].

8.1 Chronology of material use in Nepal

Stone usage in architecture began in Kathmandu Valley with the Lichchhavi era around the 1st century CE. Before that, Kirat people used brick and wood, with limited stone for worship. Lichchhavi experiments with stone temples started, burnishing techniques emerged by the 5th century, protecting carvings. Wood and brick became dominant in Malla period. Gurkhali era mixed Newar style with Hindu/Islamic influence. Restoration of monarchy in 1951 revived heritage interest. Today, traditional materials persist in heritage sites, while modern architecture uses brick, steel, and glass [10].

8.2 Materiality in Heritage Conservation

Materiality pertains to the tangible attributes of an object, encompassing its characteristics and composition. Heritage institutions rely on conserving physical remnants of the past, with conservators ensuring object preservation. Deterioration not only causes object loss but also erases historical connections and knowledge. Material-based conservation safeguards both artifacts and their insights, forming the conservation profession's foundation. "Object integrity" guides conservation decisions, preserving physical, contextual, and conceptual aspects. While physical stability historically received focus, minimal intervention, authenticity, and reversibility also steer conservation practices [11].

8.3 Material decay and deterioration: challenges and solutions

Masonry materials are susceptible to damage from physical and chemical factors, with "weathering" covering moisture effects, rain, freezing, salt, and chemical exposure. Biofilms

can stain and strain historical masonry, worsened by changing climates.

Conservation involves assessing, documenting, safeguarding, and restoring buildings. Conservation and repair principles for old buildings aim to ensure structural integrity, prevent deterioration, and preserve the original work. Repairs should be discernible and avoid mimicking the original for future archaeological recognition [12].

8.4 Authenticity and its Relationship to Materials

Authenticity means thinking about the past and what things are made of when fixing them. But usually, people only care about how things were originally built, not how they were fixed or changed later. This simple way of looking at things makes it hard to know what's truly authentic. If fixing things a lot today makes them less valuable as history, then fixing things a lot in the past should also do the same. But our ancestors did these fixes to keep things real. Since being real is very important in taking care of old things, we should rethink what it means to be real based on what they did [10].

8.5 Authenticity in heritage conservation

As per UNESCO's concept of Outstanding Universal Value, the uniqueness of historical sites is preserved through their distinct design, materials, and craftsmanship within traditional surroundings. Despite urbanization, the Kathmandu Valley maintains authenticity in its historic ensembles and traditional urban fabric [?]. Jokilehto (1994) notes that authenticity of heritage and its context determines cultural value assessment, emphasizing the need to preserve existing resources for future memory. This is vital for maintaining identity and authenticity in today's society. Preserving dynamic built environments and authentic traditions requires careful management and support, as such traditions are scarce and need assistance to maintain their genuine creative essence. The authenticity criteria table highlights material aspects by mentioning that materials were combined or deposited during a specific time and pattern to create a historical site (Criterion B). The chosen materials show the preferences of the creators and reflect available resources and technologies. Regional building traditions often focus on native materials, contributing to a sense of time and place in an area [13].

8.6 Material authenticity and its interpretation in Nepal

In Nepal, the long-standing practice of maintaining and rebuilding temples, with replaced parts, challenges the strict definition of authenticity based on original materials and construction. This Nepalese tradition values both the temple's design authenticity and the skills passed through generations. Contrastingly, international conservation principles emphasize original materials and scientific dating, influenced by European historicism. The clash might arise from the fascination with dated past and Western linear time, differing from Nepal's cyclical time rooted in seasonal renewal. Examining this conservation practice as an intangible part of Nepal's architecture can offer new insights into authenticity and tailored conservation standards [5].

8.7 Craftsmanship in Nepal

In Nepal, the Kirat society had "eighteen crafts" similar to those in the Sakya society during Buddha's time, skilled in various building crafts, with all crafts involving cutting materials except pottery. The society had four castes, and with the arrival of the Lichchhavi, this mixed society adopted four castes and eighteen crafts [10]. Skills were passed down through generations within families, following apprenticeships. King Jayasthiti Malla during the Malla period reinforced the societal division based on crafts, creating sixty-four occupational groups, many focusing on building crafts. As the Malla dynasties introduced Hinduism, Newar society joined the Hindu caste system, leading to specialization among different clans. Families like Awal, Maharajan, Silapakar, Shakya, and Prayapati excelled in clay, wood, and stone work. Over 500 years, Newars developed expertise in arts and crafts, passing knowledge down orally. The 18th century saw impressive architectural achievements like Nyatapola maintained and restored by skilled Newar craftsmen. Hindu deity Vishvakarma, revered as the guide for Newar craftsmen, influenced their work. Craftsmen used Hindu texts like the Manasara for construction guidance. Patan excelled in stone carving and metalwork, Bhaktapur and Thimi in brick and terracotta, and Bungamati in woodworking. Specialized craft concentration gave each city a distinct character [14].

8.8 Legislation on material value conservation in Nepal

8.8.1 Basic Guidelines on Conservation and Reconstruction of heritages damages by the earthquake

Guideline 12 suggests using traditional materials and techniques for restoring monuments, correcting past non-traditional restorations. For seismic safety, non-traditional methods need approval and should be discreet. Guideline 21 emphasizes quality, easy availability of traditional materials, and coordination with the Department of Archaeology. Quality wood, especially Salwood, is preferred for load-bearing and exposed areas. Guideline 22 prioritizes training and utilizing skilled Kaligarhs (craftsmen). Guideline 31 allows replacing destroyed parts of monuments with new materials matching original quality, structure, and craftsmanship based on evidence [15].

8.8.2 Guidelines by ICOMOS

The restoration guidelines given by international charter for the conservation and restoration of monuments and sites, The Venice Charter which was adopted by ICOMOS 1965 has mentioned guidelines for material value conservation as: Article 9 stresses restoration as a specialized process to preserve the aesthetic and historic value of a monument, respecting original materials and documents. Restoration must cease where speculation begins, and any necessary additional work must be distinguishable from the original design. Archaeological and historical studies should precede and follow restoration. Article 10 permits modern techniques for consolidation if traditional methods are insufficient, backed by scientific proof and experience. Article 11 emphasizes respecting contributions from different periods in

a monument's history, avoiding style unity. Uncovering underlying states is rare, requiring little loss of interesting material and significant gain of valuable, well-preserved material. Decisions on removal must not rely solely on the restorer. Article 12 highlights seamless integration of replacements while maintaining distinction from the original to prevent distortion of artistic or historical evidence. Later ICOMOS Charter- principles for the analysis, conservation and structural restoration of architectural heritage (2003) ratified by the ICOMOS 14th General Assembly, in Victoria Falls, Zimbabwe, October 2003 mentioned the guidelines for conservation of material value as: Guideline 3.10 emphasizes understanding the properties of restoration materials, especially new ones, and their compatibility with existing materials, considering long-term effects to prevent negative consequences. Guideline 3.11 stresses preserving the unique features of the structure and its surroundings as they were originally or in the past. Guideline 3.12 highlights interventions should respect the concept, techniques, and historical significance of the original or earlier states of the structure, leaving identifiable evidence for the future.

9. Study Area

9.1 Study Area 1: Kasthamandap

Kasthamandapa, originally constructed during the Licchavi era (3rd - 7th century A.D.), is renowned as Nepal's oldest standing wooden structure. While structurally functional, its wooden parts are ornately embellished, masking their role as support. Elaborate carvings of symbolic figures, often in vivid colors, adorn pillars, brackets, struts, beam frames, window and door frames. The sculptures appear as if integrated into the walls rather than being integral to the building's support.



Figure 1: Kasthamandap in 2023 (Source: Author)

9.2 Study Area 2: Nyatapola

In 1701 AD, King Bhupatindra Malla built the Nyatapola temple to control Bhairavnath, an aggressive god. The temple features unique architecture and stands at 32.19 meters, making it Nepal's tallest structure. The temple is renowned during Jatras for its amphitheater-like qualities, providing excellent views from its exposed foundation plinth decks across five layers. "Nyatapola" comes from "Nyata," meaning "five," and "Pola," translating to "roof" in Nepal Bhasa, often referred to as the "Five Storey Temple."



Figure 2: Nyatapola (Source: Author)

10. Research Findings

Through the case studies of Kasthamandap and Nyatapola, it was evident that the choice and preservation of specific materials greatly influenced the structural integrity and historical significance of these iconic heritage structures. The study emphasized the importance of utilizing authentic materials, such as mud mortar, Ma:appa bricks, timber, and clay tiles, to maintain the cultural value and authenticity of these architectural gems. The study includes the observation and in-depth interview with the experts involved in the reconstruction and renovation of the case areas as well insights were taken from the academic conservation experts.

10.1 Reconstruction after 2015 Earthquake

10.1.1 In case of Kasthamandap

Originally thought to be from the 7th century BC, subsequent research showed it dated back to the 5th century BC. Reconstruction was led by the Department of Archaeology (DOA) in collaboration with Durham University. Modern technology was initially proposed but met resistance due to historical methods' effectiveness. The decision was made to reconstruct using original materials like mud mortar, wood, and old-style bricks. Local artisans and experts partnered to restore Kasthamandap, with funding from the community and

Nepal government. Skilled craftsmen handled woodworking, and high-quality materials were ensured, even as traditional methods were respected. Local residents played vital roles, managing materials and providing labor. Challenges included sourcing wood due to depletion, but political connections aided procurement. Bricks were remanufactured to match the original sizes. The commitment to authenticity and conservation principles resulted in a successful restoration, overcoming challenges in material procurement and adaptation.

Material Sourcing

The reconstruction project sourced materials from different locations to ensure heritage structure authenticity. Mud mortar and components were from Bafal and Dharahara. Clay for bricks came from Satungal, where brick production occurred in Barahi Brick factory. Wood came from regions like Hetauda, Mahottari, Dhangadhi, Parsa, and Rautahat. Patan craftsmen provided metal components, while skilled draftsmen from Patan supplied stones. Collaboration across regions and craftsmen aimed to restore and preserve cultural heritage.

Material Reproducing

Materials were replicated through scientific tests, focusing on size, weight, and compressive strength to match ancient bricks. The brick's compressive strength was raised from 5MPa to 7.6MPa for increased structural stability. Soil composition for Kasthamandap's mud mortar was determined via lab testing of foundation soil samples. A balanced mix of clay, silt, and sand in a 1:2:3 ratio was found most suitable, offering the right stickiness for the mortar.

Reuse of materials

In the restoration process, most intricate wooden crafts, such as meth and thams, were effectively repurposed. However, deteriorated bricks and tiles required meticulous remanufacturing due to their condition.

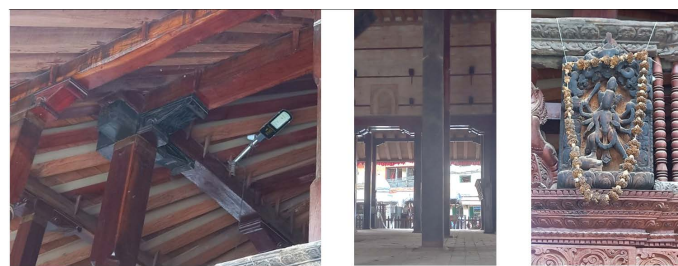


Figure 3: Meth, Tham and wooden image reused (Source: Author)

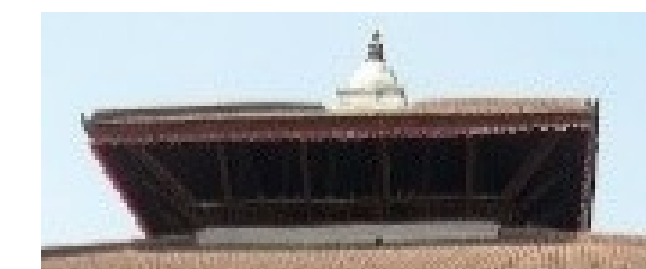


Figure 4: Gajur made of bricks, surkhi and lime mortar before 2015 earthquake (Source: Author)

Material shift Minor facade changes were restored to their original style, and modifications were made to the Gajur to match the initial design. The walls remain exposed in their natural state due to the absence of surkhi and lime mortar in the original design. The Gajur was also reverted to its authentic metal form as per the original design.



Figure 5: Metal gajur after reconstruction as in original design (Source: Author)



Figure 6: Use of lime wash before 2015 earthquake (Source: Author)



Figure 7: Raw brick wall exposed as original design (Source: Author)

Structural changes Structural enhancements included adding copper shoes to ground floor thams, increasing their durability and wood protection. Wooden columns were strategically introduced to reinforce brick walls, maintaining the load-bearing system and preventing a shift to a frame-based structure due to excessive columns.



Figure 8: Ground floor thams provided with copper shoe (Source: Author)



Figure 9: Use of wooden columns to strengthen the structure (Source: Author)

10.1.2 In case of Nyatapola

Initially dated to 1701 AD, further research was conducted in collaboration with specialists and preservation professionals. The local government oversaw the restoration, opting for traditional techniques and materials to maintain authenticity. The community and preservation experts rejected modern methods, leading to the decision to rebuild using original materials.

Skilled local craftsmen managed intricate wood and brickwork, and bamboo scaffolding paid homage to tradition. The local community actively participated, forming committees for restoration oversight and support. Challenges arose in sourcing wood due to scarcity, which was solved through political connections and agreements with the Timber Corporation. Remanufacturing of bricks and tiles was undertaken, adhering to the original sizes.

Challenges during reconstruction included seepage prevention, wood procurement cost differences, soil sourcing complications, and some unexpected disruptions. Adaptability and innovative solutions were crucial in overcoming these challenges and preserving the temple's heritage. The restoration effort stands as a testament to the commitment of the restoration team in maintaining the authenticity and cultural significance of Nyatapola Temple.

Material Sourcing

The material was sourced from local areas. The clay for mud

mortar was sourced from Shivadol. More than 17,000 Jhingati, more than 400 Kopu Appa, 4 Gong Appa, Ghoda Appa, soil and other materials were received as support from various dignitaries including Tilmadhav Narayan Temple, Lokeshwar Temple. Reuse of materials: Only a small amount of materials could be reused during the renovation due to the extensive damage to the bricks and jhingati tiles. A few wooden carvings needed repairs. The head of the Garuda deity in the front tunda (southern side) was also restored.



Figure 10: Head of Garuda repaired with new one on Southern (front) Tunda (Source: Author)

Structural changes

During strengthening, it was noticed that the inner and outer wall plates of the monument weren't connected originally. To address this, inner tie systems were introduced, along with diagonal tie-ups in corners, significantly enhancing structural integrity. Wooden components were treated with care, utilizing half lap and tenon mortise joints to ensure secure connections while preserving the architectural style. The original structure was preserved to safeguard its historical essence. When maintenance demanded new materials, they were thoughtfully integrated to balance preservation and enhancement.

Material shift

There were minimal changes in the materials used. However, at the edge of the plinth, a concrete band was noted instead of stone. Additionally, instead of using linseed oil as a preservative, some decorative paintings were observed on the joist. And bitumen stickers and tar felt are used on the roof.



Figure 11: Decorative painting in process of renovation which was not there before (Source: Author)



Figure 12: Replacement of stone with concrete (Source: Author)

11. Discussion and analysis

11.1 Assessing Reconstruction and Renovation

Through Diverse Principles to Uncover Material Significance in Conservation: Exploring Material, Authentic, and Cultural Values

11.1.1 Validation of the Reconstruction Procedure in

Accordance with Fundamental Guidelines for the Conservation and Restoration of Monuments Affected by the 2015 Earthquake

In case of Kasthamandap, the reconstruction process adhered to several key guidelines. Guideline 12a underscored the use of traditional building materials and construction techniques, rectifying any past deviations from these norms based on current evidence. For instance, Gajur material was restored, and lime, surkhi, and cement were replaced with mud mortar. Guideline 21 emphasized the use of Nepali Salwood with controlled moisture content due to the lengthy seasoning time required for significant structural elements. Skilled artisans from Bhaktapur were engaged in line with Guideline 22. Guideline 31 ensured the monument's reconstruction maintained its original form, shape, and size, along with its traditional composition, spirit, and technology. Components in good condition were reused, and replacements followed the original material's qualities, physical structure, and craftsmanship, exemplified by the remanufacture of bricks, tiles, and wooden carvings with identical features.

In case of Nyatapola, during the renovation, adherence to crucial guidelines was evident. Guideline 12a stressed the utilization of traditional building materials and construction techniques. However, if past restorations had employed unsuitable materials and methods, rectification was not carried out in the current restoration, maintaining the previous deviations. For instance, cement substituted for stone remained untouched. Guideline 21 dictated the use of pure Nepali Salla wood. Guideline 22 highlighted the engagement of skilled artisans from the local Bhaktapur area. Guideline 31 encompassed the reconstruction of the monument with unwavering fidelity to its original form, shape, and size, preserving the traditional essence and composition. Existing components in good condition were reused, while replacements followed the original material's characteristics, structural integrity, and craftsmanship. This was demonstrated by the remanufacture of elements like kopu

apa, gong apa, and wooden carvings with identical features.

11.1.2 Validating Reconstruction Procedure with The Venice Charter (ICOMOS)

In the context of Kasthamandap's conservation, Article 11 underscores the significance of acknowledging contributions from diverse eras within monument preservation. It emphasizes that a unifying style isn't imperative; occasionally, uncovering hidden layers holds value for historical and aesthetic reasons. Elements such as Thams and carvings, carrying historical weight, are retained. Article 12 accentuates the importance of seamlessly integrating replacements, differentiating them from the original to uphold authenticity, a principle evident in the reconstruction process.

Similarly, in the case of Nyatapola, Article 11 has been adhered to, emphasizing the respect for contributions across various epochs within monument preservation. This approach allows for unveiling hidden layers when deemed appropriate. Notably, historic carvings and sculptures are safeguarded, while new additions are distinctly marked for future renovation. Similarly, Article 12 is followed, ensuring the harmonious integration of replacements that remain distinguishable from the originals, thereby preserving historical accuracy.

11.1.3 Validating Reconstruction Procedure with ICOMOS Charter (2003)

Guideline 3.10 is followed by both Nyatapola and Kasthamandap where the characteristics of materials used in restoration work (in particular new materials) and their compatibility with existing materials is fully established. This includes long-term impacts, so that undesirable side-effects are avoided.

11.1.4 Validating Reconstruction with Nara Document

Authenticity Criteria In the pursuit of validating the material authenticity of monuments, it is imperative to adhere to Criterion B outlined in the Nara Document. Both Kasthamandap and Nyatapola effectively exemplify this criterion by embodying the notion that "Artifacts of a specific era and arrangement shape a historic property." The material choices made in the construction of these monuments eloquently mirror the preferences and technological capabilities of their creators. Additionally, the utilization of regional building traditions, often centered around locally available materials, plays a pivotal role in infusing a profound sense of time and place into the architectural landscape of their respective regions.

11.2 Analysis of the interview with conservation experts

The interviews provide valuable insights into the intricate relationship between materials, authenticity, and cultural significance within the realm of heritage conservation, with a focus on the restoration of Kasthamandap. Traditional materials like bricks, wood, and mud mortar are pivotal in upholding the historical and cultural essence of heritage structures. Restoration efforts strike a delicate equilibrium between structural stability, longevity, and the retention of

original materials and techniques. The restoration process for Kasthamandap exemplifies the importance of materials like bricks, which are meticulously reproduced based on historical specifications. Wood, a key component, is sourced meticulously, and traditional carpentry techniques are employed to uphold cultural values. Overcoming sourcing challenges underscores the need for collaboration among artisans, experts, and local communities. Scientific assessments validate traditional practices, as seen in mud mortar testing. Local collaboration and expertise meld traditional wisdom with modern understanding. Material assessment's cultural value involves technical analysis and expert consultation, ensuring alignment with historical accuracy and cultural significance. The integration of rituals and cultural traditions during restoration enhances authenticity. Ultimately, materials embody history, culture, and craftsmanship in heritage conservation. Their selection, reproduction, and application contribute to cultural preservation while addressing stability and longevity concerns.

The Nyatapola case interview highlights materials' integral role in heritage conservation. Local material sourcing maintains ties to original craftsmanship, exemplified by mud mortar and region-specific wood. Traditional practices, such as shilaye for waterproofing and Gehru paint, augment cultural and historical significance. Challenges in material sourcing and usage, like seepage prevention and pricing disparities, are overcome with innovative solutions. Adaptive measures, including inner tie systems and diagonal tie-ups, enhance structural stability while respecting authenticity. The strategic reuse of materials and introduction of new ones strike a balance between preservation and improvement. Innovation is evident in techniques like tar felt and Bitumen stickers for seepage prevention, aligned with Department of Archaeology criteria. The interviews underscore materials' pivotal role in maintaining a site's authenticity, material integrity, and cultural value. The selection, sourcing, and utilization of materials emerge as cornerstones in preserving the historical and cultural essence of heritage structures.

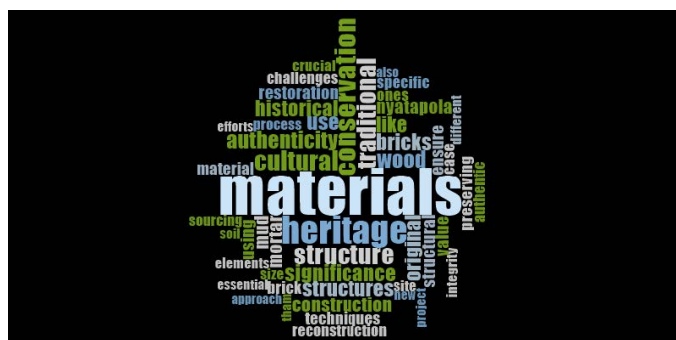


Figure 13: Word cloud generated from the interview on the basis of word frequencies (Source: Author)

The conservation efforts for both heritage sites were profoundly shaped by the utilization of traditional materials, such as mud mortar, bricks, and wood. These time-honored elements served as the corners tone of the restoration process, embodying the essence of cultural heritage and historical authenticity. This significance is vividly reflected in the word

cloud generated from the interviews, where these materials emerge as the most frequently reiterated words, underscoring their pivotal role in the preservation of these cherished landmarks.

12. Conclusion

The significance of material in heritage conservation, as exemplified by Kasthamandap and Nyatapola in Kathmandu, encapsulates the delicate equilibrium between historical authenticity and the preservation of cultural value. Expert insights reveal that the choice of materials is paramount to maintaining the essence of these iconic sites. By adhering to traditional construction techniques and replicating materials with precision, a tangible connection to the past is sustained. Innovative approaches to material identification and sourcing, while rooted in tradition, infuse scientific precision to restoration efforts. These methods underscore the meticulous process of capturing not just the physical attributes, but the essence of craftsmanship embedded in the structures. The insights gained from skilled artisans contribute to a holistic restoration process. Beyond the tangible, these heritage sites carry intangible cultural values. They are repositories of collective identity and cultural practices. The preservation encompasses more than physical restoration; it involves safeguarding the rituals, societal connections, and spiritual essence intertwined with these structures. In summation, the research portrays materiality as the thread that weaves authenticity and cultural value together. Kasthamandap and Nyatapola encapsulate Nepal's history and traditions. The insights offered serve as a roadmap for global heritage conservation, reminding us that while these structures are of the past, their enduring legacy is for the future – a harmonious balance between preservation and continuation.

13. Recommendation

Adherence to established conservation guidelines is paramount, focusing on authenticity and cultural significance. Traditional materials, such as wood, bricks, and mud mortar, should be prioritized whenever possible to maintain historical essence. Collaboration with skilled local artisans is vital for faithful replication, ensuring the preservation of cultural values. Conducting scientific tests to validate the suitability of traditional materials is a fundamental step in this process. Selective replacement of severely deteriorated elements, while matching original characteristics, strikes a balance between preservation and necessary improvements. Cultural considerations, including rituals, add an extra layer of authenticity to the restoration process. The challenge of balancing structural stability with original form and composition must be met, while community involvement fosters ownership and support. Finally, ongoing research into traditional materials and techniques should continue to enhance heritage conservation efforts.

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