

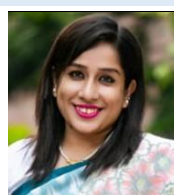
ACCU NARA

GROUP TRAINING COURSE

CASE STUDY REPORTS 2023



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Problems and Needs Identified for the Conservation of a Swampy Wooden Schooner

Tania Sultana

A submerged wooden 'schooner' was found on June 2012 in Jhaubagan seabed of Kuakata seabeach (Patuakhali District) at Bangladesh. An expert committee consisting of 11 (eleven) members was formed from the Ministry of Cultural Affairs to rescue this ancient artefact. Later, in the light of the committee's recommendations, another technical committee was constituted for the archaeological excavation and conservation work for the salvage of the 'schooner' headed by boat expert from France Mr. Eves Mare. Under the supervision of the said expert committee and technical committee members and with the cooperation of various organizations of the Bangladesh government excavation was carried from 23/12/2012 to 27/02/2013 AD.



Figure 1: Phases of lifting the submerged wooden 'schooner' during the excavation time at seabed

Brief Description of the Schooner:

Inside the 'schooner' were found iron and copper nails, broken pieces of pottery, copper sheets, iron chains, jute sacks, coconut garlands, ropes made of coconut husks, remnants of mats etc. At the time of salvage the schooner was determined to have a wet weight of about 90 tons and a length of 72 feet. About 3 km from the excavation site. Such heavy and large artifact was shifted to a place called Battala (about 3km away from the excavation site) on the eastern side of the Kuakata Buddhist Temple. It has been possible to successfully complete this complex and risky task due to the relentless efforts of the Bangladesh Armed Forces.



Figure 2: After excavation the 'schooner' is transported by a temporarily constructed railway line.

If the work could not be completed, the precious artifact might have been lost to the seabed forever. Therefore, taking the initiative and successfully completing this excavation work was undoubtedly a groundbreaking and commendable decision.

Swamp wood and its historical importance:

Waterlogged wood refers to wood that has been under soil or water for a long time and whose internal pores, capillaries and micro capillaries are filled with water. Besides, these places contain different types of harmful substances including microorganisms along with the water.

Through scientific research, it is possible to reveal many important information about ancient culture and civilization from swamp wood and other historical artifacts found with it. For example: In ancient times, a clear idea can be obtained about the trade relations of one state with another state, information about the migration of a certain community or group of people, and even information about important directions to prevent environmental disasters can be obtained from all these historical records. So swamp wood is of special importance among the archaeological remains. Conservation treatment and maintenance of any wetland wood specimen requires greater attention to long-term management.

Present condition of the Schooner:

The decision to place waterlogged wood in a completely different environment i.e. in the open after excavation, which has been in a certain environment for a long time under soil or water, was not correct. In this case, special precautions were required before excavation under the direct supervision of conservationists specializing in swampy wood. For example: ensuring the safety of the schooner after excavation, ensuring a suitable environment for keeping it and making all preparations for conservation treatment mandatory, etc. Such matters were not followed properly and various physical changes were made in the timbers of various parts of the schooner. These physical changes are usually unidirectional, which greatly hinders proper conservation treatment of submerged wood. In some cases waterlogged wood loses its preservation capacity forever.



Figure 3: Cracks in wood caused by exposure to storage prior to conservation

At present several parts of the schooner's planks are missing in the middle and down the right side. New wood additions in many places done. The decision to add new timber to facilitate safe lifting and transport of the schooner during excavation was a sound one.



Figure 4: New wood additions in many places.

Later, after the work, the new timbers were removed and the shape of the original structure could be fixed by using supports in different parts of the schooner in the rehabilitation method. Due to not removing new wood from various parts of the schooner, various changes have taken place in its physical structure. The main structure of the schooner is not in its original shape, many of the timbers have bent and distorted the structure. However, there are many other factors that cause a schooner's main structure to bend.

It has already been mentioned that if a wood is left for a long time in a different environment i.e. in soil or water, it undergoes extensive decay and its strength is severely reduced. On the other hand, the stiffness of new wood is relatively high. In this case, adding new wood of higher strength to the waterlogged wood of low strength,

creates additional stress on the waterlogged wood. Due to which the stability of the main structure is severely compromised. That is exactly what happened to the schooner. For this reason it is advisable to add any type of new wood to waterlogged wood without proper preservation treatment and testing.

A few places on the schooner, examined with a small cellular microscope, showed extensive white coating on the surface of the wood. Despite several attempts with water, the white spots could not be completely removed. These are known as salt deposits.



Figure 5: Examination the small wood cellular with a microscope and trying to remove the white spots with water.

Several parts of the schooner were found to be rotting and infested with wood. This attack is quickly spreading to other parts of the wood.



Figure 6: Rotting wood



Figure 7: Infested wood

Recommendations:

- In order to recover the properties of the soaked wood, it is first necessary to determine the mass of each piece of wood. Then the wood should be periodically submerged in water for long periods of time. However, if you keep the wood in running water, it will be much easier to remove the impurities accumulated in their internal holes, small spaces and capillary channels. In this case, different sizes of stainless steel trays can be used depending on the shape of the wood chunks. Periodically, after cleaning the wood with a soft brush, after removing the old water, reweigh it and immerse it in clean water. This process needs to be continued as long as the mass of the wood continues to grow. This period may be 5/6 years or more.
- After a certain time, it will be seen that the mass of the wood does not increase even after being immersed in water, then comparing the initial mass of the wood with the final mass, it will be known how much the characteristics of the water-logged wood have been restored. In this way, after converting each piece of schooner wood to as much waterlogged wood as possible, their conservation treatment steps can be started sequentially.
- The stages of conservation treatment are: water removal, replacement, solidification and controlled drying. There are many well-known methods around the world to implement these steps, out of which five methods have been mentioned earlier. All these methods use different types of chemicals, modern

machinery and other materials. Generally, the most convenient method can be selected considering the feasibility of implementation and the availability of the necessary materials related to conservation treatment in the local market of Bangladesh. However, since these treatment methods are very expensive, time-consuming and hazardous to human health and the environment, various strategies and precautions are required in their implementation.

- In order to ensure the safety of the schooner, first of all, chemical treatment of wood affected by rotting and insect attack can be undertaken urgently.
- The same treatment can be applied to other woods to protect them from rotting and insect attack later on.
- Water soluble chemicals can be used in wood rot and insect infestation treatments. As a result, it will be possible to easily remove these chemicals from various parts of the schooner before starting the main treatment of the submerged wood.
- Due to uncontrolled drying, the schooner's timbers have lost the characteristics of waterlogged wood. Therefore restoring the properties of waterlogged wood can be seriously considered.
- The chemicals used in the preservative treatment of wet wood are generally very hazardous to human health and the environment. Appropriate measures may be taken regarding taking special precautions in this regard.
- In order to ensure the safety of the juncture after conservation treatment, its long-term management can be seriously considered.
- A long-term (approximately 10 to 15 years duration) project may be considered for proper completion of all works, including efforts to restore lost swamp wood properties from schooner timbers, proper conservation treatment and post-treatment maintenance of the schooner.

Challenges and Concerns in the Preservation of Wooden Heritage Sites in Bhutan: A Case Study on the Restoration Project of Wangdue Phodrang Dzong.

Dorji

Wangdue Phodrang Dzong is a historic fortress located in central Bhutan. It holds significant historical and cultural importance in the country's history.



Photo 1. Strategic location of the Dzong (Fortress)

Wangdue Phodrang Dzong was built in 1638 by Zhabdrung Ngawang Namgyal, the spiritual and political leader who unified Bhutan. It was strategically constructed on a ridge between the Puna Tsang Chu and Dang Chhu rivers to oversee and control the routes connecting western and central Bhutan. The dzong served as an essential defense against potential Tibetan invasions and internal conflicts among regional rulers.

The Dzong follows traditional Bhutanese architectural styles, characterized by massive stone walls, and intricate woodwork. It has a distinctive three-courtyards: 2/3rd of the first courtyard houses administrative offices and 1/3rd houses monk's accommodations and shrines, the middle courtyard contains temples and the monks' residence, and the third courtyard with the main tower or Utse and an assembly hall for the monks.



Photo 2. Aftermath of the tragic fire incidence.

Over the centuries, Wangdue Phodrang Dzong underwent several renovations and expansions. Unfortunately, On June 24, 2012, a fire broke out in the Dzong and quickly spread, destroying the entire complex. The fire was a major loss for Bhutan, as the Dzong was one of the most important cultural and historical sites in the country.

What caused the fire and why couldn't the fire be contained in time?

The fire's cause remains uncertain, though speculation points to a potential electrical short circuit originating from one of the administrative offices in the first courtyard. While past fires in Dzongs were attributed to butter lamps, modern facilities present the current hazard. With electrification prevalent in nearly all dzongs, subpar wiring or inadequate maintenance of aged systems could lead to short circuits – a predicament that came to the forefront. Since the incident occurred on a Sunday when the office was unoccupied, the fire gained momentum unchecked.

Perched atop a hill with limited access points, Wangdue Phodrang overlooking the Punatsang Chhu and Dang Chhu rivers on three sides, rendering it challenging for firefighters to combat the blaze. The very inaccessibility designed to repel adversaries ironically impeded firefighting efforts. The fire hydrant, although installed, proved non-functional due to a lack of regular maintenance and fire drills. This oversight could have been avoided with

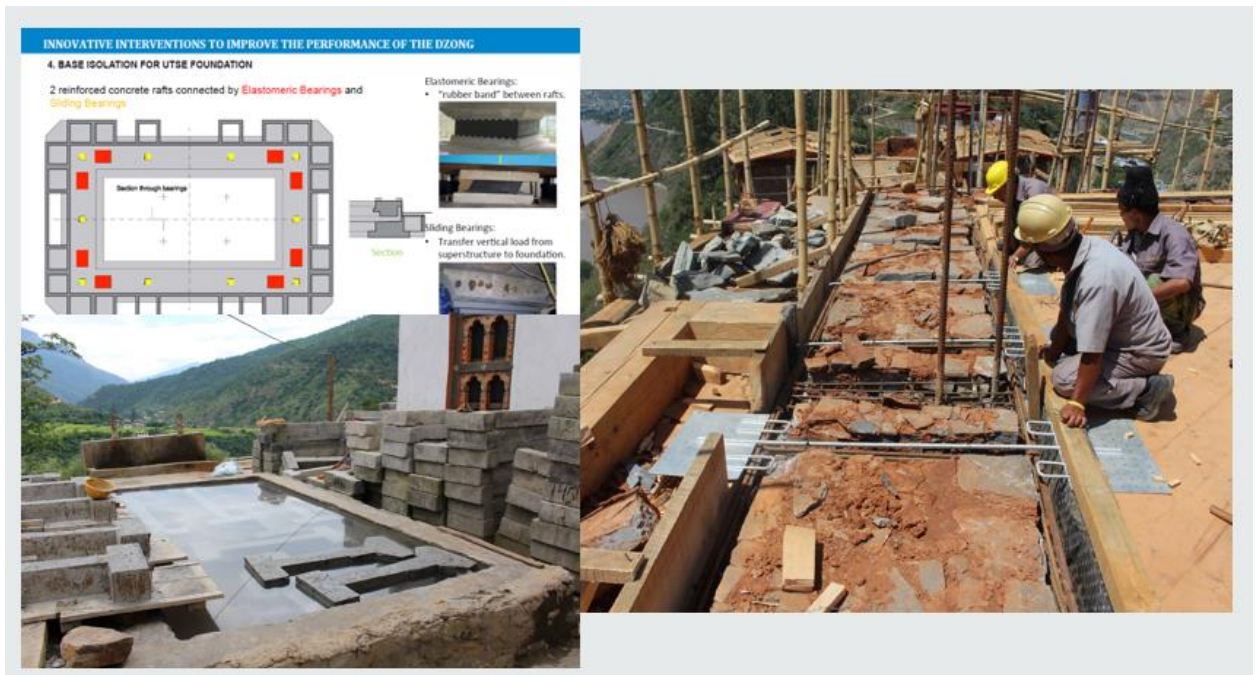
vigilant oversight and drills conducted by the responsible authorities, potentially salvaging the structures in the second and third courtyards.

At the command of His Majesty the 5th King, the Royal Government of Bhutan began planning to rebuild the Dzong to its former glory immediately after the fire. The reconstruction project was launched in 2014 with funding support from the Government of India. The reconstruction aimed not only to restore the physical structure but also to maintain its historical and cultural significance.

Starting from 2015, I was reassigned to the Wangdue Phodrang Dzong Reconstruction Project (WDRP), where I was tasked with overseeing the technical aspects of the project and assisting the project director in managing it. This marked my initial involvement with Cultural heritage sites. Despite Bhutan not having any designated World Heritage sites, we have 12 locations on a tentative list, with Wangdue Phodrang Dzong being one of them. During my time as a project engineer at Wangdue Phodrang Dzong, our team achieved the following milestones while also identifying certain areas for improvement:

Accomplishments:

1. **Effective Modern Technology Integration:** In order to ensure the durability and safety of the structure, we incorporated modern technology to enhance its resilience against seismic activity and fire hazards. Given Bhutan's susceptibility to earthquakes, it was crucial to understand the risks involved. The project implemented earthquake-resistant techniques like base isolation in the Utse and used Reinforced Concrete (RCC) rafting in the 2nd courtyard. Precast RCC bond stones were also used to withstand seismic forces. Additionally, fire alarm systems and emergency evacuation procedures were put in place to swiftly respond to fire incidents and protect the Dzong. Today, regular inspections are being conducted to maintain the effectiveness of fire safety measures. This comprehensive adoption of modern technology and best practices set a precedent for preserving historical sites and demonstrated how embracing advancements in construction technology can safeguard cultural heritage.



2. **Revitalization of Cultural Etiquette:** The completion of the Dzong had a positive impact on Bhutanese cultural practices and traditional attire. Prior to the completion of the reconstruction, people often visited offices wearing informal and convenient western-style clothing. However, the restoration of the Dzong sparked a positive change, encouraging a return to traditional attire and etiquette. The presence of this significant structure renewed pride in cultural heritage and led to increased adoption of formal dress, contributing to a resurgence of Bhutanese identity rooted in tradition.
3. **Sustainable Strategies of Wangdue Phodrang Dzong:** The Dzong's sustainability was evident in its design, which balanced traditional architectural elements with modern functionality. The Dzong supported monastic life and administration with suitable living spaces and facilities, ensuring the continuity of spiritual practices and efficient administrative operations. The project also aimed to manage visitor numbers effectively. From December 30, 2022, to June 20, 2023, the Dzong hosted numerous visitors, including foreign tourists, locals, and monks. Introducing entrance fees for visitors was proposed as a sustainable solution to both generate funds and regulate visitor numbers, preserving the Dzong's integrity.

Challenges:

1. **Insufficient Planning and Estimations:** Thorough planning, including comprehensive blueprints and precise projections, should have been a fundamental aspect of the project's preparation. Regrettably, the project commenced without a Detailed Project Report (DPR) and relied solely on approximate estimations. This issue has consistently plagued all Dzong Construction and Renovation endeavors overseen by the Ministry of Home Affairs, primarily due to the frequent necessity for modifications. Precise architectural schematics and accurate financial assessments are imperative to ensure the project's successful completion. They play a crucial role in allocating the appropriate resources and attaining the project's objectives. An evident illustration of these deficiencies was the extension of the project timeline. Although the project was initially slated for completion by December 2018, it had to be postponed to December 2022 due to the inadequacies in the initial planning stage.
2. **Challenges in obtaining the rates for traditional construction materials:** The reconstruction project of Wangdue Phodrang Dzong encountered difficulties in determining rates for traditional construction materials and artifacts. These challenges had wide-ranging impacts on the project, affecting aspects such as budgeting, procurement, project schedules, and allocation of resources. Common items like red mud, traditional door latches, statues, and religious articles lacked standardized pricing in the market. This absence of established cost structures posed challenges for project planners and managers in accurately estimating expenses and allocating funds.

Recognizing these obstacles, the Department of Culture and Dzongkha Development has taken the initiative to establish standardized rates for materials used in cultural heritage buildings and artifacts. This effort is a strategic response to the difficulties faced during the Wangdue Phodrang Dzong reconstruction. Through collaboration with relevant authorities, the Department aims to enhance practices related to budgeting, procurement, and project management. This endeavor ultimately seeks to ensure the successful implementation of projects focused on cultural preservation and construction in the future.

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Challenges and necessity in wooden build heritage conservation in Cambodia

In Crisna Sothea

Since ancient times, building in wood has been a symbol of Cambodian culture, including traditional wooden architecture. It represents a significant part of Cambodia's cultural heritage. There are pieces of evidence regarding the trace of using time as a component inside the stone temple, dating back more than a thousand years ago. Khmer wooden buildings including houses, have been constructed with a raised floor and rounded ends. In the Cambodian heritage protecting zone, the existing resident can apply to rebuild their wooden house which follows the plan issued by the authority. This aims to harmonize the old and the new, the townscape can retain its unique character, aesthetic, and appearance which plays an important role in attracting visitors and boosting economic growth. It helps to preserve the cultural space and identity of a community.

Case study: Kratie Province The 100 Columns House

There is no actual record to determine how old this house is. Anyway, according to some sources from the descendant of this family, it is believed to be over 150 years old. It is occupied by three families living together. The land property had to be sold in 2020 to divide the assets. The house will be dismantled as there is no intention to include the wood components in the selling agreement. Unfortunately, it seems that the local authorities are unable to purchase these land properties as they lack the necessary funding to do so, but only wooden house structures. This is caused by the potential increase in the financial value of properties in conservation areas, through local market demand for development and tourism.



Fig.1 House original location as the roof were added



Fig.2 Dismantling Process

The MCFA initiated the purchase of the wooden structure with the intention of rebuilding it in another location. A survey was conducted to undergo structural and architectural assessment of this building before dismantling. This involves accurately documenting the building's features, including measurements, photographs, and drawings. This documentation helped to inform the dismantling and reconstruction job. The whole building was carefully dismantle, as some part of the component damage were required to be repaired or replace by the same material. Then the building was reassembled to its original state.

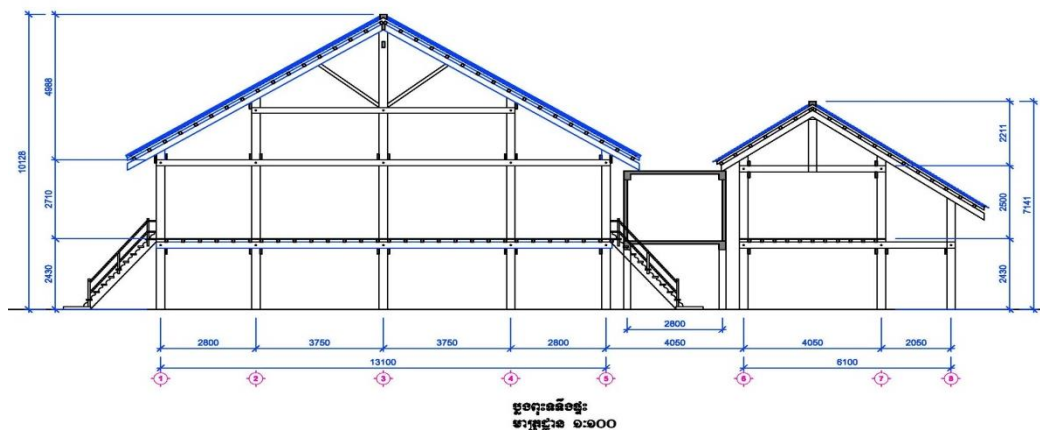


Fig.3 Cross Section Plan

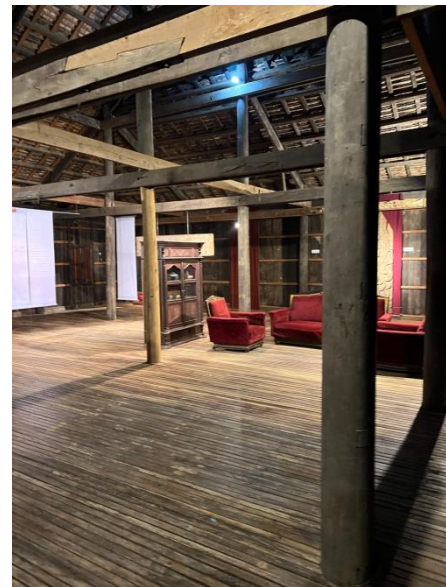


Fig.4and 5(Left to Right) Building after rebuilt on new location and Artifacts stored inside

Problem 1: Damaged components and replacing material

When it comes to weather conditions in Cambodia, due to the hot and humid tropical climate, wooden buildings are prone to decay over time. Mold, rot, and insect infestation can all cause damage and decay, while high temperatures can

lead to warping and splitting of the wood. Furthermore, the choice of materials and treatment methods used for the preservation of wooden objects in cultural heritage is another challenge here especially the wooden pillar which those kinds of high quality timber is no longer exist due to deforestation. Moreover, unlike Japan, we do not have a reserve forest for heritage timber used in conservation work. It appears that the restoration of a wooden heritage building might require more funds because the materials are limited. As a result, the total cost of the project could potentially increase too. So, dismantling was performed very carefully. Many components needed to be replaced as they were not reusable.

Problem 2: Townscape and function

The relocation of the structure has had a significant impact on the identity of the original community where it was situated, which is now over 20 kilometers away. The community has had to adjust to the loss of this important landmark, and it has changed the character of the area. Furthermore, after finishing the reconstruction, this house has been transformed into a community museum and a gathering place for traditional ceremonies. This means the function of the building is completely changed from the previous one as a residential house to a public property.

According to the above-mentioned problem, there are two important necessities should be done such as:

- Improve the role of communities to get involved in valuing and protecting their local heritage and recommend that this be supported through the involvement of heritage interest groups and through the organization of seminars and workshops, publications and exhibitions, training and work with young people, technical advice, media events, and programs. Heritage conservation plans of heritage wooden building across Cambodia should be conducted for inventory purposes and should be supported by the occupants of the historic area.

-I think that offering more government subsidies could assist property owners to maintain their wooden building. This help to keep them from being sold off too quickly and preserve them for future generation.

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The Need for protection of the Lesser-known Indigenous Earthquake Resistant Wooden Heritage of Northern India

Maulishree Mishra

Introduction

India is home to Heritage of varied cultures spanning different time periods and this Heritage is the pride and reflection of the diverse cultures that coexist here. But sites of Historical importance in a country like India are often left to neglect due to the massive numbers, lack of knowledge and resources, leading to a decay of evidences over a period of time which might have otherwise helped in developing an understanding of history of a specific region/area giving an insight into our past and also become potential generators of local economics in the long run.

Most of India's genius Indigenous heritage (Tangible/Intangible/Processes) is unidentified or partly identified heritage and needs more attention, research as well as protection as the case discussed focuses on one such type of Wooden Heritage, the associated processes, as well as the communities associated with it. In the long list of unidentified heritage, the least recognised is the Wooden Heritage of the Himalayan Region. The typology of this varies amongst the sub-regions and is community specific as does the ornamentation reflecting the culture, beliefs, traditions and life of its inhabitants but majorly three styles can be broadly noticed the first prevailing in the northern most part of the country i.e the cold dry region of higher Himalayas i.e. Spiti and Ladakh (which is on tentative WH List), the second prominent in the lush green snow covered meadows of Jammu and Kashmir and the third **situated in the middle Himalayan region of Himachal and Uttarakhand**. The earthquake resistant system of building in this region is famously referred to as the *Kath-Khuni* in Himachal and *Koti-Banal* in Uttarakhand.

Although located in the area of high seismic activity, the traditional Stone and wood buildings of this area are said to have witnessed earthquakes of high magnitudes over the last 8-10 centuries and still stand unmoved by the tremors that strike the region from time to time. It is said that some of these structures date around 1000 years and many of them have been built over pre-existing foundations of older structures which must have stood in their place (radiocarbon dating of the wood from the base of these structures was carried out around the year 2000).

The importance of the *koti banal* as an instrument of learning can be well understood after going through the following information: “*The entire Himalayan terrain is recognized as being highly vulnerable to earthquakes (Bilham et al., 2001; Feldl and Bilham, 2006) and in the past the region has been jolted by four great earthquakes (with local magnitudes > 7.5): 1897 Shillong Plateau earthquake, 1905 Kangara earthquake, 1934 Bihar/Nepal earthquake and 1950 Assam earthquake apart from Kumaun earthquake of 1720 and Garhwal earthquake of 1803 (Thakur, 2006). Regions between the rupture zones of the great earthquakes are recognized as seismic gaps that are interpreted to have accumulated potential slip for generating future great earthquakes. The entire state of Uttarakhand falls in the seismic gap of the 1934 Bihar/Nepal earthquake and the 1905 Kangra earthquake and is categorized into Zone IV and V of the earthquake zoning map of India (IS 1893 - Part1: 2002).*”

(Rautela and Joshi 2008)

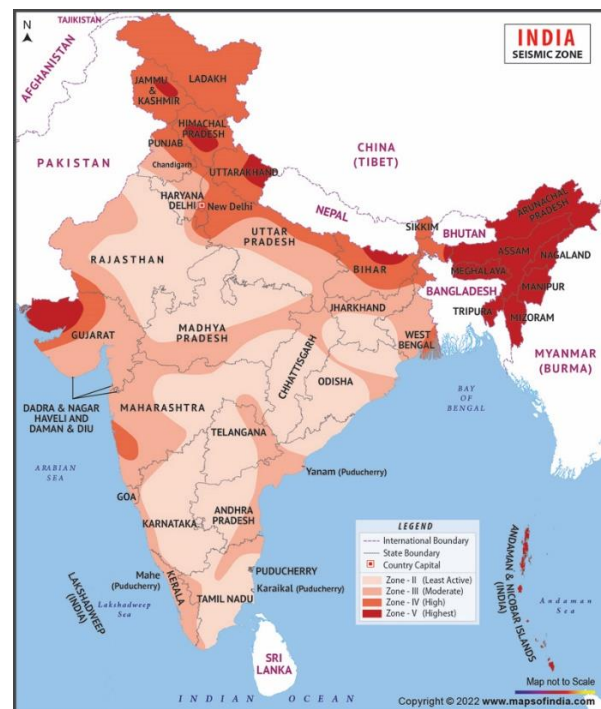


Figure 1. Seismic zoning Map of India.

Koti Banal Structures of Uttarakhand



Figure 2 The Traditional Wooden Houses in the settlements of Mukhba and Bagori in the Bhagirathi (Ganga) valley at Harsil.

Location

The pockets of Koti Banal Architecture in Uttarakhand are spread parallel to the course of the two most holy rivers of India, Ganga and Yamuna in parallel to the upper and middle course of the rivers. The settlements, hamlets closer to the main highways have already been completely lost/replaced with modern construction due to developmental activities as no law protects them, while those located at a distance of more than 5-10 kilometer's from the main connecting road are still present with some of the traditional buildings abandoned while others being slowly replaced with modern construction, due to difficulty of maintenance.



Figure 3 The transforming landscape of the settlement of Mukhba located on the banks of river Ganga. Many of the traditional timber houses have drastically been reconstructed with modern materials.



Figure 4 The rear elevation with the horizontal wooden beams and stone infill.



Figure 5 The front entrance and veranda of a typical dwelling

Understanding The Unique Earthquake Resistant Koti Banal Construction

The locations where the settlements of Koti Banal flourished had three major resources at hand i.e. a flowing river from where the river stone could be easily procured, dense Devdar forests (Cedrus Devdara is considered an auspicious tree as it can stand for well over a 1000 years without being impacted by insects and termites), and mountains in the vicinity for procuring slate stone for cribbage and roofing. The houses are mostly follow the natural slope of the landscape or are placed on small flat patches facing the sunny side. The houses or temples built in this style can have 3-7 stories. The communities associated with such structures probably selected these locations due to fresh water supply of glaciated waters, forests in vicinity for livestock and gentle slopes for agricultural activity, moreover since the locations were close to dense forests and high mountain ranges it was important to consider safety, comfort and protection from the natural as well as human elements and that could have been a major reason that these structures were built like impenetrable isolated forts with only one entrance to inside and very small openings on upper floors to the outside.



Figure 6 The side elevation of a traditional Koti Banal structure with the horizontal wooden beams and stone infill



Figure 7 Five storied high Koti Banal structure at Koti village of Uttarakhand (Ref : Rautela, P., et.al.: Housing Report: Timber-reinforced Stone Masonry (Koti Banal Architecture) of Uttarakhand and Himachal Pradesh, Northern India. World Housing Encyclopedia

In *Koti banal* construction the walls are made of dressed stone and wooden beams which are alternatively stacked up, using a system of dry masonry with wooden beams after every 3-5 courses of stone. The

construction of such structures was largely done by local artisans and involved laying two wooden beams longitudinally parallel to each other with a gap in between which is filled with stone infill/cribbage packed as a filler. The wooden beams interlock at the corners and the external and internal beams of the wall are held together by wooden cross braces or dovetails (Fig 7). The joining of the alternate courses of beams was done using wooden pegs to allow movement at the time of earthquakes. The cribbage inside adjusted and helped in dampening of the vibrations at times of an earthquake.

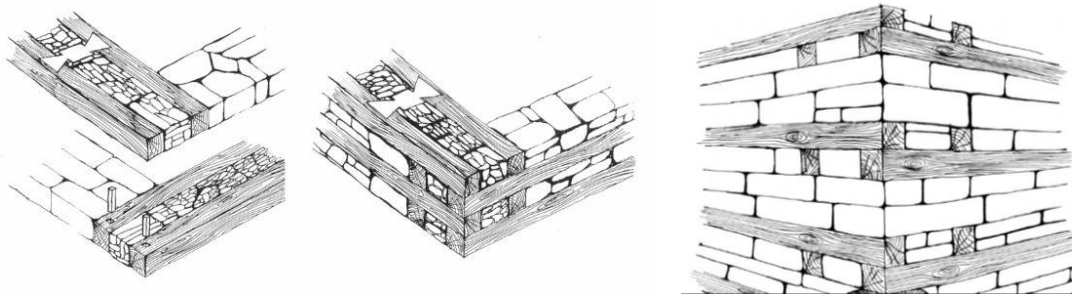


Fig 8. An image showing the construction and joining detail. (Ref: Thakkar, Jay & Morrison, Skye. (2008). Matra: Ways of Measuring Vernacular Built Forms of Himachal Pradesh)

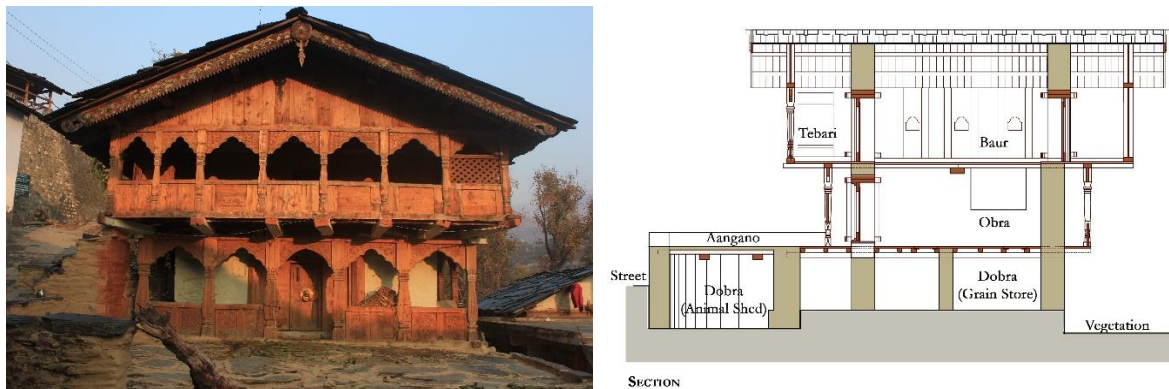


Fig 9. Represents the front elevation of an evolved version of *koti banal* dwelling from a settlement in Yamuna valley, while Fig 10 represents the section of the same dwelling indicating the various parts of the house, where the lowermost floor is used for keeping sheep & goat and the upper floors are used as living areas.



Fig 11. and Fig 12. Apart from construction of the structure, a remarkable level of wood carving and ornamentation can be found in the door frames, brackets, pillars, panels and other parts of the structure in deodar wood which comprises of mostly of geometrical patterns.

In 1991 the city of Uttarkashi in Uttarakhand was jolted by an earthquake of magnitude 6.6. What amazed the geologists and researchers was that the traditional *koti banal* structures at the villages of Koti and Raithal which were just 30 km away from the epicenter were completely unharmed while all the modern construction that dotted the area was completely destroyed. The big question was that how did the builders of these

structures figure out centuries ago that the area was highly seismic and then develop a technology that could withstand the movements caused by high magnitude earthquakes. The question needs more research and these structures need more protection and maintenance.

Conclusion

The issues specific to the case in discussion are as follows:

- (1) The wooden buildings of *Koti banal*, kath khuni style are not protected by any common heritage policy specific to type of architecture which talks about the preservation and maintenance of indigenous heritage and the communities related with it.
- (2) Lack of knowledge about heritage amongst local communities and pride for their heritage, as newer generations are more aspired by the modern lifestyle of cities and often migrate abandoning their heritage.
- (3) No Laws in place means no long-term planning for improving the context and economics of these indigenous places resulting in haphazard mushrooming of structures within the historic settlements hence damaging their aesthetic value overtime and also impacting the general condition of infrastructure which falls below livable condition overtime.
- (4) Prolonged non-maintenance and neglect has taken its toll and many of them have turned structurally unsafe to be put to human use, due to a number of factors like :
 - a) Poverty as there are no subsidies/incentives for maintaining such heritage,
 - b) Scarcity of wood as most of the forest cover has already been lost and there are no regulations for maintaining forest supplies for upkeep of such settlements,
 - c) Lack of skilled artisans and no regular maintenance and general living inconvenience due to which more and more people are leaving for a life in the cities.
- (5) There exists no formal documentation of the settlements and the structures that exist, although some of it has been documented by researchers and historians
- (6) The repairs and maintenance that happens is more cosmetic as the skilled craftsman are hard to find, due to which more harm than good happens to these centuries old structures.
- (7) Such settlements are rooted to their settings and should be conserved as a whole but sadly modern constructions and developments threaten their very existence.
- (8) Absence of a planned sustainable development model for tourism and other activities as it holds potential of being developed as eco-tourism sites.
- (9) Lack of motivation and support for trained craftsman to carry forward traditional knowledge.

A major chunk of India's heritage in the indigenous regions with the indigenous communities is still undocumented and remains to be researched upon and rescued. Sites comprising of indigenous settlements and communities, petroglyphs, historical artefacts etc. are often destroyed unknowingly during infrastructure development or construction activities due to lack of knowledge and proper laws with regards to its management.



Fig 13. Someshwar Devta Temple at Mukhba after being painted with synthetic paints and cosmetic additions

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INTRODUCTION

The current Osmania University College for Women (OUCW) in Hyderabad, was once known as the British Residency. The British residency complex comprises Durbar Hall, the main residence for the British Residents and many other heritage ancillary structures like servants' quarters, barracks, gardens, cemetery, gates, etc. The construction initially took place between 1803 and 1806 under the direction of James Achilles Kirkpatrick, the fifth British Resident to Nizam's Government. Subsequent Residents expanded and developed the Residency complex over time. The Nizam oversaw periodic building construction and interior refurbishments. The architecture of the Durbar Hall showcases a Palladian or Neoclassical style, adorned with English furnishings sourced from London's Carlton House, the former residence of the prince Regent. Some of the building materials such as I sections, floor tiles, and metal ceiling panels were imported from England. In 1949, as the British departed Hyderabad, the decision was made to hand over the Residency Campus to the Women's College of Osmania University, which was established in 1924. Since then, the Residency buildings have been subject to ad hoc modifications and adaptations to suit the needs of the Women's College. Following its nomination to the World Monuments Watch List, a conservation management plan was developed for the complex, leading to the commencement of the restoration of the Durbar Hall in 2015.

CHALLENGES

This report focuses on the challenges encountered throughout the execution of the restoration of historic wooden components of the British Residency in Hyderabad. The issues identified are interrelated and hence need to be looked at together.

Organic Nature of Wood and Accelerated Deterioration

British Residency is a composite structure consisting of stone and brick masonry along with wood. The organic nature of wood meant that it reacted sensitively to changes in its environment, making it more prone to decay and deterioration compared to inorganic materials like stone, brick and metals. These issues arose from a variety of factors, including prolonged environmental exposure, infestations by termites and other pests, and destructive fungal attacks. This vulnerability added an extra layer of complexity to the conservation and restoration efforts for wooden components in British Residency. The lack of maintenance also took a greater toll on historic wooden components leading to significant deterioration. Without proactive maintenance, even minor issues escalated into extensive structural problems. Changing weather patterns and increased humidity levels in certain areas further accelerated the decay and degradation of the historic wooden components.

A significant number of historic wooden members serve as structural members embedded within or supporting the masonry. As a result of all of the above factors, wooden members deteriorated faster than the masonry structure. Due to severe deterioration in situ repair of these members was not possible in most cases. Therefore, the restoration of the historic wood required careful dismantling and subsequent reconstruction of the surrounding historic masonry, which could have otherwise been repaired in situ.



Rotten wooden joists



Deteriorated wooden panels supporting papier mache ceiling

Characterization and Sourcing of Historic Wood

Historic flooring in Durbar Hall consisted of plain teakwood boardings and a distinctive parquet border comprising of plain as well as black wooden pieces. While a few pieces from the parquet border showed severe signs of deterioration and decay, many pieces were also missing. Geometric patterns and existing wooden pieces from the parquet border were examined to determine the restoration approach for missing wooden pieces. Upon initial visual inspection, it seemed that the black wooden pieces belonged to a distinct wood species; however, the species of this wood could not be identified. Although the species was speculated to be ebony, no archival records or local flora substantiated this hypothesis.

Finding suitable wood of a similar species and quality as the original, especially if it is rare or not readily available, proved to be difficult. Consequently, a decision was made to match the historic pieces by transforming teakwood pieces into ebony counterparts through the application of black colour.



Process of restoration of a parquet border

Restoring severely deteriorated wood, ensuring integrity but compromising authenticity

With the collapse of the beam supporting the Madras terrace roof in the Western Oval Room, the project team was faced with the decision of whether to replace the beam with a new one or repair and reuse as much of the beam as possible. After a thorough examination of the condition of the old beam, and discussion with structural experts and carpenters, it was concluded that the good parts of the old beam would be reused to the maximum possible extent and new wood will be added to it to complete the beam to the required size.



Retrofitted beam

A similar methodology was followed while conserving other wooden building components as well; however, the approach had to be adapted as per the context, significance and condition of wooden members. This was particularly critical in cases of structural members. The following order of approaches was used.

1. Retrofitting historic teak wood using recycled teak wood and/or new wood (used in the case of the mentioned beam)
2. Replacing historic teak wood with recycled or new teak wood
3. Replacing historic teak wood with recycled or new other easily available species
4. Replacing historic teak wood with I-sections and other materials



Retrofitted beam in place

It was realized that due to the severe condition of wooden members because of their organic nature and affordability and availability of teakwood, approaches 2 and 3 were exercised more. This ensured structural stability and sustainability and affordability but did compromise on authenticity to various degrees.

In the instance of the mentioned beams, they were retrofitted and reused. As time passed, cracks appeared in the roof above. To provide extra support, I sections were introduced. These additions kept the original beams in position but made them functionally unnecessary. This led to exercising approach 4 more in the following conservation strategies.



Additional support of I sections added to the system of wooden beams



I sections being used to replace

Authenticity vs Sustainability

The restoration journey of the historic wooden members prompted a contemplation regarding the balance between sustainability and authenticity. As the restoration process unfolded, the fundamental question emerged: What holds greater significance, the preservation of authenticity or the embrace of sustainable practices? The restoration process extended beyond just material choices.

1. Procuring specific wood species from far away - Obtaining particular wood species from distant locations with the aim of replicating the original historic wooden elements might not align with sustainable conservation practices. While the intention to maintain historical authenticity was there throughout the project, several ecological and environmental factors warrant consideration when evaluating the viability of such an approach.
2. Forests as part of the supply chain for timber - Wood is the only significant building material that is grown, however growing and processing wood for construction is a tedious process. Trees, the primary source of wood, require a considerable span of time to mature. The potentially deleterious consequences of excessive deforestation and indiscriminate tree felling for construction purposes become evident when scrutinizing the principles of sustainable conservation. These practices can lead to deforestation, a phenomenon marked by the widespread removal of trees without allowing for adequate natural regeneration.

Lack of Expertise and Craftsmanship

The process of reviving the Residency's historical grandeur required craftsmen who possessed an understanding of traditional woodworking techniques. However, identifying such skilled carpenters proved to be a challenging task. Various strategies were employed to address the shortage of skilled carpenters. Collaborative efforts were initiated with local vocational schools and artisan communities to identify and train individuals who displayed a keen interest in traditional woodworking. The recruitment of skilled carpenters from neighbouring regions was also explored.



Carpenters reproducing missing wooden posts

Achieving Uniform Surface Finishes – Aesthetic Dilemmas and Preservation

Stripping away numerous layers of later-added paint from historical wooden members posed a challenging task. **This process frequently resulted in unintended harm to the wood's surface during the cleaning process.** Varied approaches were required for distinct surfaces, influenced by factors such as their placement within the building (whether internal or external), the functions of the wooden components, and the number of paint layers to be removed.



Different techniques used for removing multiple pain layers

Achieving a match between the restored surface finish, whether it was paint or polish, and the historic original presented a complex task. This difficulty arose from factors like restored and retrofitted areas, whether the surface was inside or outside, and the direction it faced (such as the southern facade getting discolored from sunlight).



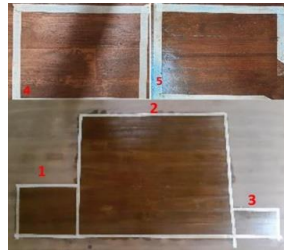
Samples for final coat for louvers



Louvers Southern facade



Process – Finishing layer of flooring



Samples for final coat for floor

Lack of documentation of conservation works for reference

As mentioned above, wood deteriorated faster than non-organic materials, leading to more frequent restoration. However, earlier repairs and restoration were carried out in a disorganized manner, only when necessary, without considering long-term conservation. We noticed that various parts like floors, doors, and windows were fixed or swapped with different types of wood, but there were no records of these actions. We only discovered these changes during the restoration process, without any documentation. Developing a conservation plan was tough because we didn't know when the changes were made, what kind of wood was used, and how to improve upon past fixes without reversing them.



Earlier repairs – Wooden piece painted black to replace original colored wood

CONCLUSION

In conclusion, the restoration of the historic wooden components of the British Residency in Hyderabad posed a series of intertwined challenges. The Residency's composite structure, combining wood with stone and brick, highlighted the organic nature of wood, rendering it susceptible to decay and environmental changes compared to inorganic materials. Factors such as prolonged exposure, pest infestations, and fungal attacks complicated the restoration process, exacerbated by the absence of proper maintenance. This fragility necessitated careful dismantling and reconstruction of wooden components amidst the masonry. The quest to restore authenticity while ensuring sustainability raised fundamental questions about the balance between historical fidelity and environmental responsibility. The shortage of skilled craftsmen, achieving consistent surface finishes, and the absence of documentation further added to the intricacies of the project. Ultimately, the restoration effort highlighted the challenges of preserving history while adapting to modern concerns.

Heritage Restoration as part of Traditional and Vernacular Construction Technique Transmission in Indonesia

Galih Sekar Jati Nagari

Heritage restorations (or revitalization or rehabilitation) in Indonesia are mostly conducted by central and local government. This involves participation and cooperation with experts from different disciplines such as archaeologist, architect, engineer, chemist, etc. to craftsmen including stonemason, carpenter, and brickmason. It starts from preparation, work, and evaluation. Those involved experts and craftsmen can be part of governmental staffs or outsourced persons. The persons who will be participated are professionals and skilled in their own field.

Heritage restoration in Indonesia usually divided base on the main material or component of the heritage construction, i.e. stones, woods, and bricks. Heritage restoration for wooden architecture as well as the other component construction involves skillful staffs including carpenters. They were recruited by our agencies in the Directorate General of Culture from several restoration projects to become regular employees. They can recruit more craftsmen to participate in the project if necessary. There is different mechanism for heritage restoration conducted by local government agencies. Because they don't have competent employee, they usually ask our agencies for assistance and collaboration, or the usually use third party companies to conduct the restoration projects. The companies have to be independent, they can hire experts and skillful craftsmen.

As mentioned before, those craftsmen who involved in wooden heritage restoration are skillful persons in their field. They gain their expertise of carpentry from experience or transmitted from generation to generation. Most or probably all of them don't get those knowledge from formal education. The common carpentry works in Indonesia related to transmission. The craftsmen will bring their relative to assist them and to become apprentice, and from the projects they can transmit the knowledge. As well as in the professional works, seniors will do the guidance and ask juniors to assist them during the restoration. The mechanism of carpentry works especially in wooden heritage restoration can be contributor in the safeguarding of transmitting traditional technology.

Case Examples in Yogyakarta:

1. Rehabilitation of *Dalem Prabeya*

- traditional Javanese construction, part of Yogyakarta palace complex, built in 1916 and still functioning as palace's royal kitchen
- the project was conducted by Regional Office for Cultural Properties Preservation in Yogyakarta Special Region Province in 2016
- semi-major restoration, repaired damage on the roof that can lead further damage to other parts of the building
- involved senior and junior staffs and an outsourced carpenter
- several senior staffs were carpenters before joining the agency



*Picture 1. a senior staff demonstrated how to replace girders by lifting the roof
Source: Regional Office for Cultural Properties Preservation, 2016*



*Picture 1. a senior (carpenter) worked together with a junior staff for replacing ceiling braces
Source: Regional Office for Cultural Properties Preservation, 2016*

2. Rehabilitation of Grhasia Hospital *Pendhapa*

- a modern vernacular building from 1930s, part of a hospital in Sleman Regency, Yogyakarta
- the project was conducted by Cultural Agency of Yogyakarta in 2018 with a third party company
- semi-major restoration, repaired damage on the roof that can lead further damage to other parts of the building
- the company involved skillful carpenters or craftsmen both seniors and juniors
- they also competent for building traditional Javanese house, and took part in several restoration projects in Yogyakarta palace



*Picture 3. skillful workers demonstrating replacement of new girder
Source: Galih Nagari, 2018*



*Picture 4. skillful workers demonstrating replacement of new rafter
Source: Galih Nagari, 2018*

Issues:

1. The safeguarding of traditional or vernacular wooden buildings have not been a major concern for many heritage experts. Most of traditional wooden buildings being safeguarded are grandiose architecture related to religion and palaces, other buildings such as common or communal houses haven't been considered as part of tangible heritage. Traditional technology including wooden architectures are mostly part of intangible heritage inventory. Central and local government can facilitate heritage restoration projects. In this case, due to the lack of designation and concern of vernacular wooden buildings as tangible heritage, they don't have base to initiate the projects.
2. New system doesn't allow each agency to recruit staff by its own, then agencies can't enlist certain competent workers depends on their needs.
3. Central and local government, as well as other institutions often conducted heritage restoration with community participation. But the availability of skilled carpenters or craftsmen are decreasing. It is hard for governments or other institutions to find craftsmen from community and to learn about their knowledge.

General Recommendation:

1. We need to follow up regulation for heritage restoration and conservation to put in traditional knowledge and community participation by making guidelines or standard operating procedure.
2. Cultural agencies or any institutions need to engage communities or competent outsourced craftsmen as part of their traditional heritage restoration projects. By participating, agencies and communities can learn together about the knowledge of traditional buildings. Youngsters from community or agencies can be involved and get the experience from senior craftsmen, then the knowledge can be transmitted.
3. Conducting more technical training for young professionals in heritage restoration with detailed workshops and include traditional knowledge as part of the learning material.
4. Many communities today prefer modern materials and technique to traditional or vernacular wooden construction, then the craftsmen change their skill and can't transmit their knowledge. To prevent the extinction in this urgent situation, cultural agencies need to conduct more detailed documentation or records of traditional building knowledges in every area in Indonesia, including the oral knowledge, practices, even the rituals. If there is absence of any particular tradition, it can be revived.

Traditional heritage can belong to both tangible and intangible heritage and need to be safeguarded. It's not necessary to differentiate them. Experts need to think more holistic to preserve wooden heritage because it is not only about the physical elements but there is also traditional knowledge lie in it. Transmission of traditional technology occurs during heritage restoration works. Thus, restoration of wooden architecture as traditional or vernacular heritage conducted by cultural agencies can be a great way to safeguard our heritage.

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Issues and Needs Identified in the Restoration Process of Ali Qapu Mansion in Meidan Emam World Heritage Site (Iran)

Atefeh Amraei

Ali Qapu Palace (or Ali Qapu mansion) is one of the important historical elements located in Meidan Emam. This building was gradually built between 1617 and 1659 by Shah Abbas I in six floors. The restoration of the pillared hall of Ali Qapu was done in different years, starting in 1964. Continuing the previous measures, the restoration and strengthening project of the pillared porch of Ali Qapu was carried out from 2005 to 2019 by the Meidan Emam World Heritage office under the supervision of the General Directorate of World Heritage Site and the Iranian Ministry of Cultural Heritage, Tourism and handicrafts. At that time, due to the significant worn-out of the wooden columns of Ali Qapu Hall, as well as the fractures created between the column and the capital and the aggravation of the situation due to atmospheric factors, there were noticeable structural problems that required immediate action. Because the lack of stability of the columns had led to the movement of the porch to the north. Considering that at the time of the project, the Disaster Risk Management Plan for the property was not prepared, it was necessary to assess the structural condition of the hall and prepare a preservation plan and stabilize the wooden structure. This work was done by a professional team in several stages, which included strengthening the wooden columns and their bases, cleaning and strengthening the wooden decorations of the ceiling, and rebuilding the wooden fences of the hall.



Picture1. Geographical location of Meidan Emam World Heritage site in Esfahan, Iran



Picture2. (Left) View of Ali Qapu Palace on the west side of Meidan Emam (Source: Meidan Emam World Heritage Office archive) Picture3. (Right) 3D model of Ali Qapu's pillared hall (Source: Meidan Emam World Heritage Office Archive)

The main problems and challenges identified regarding this building are summarized in the following table:

Table 1: Identified problems and needs regarding the wooden structure of Ali Qapu's pillared hall

Problems	Needs
Structural Factors	
Instability of wooden structure	Reinforcement of worn wooden columns
Exhaustion of wooden columns and insufficient strength	
Natural Factors	

Problems	Needs
Climatic changes and the expansion and contraction of wooden structures due to extreme cold and heat	Using protective layers Controlling the climatic factors
Atmospheric factors such as rain and dust	
Human Factors	
Crowd of visitors and increased risk of destruction of structures	Controlling the number and behavior of visitors and continuous monitoring
Lack of fire extinguishing system in case of fire	Development of Disaster Risk Management Plan
Biological Factors	
Biological degradation of wooden structure of the roof due to the activity of termites	Repairing destroyed structures and preventing the activity of termites
The presence of birds and damage caused by droppings on the ceiling decorations	Non-invasive and nature-friendly methods to prevent bird nesting like using passive elements
Biological factors and their silent activity, such as insects, wood-eating beetles and termites	Biological control of insect attack and biological protection Removing the basic need of insects
The destruction of wooden decorations and paintings	Continuous restoration of decorations by removing the destruction factors and using protective layers
The loss of the Layeh-Chini decorations on the columns and the lack of sufficient evidence for their restoration	More investigation is needed
Pests' resistance to pesticide	Integrated Pest Management (IPM)

1- Structural problems, including the lack of stability of the columns and the porch structure: The strengthening of the wooden columns of the porch was successfully completed as one of the most complex stages of this project. This work was done by taking down the desired columns with protective and security measures and carving and emptying the inside of the column and installing an iron beam inside it in order to strengthen the column, correct the bending of the column and install it again. In addition, due to the column destruction and subordination corrosion under the columns and the subsequent settlement of the columns and the roof, these parts were strengthened by creating a resistant foundation.



Picture 4, 5, 6, 7, 8: Restoration and strengthening of wooden columns (source: Meidan Emam World Heritage Office archive)

2- Natural problems caused by climate change: Due to the intensification of climate changes in recent years and the abnormal increase and decrease in temperature, the process of contraction and expansion caused by temperature changes damages the structures and wooden decorations of the hall. Also, the rain and its penetration from under the roof causes damage to the wooden decorations and the roof structure through gradual decay. This issue can intensify the activity of biological factors.

3- Human problems: Meidan Emam of Esfahan is one of the most visited historical monuments in Iran, and many domestic and foreign tourists come to visit it every year. It seems that due to the age of the building and the vulnerability of the decorations, paintings and wooden columns, the number of visitors to the Ali Qapu mansion needs more control and supervision. In this regard, the need to develop a Tourism Management Plan is strongly felt. In addition to this, the building is exposed to risks such as fire, which is

still being protected with fire extinguishers, and due to the large number of tourists, this issue can be very dangerous. In 2021, a draft of Disaster Risk Management Plan for Meidan Emam has been prepared, but it has not yet been implemented. Apart from this, the placement of this property in the urban context has exposed it to all kinds of development and damaging projects.

4- Biological problems caused by the activity of insects and bird droppings: one of the biggest challenges that the Ali Qapu building is currently dealing with in terms of wooden structures and decorations is the activity of insects, especially wood-eating beetles and termites, which seems to be in a poor controlling condition. Despite the structural repairs, the existence of these insects is destroying the wooden columns and the roof structure, causing the instability. Measures have been taken in this regard, but none of them have been effective so far. These damages are especially detected during the restoration of decayed parts. Due to the historical value of the Aali Qapu's roof, and the use of plantain wood and colorful decorations and luxurious gilding, it is unfortunately not possible to separate, treat and re-install it. In addition, the use of insect controlling methods such as spraying and injection of poison is not effective due to the depth of penetration of the insect. Also, due to the dust in the city of Esfahan and the atmospheric factors, the existing solutions are not responsive, so currently, no suitable treatment has been found to solve this problem. Moreover to the issue of pests, nesting of birds or their droppings also damages the decorations and appearance of the roof.



Picture 9 and 10: Holes and damage caused by pest activity (source: Meidan Emam World Heritage Office Archive)

According to the stated problems, I have concluded the following needs:

Requirement 1: Implementation of the Disaster Risk Management Plan (DRMP): One of the problems that has led to more exposure of the property to the risks is the lack of implementation of the Disaster Risk Management Plan. For this reason, it is necessary to implement the risk mitigation program, including reducing the risk of fire or monitoring development activities, with the cooperation of institutions such as the municipality and the fire department as soon as possible. Also, it seems that attention to the current conditions of the property and the risks caused by biological factors should be specially seen and reviewed in the DRMP of the property. The immediate action in this regard is strongly needed.

Need 2: Biological control of insect attack and biological protection: due to the complexity, extent and worsening of the problem of the presence of wood-eating beetles and termites, the formation of a professional and specialized team in this field and the use of experienced domestic and foreign consultants are strongly needed. In this way, the type of pests and damages can be accurately identified and appropriate treatment can be started. One of the basic needs of this work is to identify an effective substance that can prevent the penetration of insects and moisture by stabilizing the top layer of the wooden elements.

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Issues faced in the preservation and revitalization of Wooden built Heritage in Kiribati:
Case study – Preserving and Reviving Maneaba in South Tarawa.

Tawake Eriata

The ‘MANEABA’ is a traditional meeting hall for I-Kiribati and it is a great architectural work of I-Kiribati ancestors. A traditional maneaba has a huge roof formed from coconut and pandanus woods, held together with coconut string. It represents traditional features of creativity, both in architectural form and structural design. It also portrays many types of unique traditional artwork, skills and culture for Kiribati such as local bindings, weaving and building skills, and a traditional leadership system known as ‘te maneaba system’. In Kiribati culture, the building (called ‘Te maneaba’) is very unique and common in all islands but the architectural form and structure is vary depending on the skills/knowledge specifically from a family or village. It has cultural significances that related to the customs and cultural norms on the island.

Brief background of the case study – Tokanuean Auriaria maneaba, Eita – South Tarawa

Tokanuean Auriaria maneaba is the only place on the island to perform a traditional welcoming to guest and a ritual practice known as ‘katoka bunna’ (protection from spirit effects). A place for cultural festivals and for elderly to meet for decision-making.

Since the early nineties, the building was constructed in its original architectural form and local structural design. It constructed using local materials and traditional skills and knowledge, as well as cultural practices associated with. People of Eita village continue to engage and respect the traditional leadership system and traditional customs of this mwaneaba. The property is well maintained and preserved through regular maintenance from a responsible family known on the village, with the support of village members. Elderly or unimwane of the village are involved in the management such as reconstruction planning and enforcing the traditional laws of Eita village.

Unfortunately, later in 1980s people from outer islands migrate to South Tarawa (urban area) and Eita was becoming overpopulated by mixed people with their own cultures. People living on Eita are not interested to participate in the preservation of Tokanuean Auriaria maneaba and so the deterioration of this building has increased. In 2019, the building was completely collapsed. Since then, the government encouraged local people in Eita village to revive this tangible heritage including intangible heritages associated with. In 2022, the reconstruction work was done.



Issue #1: Lack of community participation in restoration work

The restoration work for the maneaba usually carried out by locals in every three to five years. The activities involve replacing old thatches with new ones to protect local timbers from exposure to heat and wet. In the past, the timbers can remain strong within almost hundred years if maintenance to local thatches was done regularly.

In the case of restoration activities for Tokanuean Auriaria maneaba, the involvement of local communities has become a major issue since people have lost interest to participate, given that the majority of people living on Tarawa came from different islands.

On the other hand, due to the lack of support from community members, local architects locally named as “taan kateitei” would feel demotivated and think that their skills and knowledge were useless. This may result in the lack of interest for knowledge holders in restoration or reconstruction activities.

The government through its three sectors, Ministry of foreign affairs and immigration, Ministry of infrastructure (carpenter division) and Ministry of internal affairs through the culture and museum division are now responsible for the maintenance and restoration work of this built heritage. Government representatives led by the culture office engaged locals from Eita village and knowledge holders to work together in the planning and implementation phases to restore this unique building and to maintain the intangible heritages connected to it.

Issue #2: Reconstruction of built heritage - loss of authenticity

Another major issue is the change to the original structure and features of the maneaba building including materials used for construction and its value to the community. A traditional maneaba is not just about the building design but more importantly is its cultural values and its purpose for promoting peace and stability at the community level.

In South Tarawa, only in Eita village that the maneaba was constructed in traditional architectural skills with local materials while in other villages, maneaba were changed to contemporary or modern designs. In the 1990s, local maneaba in almost all villages on South Tarawa have been demolished given the fact that people could not able to provide new local thatches to preserve the local timbers, which causes the timber to rot from being exposed to heat

Kiribati

and excess moisture. During these times, the reconstruction plan has been changed as elders with members of local communities decided to construct a modern maneaba. As a result, tangible heritage and cultural practices were lost. The current situation is that most of the maneaba on South Tarawa were built with imported materials and used for church gatherings and parties, except for Eita village.

The original and local structure:



The new modern structure:



The maneaba in contemporary or modern structures and features are not authentic. The cultural significances of the built heritage with cultural practices associated with the traditional procedures of constructing the maneaba have lost. These includes the intangible heritages such as architectural skills, weaving and binding skills and cultural festivals.

Recent activities for preservation and revitalization of wooden built heritage led by the Culture office is focussed only on traditional Maneaba such as ‘Tokanuean Auriaria maneaba’ in Eita village and ‘Te Umanibong maneaba’ located at the Museum compound. However, the challenge faced is the conflict between local builders (knowledge holders) and Architects from the government sector (those who graduated with architectural modern skills/knowledge). Local architects felt demotivated to work with government architects thinking that their skills/knowledge are not considered and undermined. This would result in the delay of restoration or reconstruction work and the lack of interest by local architects in the activities.

Issue #3: Poor Documentation and Transmission of traditional architectural skills and knowledge

It is a concern that the documentation of the complete traditional procedures for building the maneaba is very poor. In the past, knowledge holders transmitted their skills through informal verbal transmission and hands on practical training within their family or village. The documentation through video producing is a new method and some knowledge holders would not accept this. In some instances, it is a cultural taboo that knowledge holders must not share their skills/knowledge for it is a family secret. They have to follow the traditional protocol or rules for sharing these unique skills.

Therefore, it is a challenge we faced now that documenting these traditional architectural skills and knowledge are not that easy. Another issue is that the information we currently have in the museum library are not complete and need further work to complete.

Needs to address the issues:

Establishing a management plan for preservation and revitalization of wooden built heritage

The need to establish a management plan or guidelines for preservation and restoration activities, and to conduct a proper consultation to local communities and other bodies that may involve in the planned activities, in order for them to understand their roles and responsibilities. This is important to ensure that the implementation of planned activities would goes smoothly and achieved.

Support for collaboration between local builders and government architects

This is indeed required given the current situation where the conflicts is always happen between local builders and government architects throughout the restoration work to the Maneaba and even during the community consultation for preservation of the maneaba in South Tarawa and also in outer islands. The Ministry of internal affairs through the culture and museum division would encourage architects from the Ministry of infrastructure to respect the traditional values and methodologies for the maneaba construction and to motivate local builders and appreciate the value of their skills and knowledge.

Capacity building

A formal training is needed for culture and museum staffs to learn and acquire skills and knowledge related to preservation, conservation and managing of wooden built heritage and other necessary skills so they can apply in their work. This is also important so they can share with knowledge holders and locals who may involve as they are the government sector that lead these activities at the national level.

RESTORATION OF WOODEN STRUCTURE “CASE OF ROYAL PALACE MUSEUM OF LUANG PRABANG ”

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Ministry of Information, Culture and Tourism Lao PDR

1. OUT LINE HISTORY OF THE PALACE BUILDING

The Royal palace was built between 1904 and 1909 as a residence for King Sisavang Vong and his family. The building was commissioned by the French colonial administration to enhance the loyalty of the king and to ensure the continued French influence in the region. By the 1930 s the palace appeared at its best in keeping with the original design intentions, providing maximum comfort to the royal family in the warm tropical climate.

When king Sisavang vong died in 1959, he was succeeded by his Sun Savang Sattana. Subsequently, in the course of a few years several alterations and additions were made to the palace. A subsequent period of modernization took place in 1968 on which occasion ‘glass bricks’ were put up in several places blocking the original arched opening of the ground floor porches. As a matter of more prominence and were prestige the stair and open terrace in front of the main wing were covered with marble flags.

During a short period from 1958 to 1960 the exterior facades were color washed with a pale ochre hue, possibly as an effort to subdue the glaring reflections of bright sun light from the otherwise white washed facades. On the front facade the stone revetment has been washed with cement giving a dull gray appearance.

As a result of more recent repair works the top of the spire was renewed in 1976 after storm damage. In 1990 the gutter and fascia boards a long the front of the main wing was renewed, unfortunately not matching in colour and detail with the original structure.

The compound of palace, taking up an area of about 35.000 square meters, is surrounded on call four sides by a high brick wall, plastered and regularly white washed, at least towards the main streets.

- The former Boat House, adorned with the royal symbol of three elephants at the pediment, is situated immediately outside the palace compound on the backside overlooking the Mekong. Unfortunately, this attractive building is presently used as rather inferior store rooms.

- The ‘winter ‘house and the tennis court date from the period of modernization. Built as a simple structure and roofed with corrugated asbestos sheets, the building has no particular architectural merit. likewise the kitchen building, the staff housing , the garages and maintenance building as well as the guard’s quarters are constructed between 1963 and 1975 as reinforced concrete structures in a rather simple design. These economy building are not included in the actual restoration project, but properly

maintained, they compose an indispensable part of the total museum environment providing of the museum.

- The Luang Prabang conference hall, situated in the southern corner of the palace compound, was originally intended to become the reception hall for the coronation of king savang vattana, but the ceremony was preceded by 1975 revolution. The conference hall is now used for public meeting and conferences.

2. THE RESTORATION PROJECT

Considering the complexity of restoration plan which presented by the Department of museums and Archaeology, ministry of information and culture, the restoration work for the Royal Palace Museum of Luang Prabang which funded by SIDA (Sweden) was conducted in 1992 – 1995 and the main duties of this project were:

2.1 The roof structure

- Existing roof tiles, handmade from clay were taken up from the roof slopes and put back in place. The surveyor was direct that each tile was handled with great care and cleaned mechanically with a hard brush to eliminate lichens, possibly in combination with diluted ammonia, horticultural tar or a similar toxic wash. As many as 30 % were in need of replacement by new tiles of equal format, color and texture. A test area was set the standard of required replacement and the contract was adjusted accordingly. Old tiles have been used on outward facing roof surfaces and new tiles mainly on the surfaces turning towards the inner courtyard.

- As plain tiles have ribs which enable them to be hung on the battens nails not generally used. However, at corners above overhanging eaves in very exposed situation every third course of tiles have been applied with corrosion resistant nails two nails in each tiles, to avoid misplacement due to wind pressure

- Once the tiles have been stripped from the roof a thorough investigation can be carried out of rafters and battens. Insect Infected timber or fungal decayed members have been treated with liquid insecticides and fungicidal solution. The surface have been flooded but without causing excessive off causing staining, special attention was required to all timbers embedded in positioned near a wall. Structural timber (hard wood “Mai Du”) in need of replacement have been calculated and accounted separately on approval by the site architect. All new timber was hard wood and well seasoned.

- Cat walks have been laid out under the plane sloping roofs for inspection purposes and mounting of electrical wiring, altogether 185 running meters including two ladders to reach the roof above the throne Hall.

- All exposed and visible timber under the first floor eaves have been painted with oil based in traditional red brownish color. Existing paintwork which was still intact but was due for repainting have been washed with soap or detergent and water, and rinsed thoroughly with clean water. The surface was then be rubbed down with abrasive paper, rinsed clean before applying undercoat and topcoat. New joinery requires complete paint system including priming. It was Important that all End grains, edges and faces were properly coated.

- All timber that were exposed at gables and under eaves above first floor level have been treated twice with an colorless organic solvent preservation and ‘ teak oil ‘ to substitute loss of substance due to weathering and ultraviolet radiation.

- Any decayed and structurally weakened timber has been repaired, preferably by new timber to be sliced or scarpred to the original member.
- All ridges, his finials were repaired in traditional way by use of hydraulic lime mortar, lime cement mortar, subsequently were white washed and consolidated with clear lime water. All mortar fillets between the brick vertical surfaces and roof coverings have been repaired and renew with lime mortar that were allow certain elasticity. Existing cracks and fissures in masonry were raked out, cleaned and repointed. Gables and walls above plane sloping roofs were repaired in the same process when scaffolding was erected. Loose lime have been brushed down, plaster repaired, white washed and consolidated with two application of clear lime water.

2.2 Roof drainage

- The average life span of 14 gauge zinc sheeting of 40 years were sharply by many factors , such as bad craftsmanship and atmospheric pollution, to about half of this period. The actual condition of zinc requires complete renewal. Any work that involves gutters, valleys, downpipes and flashings in zinc was the professional craft of a plumber, not generally found in Luang Prabang.
- Stripping off the fabric of existing gutters, valleys, zinc flashings and fascia boards have been punched below the possible. At best felt was recommended as an underlay for new zinc flashings allowing free movements from thermal expansion.
- All gutters, valleys and flashings have been renewed in the appropriate zinc. Defects in the construction have been adding a tie rod between the boards and the fascia by every 1.80 meters to secure half round gutter and fascia in correct position to prevent sagging when gutter is full of water.
- Screen or strainers to prevent debris from clogging leaders have been put to use.
- Fascia boards were replaced.
- Valley gutters of zinc were renewed. Existing timber boarding have been examined for any sings of decay before new zinc sheeting was applied.

2.3 Central spire and pediment above main entrance

- The extend of structural repairs of spire were determined after the scaffolding has been put up. Renewal of structural timber and cladding have been determined in liaison with the site architect.
- Loose varnish, paint and gold leaves were brushed away. Paint which was seriously decayed has been rubbed down with abrasive paper. Existing surfaces which was still intact but was due for new treatment were washed with soap to provide even and clean ground for application of gold leaves. Lacquering according to traditional methods by used of 'Nam Kiang' as a ground for application of gold leaves; early ordering and procurement required.
- The elephants and snakes (royal ensigns and symbols for the protection against any evil respectively) at the pediment have been coated with gold leaves in similar way according to established traditions, the setting treated with oil paint added traditional red pigments.

2.4 External facades.

- All gables and external facing above plane sloping roofs were repaired when scaffolding was erected for renewal of roofs covering. Rake out all old lime pointing form cracks and fissures, clean repaint; plaster to be repaired with lime mortar, surfaces white washed and consolidated twice with clear lime water.
- Red plastic paint was stripped off from the foundation wall. The surface brushed clean of loose plaster not adhering well to the backing, plaster repairs with lime mortar, color washing and consolidation of surface with clear lime water. Lower part of leaders of cast iron has been repainted with old paint matching color with the foundation walls.
- Brick paving surrounding the palace were repaired with cement, lime sand mortar to ensure that they remain watertight. Special attention was needed to faulty joints between vertical and horizontal surfaces to avoid water percolate foundation Extra storm water drainage required along facade of new extensions from 1963 (alternatively , renewal of bad repair work carried out after removal of former stairs to throne hall, obviously water become stagnant here due to insufficient slope towards storm water drainage).
- Champa trees growing to each side of the eastern stairway have been cut down and replaced with 'Nam kiang' and new gold leave foliage. Old varnish have been removed and rubbed down by abrasive paper to clean and even surface. Existing glazing repaired, repaired, new sprigs and putty.
- Main entrance double leave door : Removal of old varnish, hand scraping and grinding with abrasive paper to obtain clean and even surface for new treatment with 'Nam kiang' priming, undercoat and finishing coat with intermediate abrasion. Renewed of gold decoration according to existing pattern.
- Twenty two new iron grilles (lattice work) (mild steel) have been mounted in front of glazed window at first floor of main wing and extension in replacement of existing ones.
- All inward opening windows were furnished with drip nose (weather board) and weather brass bar to prevent wind blown rain to penetrate the interior.

Thank you very much

Townscape Wooden Cultural Heritage Conservation Challenges in Kampung Bharu Kuala Lumpur and Kampung Morten Melaka

MALAYSIA

Rohayah Che Amat

Kampung Bharu Kuala Lumpur, a long-established Malay town tucked within the bustling modern city, is a living witness to the clash of tradition and modernization. This town displays the continuing legacy of Malay architectural heritage with its array of traditional wooden dwellings. Kampung Morten Melaka, on the other hand, is located in the buffer zone historical centre of Melaka, UNESCO World Heritage Sites, and bears the echoes of multicultural influences portrayed its identity over generations. There are obstacles that these two places face in their efforts to preserve their wooden Malay cultural legacy. The complicated backdrop of urban development demands, shifting community dynamics, architectural integrity, and the requirement for sustainable utilisation necessitates novel preservation measures. The potential loss of cultural heritage sites such as Kampung Bharu Kuala Lumpur and Kampung Morten Melaka as a result of development pressures is a legitimate concern. Many historic regions around the world face the issue of striking a fine balance between maintaining these sites and accommodating urban expansion. While there is always a risk of cultural heritage being lost due to rapid development, it is also crucial to emphasise that awareness and attempts to conserve history are increasing.

Historical and Cultural Significance of Townscape Heritage

Kampung Bharu was founded as a Malay farming village on Kuala Lumpur's outskirts in the late 19th century during British colonial authority. The village promoted Malay culture and lifestyle. The Malaysian government developed a master plan for Kampung Bharu in 1956 to preserve its Malay culture while adding modern facilities. A 2004 redevelopment plan sought to modernise Kampung Bharu with high-rise structures and commercial centres. The project was opposed by citizens worried about losing their culture. In 2011, the government created a comprehensive development plan to balance urbanisation and history. The design includes infrastructural modernization, green spaces, and historic housing preservation. The government established the Kampung Bharu Development Corporation (KBDC) in 2020 with the KBDC Act 2011(Act 733). The KBDC coordinated development and cultural preservation. Development activities focus on preserving Kampung Bharu's culture and improving infrastructure and services. Community engagement is stressed to ensure citizens' perspectives are heard in planning. Kampung Bharu development plans must combine modernization and historical preservation, address land ownership issues, and sustain community cohesion despite changing urban dynamics.

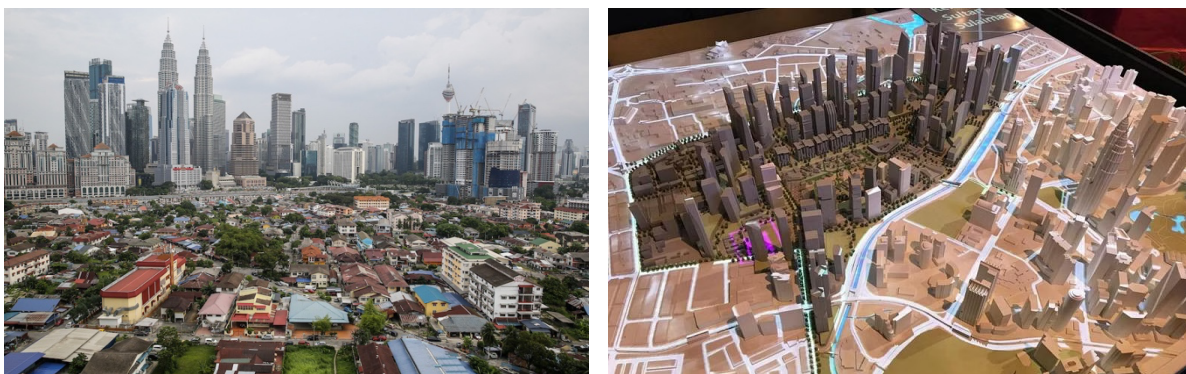


Figure 1 : Kampung Bharu's townscape setting (left) and development proposal for Kampung Bharu (right).

Source of photos : <https://www.pkb.gov.my/>

Kampung Bharu Kuala Lumpur, as a communal settlement for Malay agriculturalists is a testament to the tenacity of tradition in a city that is swiftly modernising. Its continued existence among Kuala Lumpur's skyscrapers is indicative of its cultural and historical significance. The wooden houses of Kampung Bharu, constructed on stilts to accommodate to the surroundings reflect the ingenuity of the Malay community. The dwellings' open layout promotes cross-ventilation, making them suitable for the tropical climate of Malaysia. The intricate wood carvings that adorn the houses are not merely ornamental; they also convey tales of local myths, beliefs, and social order. The cultural identity of Kampung Bharu is intricately intertwined with the

Malay way of life. Its communal spaces, such as the mosque and the market, foster cultural practices, religious rituals, and social interactions.



Figure 2 : Kampung Morten's townscape setting (left) and one of the traditional Malay house in Kampung Morten (right).
Source of photos : Malay Mail

As it explores viable development options, Kampung Morten has halted its progress. Urban dynamics impede comprehensive plan implementation, posing challenges. Kampung Morten has their own identity. Traditional Malay wooden house. This village is located in the midst of Malacca's cities, yet it retains its traditional characteristics, such as architecture, decoration, and landscape, among others. The majority of buildings are constructed from native wood and have a single-storey. Kampung Morten Melaka provides a glimpse of Malaysia's maritime history and cultural heritage. During the time of the Melaka Sultanate, this village, which is situated along the Melaka River, grew into a commercial area and residential. The wooden homes of Kampung Morten have gabled roofs, intricate embellishments, and louvred windows. These architectural features reflect both local craftsmanship and the influence of the colonial powers that occupied Melaka in the past. The homes are not static artefacts; they serve as living manifestations of the village's evolving cultural tapestry. The cultural significance of Kampung Morten extends beyond its architecture. The village's proximity to the once-bustling Melaka River trade route highlights its historical position as a hub of commerce and cultural exchange. The riverfront way of life and traditional activities continue to flourish, providing a link to the past while catering to modern requirements.

Wood is fundamental to Malay traditional architecture, symbolising the culture, environment, and technology of the region. The quantity and versatility of wood have left an attractive and practical architectural legacy. Malaysia's abundant forests and wood's versatility make it a viable building material. As a result, several Malay traditional building architectural styles have emerged. Wood's adaptability allows to express themselves while still building utilitarian buildings, from elaborate carvings that reflect cultural history to post-and-beam structures. "Rumah Panggung", or elevated stilt homes, are Malaysia's architectural identity. These stilt-raised homes are ideal for humid climates because they reduce floods, enhance circulation, and create open spaces below. Complex joinery in traditional Malay construction employs hardwood pegs for connections, demonstrating a commitment to environmentally friendly architecture. Malay culture and beliefs are depicted on wood for reasons other than practicality. Through rituals and community collaboration, traditions are integrated into building. The wood connection is imperceptible. It defines a nation by connecting nature, legacy, and identity. Wood art in Malay traditional architecture recounts stories, preserves culture, and leaves a legacy.

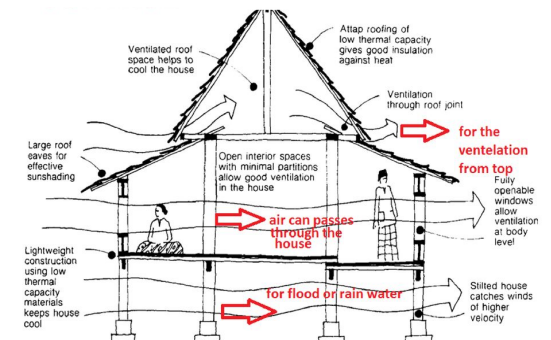


Figure 1 : Kampung Bharu's traditional houses (left) and Malay wooden house architecture (right).
Source of photos : <https://sg.news.yahoo.com/kampung-baru> (left); Lim, 1991 (right)

Envisioning A Sustainable Heritage Conservation Path Forward

Kampung Bharu faces complex issues as it embraces urbanisation while preserving its traditions. Maintaining its cultural identity while modernising is a tricky balance for the community. Metropolitan aesthetics threaten overshadowing Kampung Bharu's uniqueness. Development's rising property values could remove long-term residents due to unaffordability, unravelling the community's social fabric and breaking ancestral links. This shift could lead to commercialization in common places, undermining generations-old bonds. Economic factors may persuade locals to sell their properties to developers, changing the kampung's demographics and cohesion. To guarantee critical services continue, strategic planning is needed as urban infrastructure may buckle under metropolitan lifestyle demands. The environmental footprint is considerable, requiring judicious development to reduce pollution and preserve green places. During this process, conserving old wooden buildings is difficult since modernity could change or obliterate architectural heritage. The changeover may also attract wealthy people and change the neighbourhood. Community inclusion drives educated decision-making, solidarity, and avoidance of divisions to manage these complexities. Kampung Bharu can create a sustainable future that honours its heritage and embraces urbanisation by balancing growth and cultural preservation.

As it preserves its cultural heritage, Kampung Morten faces unique challenges posed by the changing urban environment. The combination of historical value and contemporary development is complex and requires thorough study. Its efforts to preserve its culture coexist with urban development. Modernization threatens to diminish the allure of Kampung Morten. It is difficult to preserve old wooden structures with intricate architectural details while meeting contemporary requirements. The delicate equilibrium between architectural heritage and contemporary comforts calls for distinctive approaches. Investment and development have the potential to alter socioeconomic dynamics and displace long-term residents. Among the challenges facing Kampung Morten is maintaining communal cohesion in the face of changing urban dynamics. As the state confronts these complex issues, community involvement becomes essential for inclusive, value-sensitive decision-making. Kampung Morten's unique blend of history, culture, and architecture demonstrates how to reconcile modernization and the past in the face of these obstacles.

Finally, the townscape heritage conservation in Kampung Bharu Kuala Lumpur and Kampung Morten Melaka elucidates the complex interplay between preservation, community participation, and adaptation measures. Townscape heritage conservation is important not just for the physical preservation of structures, but also for the preservation of history, identities, and cultural linkages. While there are problems, there is cause to be optimistic that Kampung Bharu Kuala Lumpur and Kampung Morten Melaka may be conserved for future generations to appreciate and cherish with concentrated efforts, strategic planning, and community involvement. The conservation of both case studies go beyond the physical structures; it safeguards the cultural practices and social bonds that define the community. The juxtaposition of Kampung Bharu Kuala Lumpur's urban surroundings with Kampung Morten Melaka's historical and multicultural milieu provides an intriguing lens through which need to analyse the various tactics adopted to assure the continued presence of these precious heritage sites.

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Conservation management problems on Bogd Khaan Palace Museum

Ariunzaya Batdorj

The imperial residence of the eighth Jebtsundamba Khutughtu Bogd khaan's "Green palace" is built between 1893 and 1903, located in capital city Ulaanbaatar Mongolia, it has 20 objects that's inscribed on the Mongolian heritage registration information list. In 1924 this palace turned in to Mongolia's first museum after Bogd khaan died. In 2022 Ministry of Culture initiated 3 of building to restore project because several buildings were restored only once in 1974, since then there had been issues about documenting and monitoring also maintaining management was not enough.

We focus on Bogd's winter palace which is timber framed building built in 1910. Wall made with horizontal wooden boards. This type of building is called Russian influenced built style. In early 1900 Russians started building this type of buildings, but until 2023 there's not much architectural characteristic significance research being done. One of the reasons that makes this building valuable is the historic value of the building. Bogd khaan lived there for 20 years with his queen. Balcony, its architectural style. Bogd khaan palace resembles an old capital city that was called khuree before socialism.



Pic 1. Site's location



Pic 2. Winter palace's location



Pic 3. Bogd's winter palace

In 2023 summer National center for cultural heritage (NCCH) of Mongolia and National research institute of cultural heritage (NRICH) of Republic of Korea had joint project for the Documentation of Architectural Cultural heritage continuing since 2014 in Bogd Khaan palace museum, I worked and participated training course in architecture team.

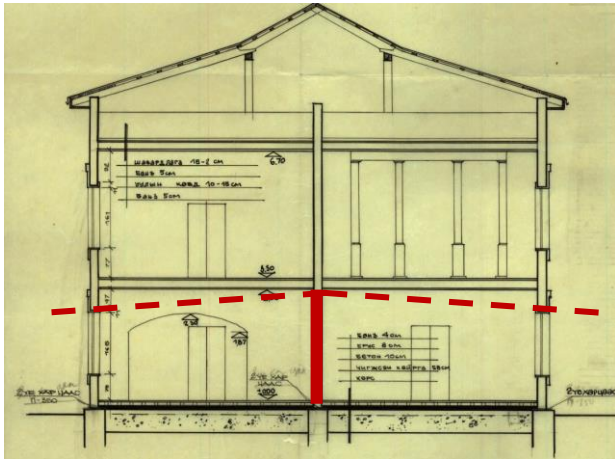
During the traditional method measurement we found some serious problems in this building:

Conservation management system problem:

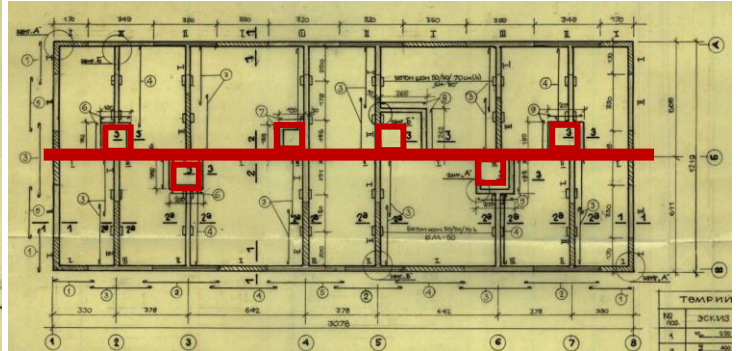
Mongolian government funding sources for heritage are not sufficient and our own conservation management system is not well developed. Heritage buildings are not maintained well under the Stalinist repressions in Mongolia and 1990 Democratic Revolution era. In 1972 first government department called Department for Historical and cultural monument restoration established and privatized in 1995. In 2020 the Government of Mongolia established Ministry of Culture, after that in 2022 Architectural heritage protection department established in National center for cultural heritage under Ministry of culture. Ministry of Culture now working on main conservation principles for the first time. If funds are embezzled or misused, heritage sites may suffer from neglect, inadequate maintenance, and lack of proper care. Over time, this neglect can lead to irreversible damage and deterioration of cultural heritages.

Building construction problem:

Building's west and east sides of exterior walls are sunked 100-150 mm, which has a serious negative impact on stability. Since it was built there was restoration project done in 1982. According to the restoration report they raised the west and east sides of the walls at once but didn't reinforce the foundation. It means there's serious problems with weak foundations because of harsh climate melting and freezing and low drainage system causes leaking and it makes land subsidence. Foundation traditional techniques are not use thick enough stone material.



Pic 4. Section



Pic 5. First floor plan

Center wall is not sink because this entire wooden building has 6 brick structure stove in center wall for heat the interior took all loads stable. Upper structure is wooden framed metal roof.



Pic 6. Rain water pipe with no drainage system



Pic 7,8. Painting of khuree, Sharaw 1912



A painting by Marzan Sharaw 1912 shows small blue barrels placed under the rain gutters of the Winter Palace (Pic 7.8). But now there is no gutter and drainage system. In Pic 6 there is plinth crack around a building foundation. Rain water and harsh climate could be main cause of wall sink.

The Utilization Management problem:

During the measurement there were excessive numbers of visitors 20-30 tourist every 30-40 minutes in a building can lead to negative impact on stability, which poses safety risks. Wooden floors were shaking, museum manager answered they only set limits on special event days in a year. In the event of an emergency, such as a fire or evacuation, overcrowding can impede the safe and swift movement of people, potentially causing injuries or fatalities.

There is no dedicated post for a separate building for the museum, as there are very few people working there. The treasurer documents the current situation and informs the Ministry of Culture.

For the museum main 3 buildings are under restoration. It's important for the museum that they should have their own authority to use museum income for conservation.

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1. Winter palace restoration report 1982, Department for Historical and cultural monument restoration
2. Documentation of Architectural Cultural heritage “Choiijin lama temple” 2019, National center for cultural heritage (NCCH) of Mongolia and National research institute of cultural heritage (NRICH) of Republic of Korea

Source:

Pic 1.

<https://www.google.com/maps/dir/Parliament+of+Mongolia+%D0%97%D0%B0%D1%81%D0%B3%D0%B8%D0%B9%D0%BD+%D0%B3%D0%B0%D0%B7%D1%80%D1%8B%D0%BD+%D0%BE%D1%80%D0%B4%D0%BE%D0%BD/Bogd+Khaan+Palace+Museum,+Bogd+Khaanii+Ordon,+Ulaanbaatar/@47.9100647,106.9064815,15z/data=!3m1!4b1!4m14!4m13!1m5!1m1!1s0x5d9692438c74ce17:0xd67030cf142c1b4d!2m2!1d106.9172868!2d47.9205896!1m5!1m1!1s0x5d9693b76a0c4c1f:0xbabf01c6008859b7!2m2!1d106.9070462!2d47.8973418!3e0?entry=ttu>

Pic 2. https://www.google.com/search?sca_esv=558536999&sxsrf=AB5stBivw0s8-T961dwWPxXR9gEtuhKIRA:1692527764275&q=%D0%B1%D0%BE%D0%B3%D0%B4+%D1%85%D0%B0%D0%B0%D0%BD%D1%8B+%D0%BE%D1%80%D0%B4%D0%BE%D0%BD+%D0%BC%D1%83%D0%B7%D0%B5%D0%B9&tbm=isch&source=lnms&sa=X&ved=2ahUKEwi02qWhheuAAxWTONAKHdodB_MQ0pQJegQIDRAB&biw=1920&bih=933&dpr=1#imgsrc=BnRkaquotI58OM&imgdii=Nz6AaPgvOoR0_M

Pic 3. Ariunzaya 2023

Pic 4. Архивн ерөнхий газар, Зураг төслийн баримтын архив, Богд хааны ордон музей 1974, 8

Pic 5. Архивн ерөнхий газар, Зураг төслийн баримтын архив, Богд хааны ордон музей 1974, 8

Pic 6. Ariunzaya 2023

Pic 7. Bogd khaan palace museum, winter palace, Sharaw 1912

Pic 8. Bogd khaan palace museum, winter palace, Sharaw 1912

Vernacular wooden built heritage in Kathmandu: Joinery System, Protection Challenges, and Preservation Strategies

Arpan Bhujju

Kathmandu, the capital city of Nepal, serves as the political, cultural, and economic center of the nation. Its name is derived from its ancient wooden buildings, “....which was originally and is still known among Newars¹ as Kathmandu, from (*kath*) ‘wood’ (of which material it is predominantly composed), and *mandi*, or *Mandan*, ‘an edifice, house, or temple’.” (Slusser&Vajracarya, 1980). These classical buildings are renowned for their intricate wood carvings and artistic sensitivity, reflecting the cultural and artistic traditions of Nepal. However, over time, many of these wooden structures have been lost, and the city now features a diverse range of architectural styles.

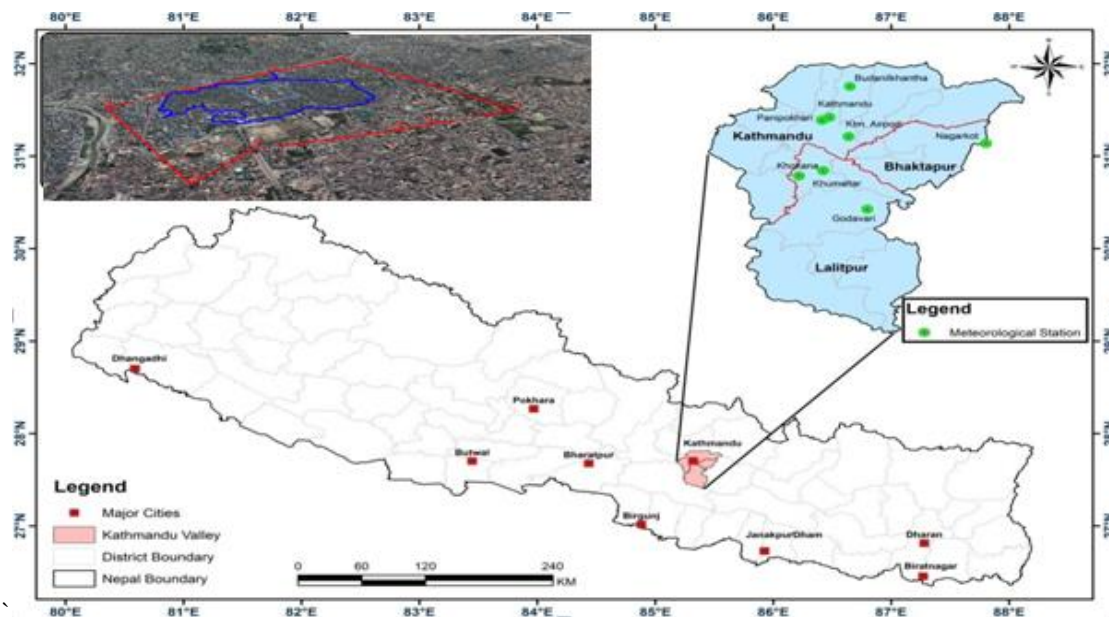


Figure 1 Location map of Kathmandu valley; the left inset map shows the geographical location of Nepal Source: (Ghimire et al., 2018)

The vernacular architecture in the city had been influenced by the environment, choice of materials, and craft activities. It differs from other Asian countries with similar cultures and traditions, primarily due to the prominent use of two construction materials: timber and brick. Classical construction rich in physical and cultural expressions, involves load bearing brick walls with secondary timber frames.

"Kasthamandapa," an illustrious exemplar of the traditional architecture found in the Kathmandu Valley, stands as Nepal's oldest heritage of wooden structures, dating back to the period between the 3rd- 7thcenturies A.D. Distinguished by its fusion of a wooden framework with finely crafted masonry walls, this iconic pavilion was ingeniously built using the timber of a solitary tree. The elaborate carvings adorning its pillars, brackets, and frames are a testament to the artistry of the era. The exceptional amalgamation of wood and masonry in this unique style serves as a definitive manifestation of the rich cultural heritage of the Newar civilization.

¹Newars are an indigenous ethnic group in Nepal, particularly known for their significant cultural, historical, and artistic contributions to the Kathmandu Valley and surrounding regions.



Figure 2 Front façade of Kasthamandapa
Source: (Khabarhub.com.July 29, 2023)

Though there are various logical and scientific features of the construction technology of vernacular wooden heritage, such as traditional masonry brick walls, roof systems, vertical components, doors, and windows, it is the meticulous wooden joinery that lies at the essence of these structures. Timbers serve as essential structural elements, meticulously assembled with special joints for various connections. This elaborate wooden joinery not only enhances the flexibility and strength of the structures but also bolsters their seismic resistance.

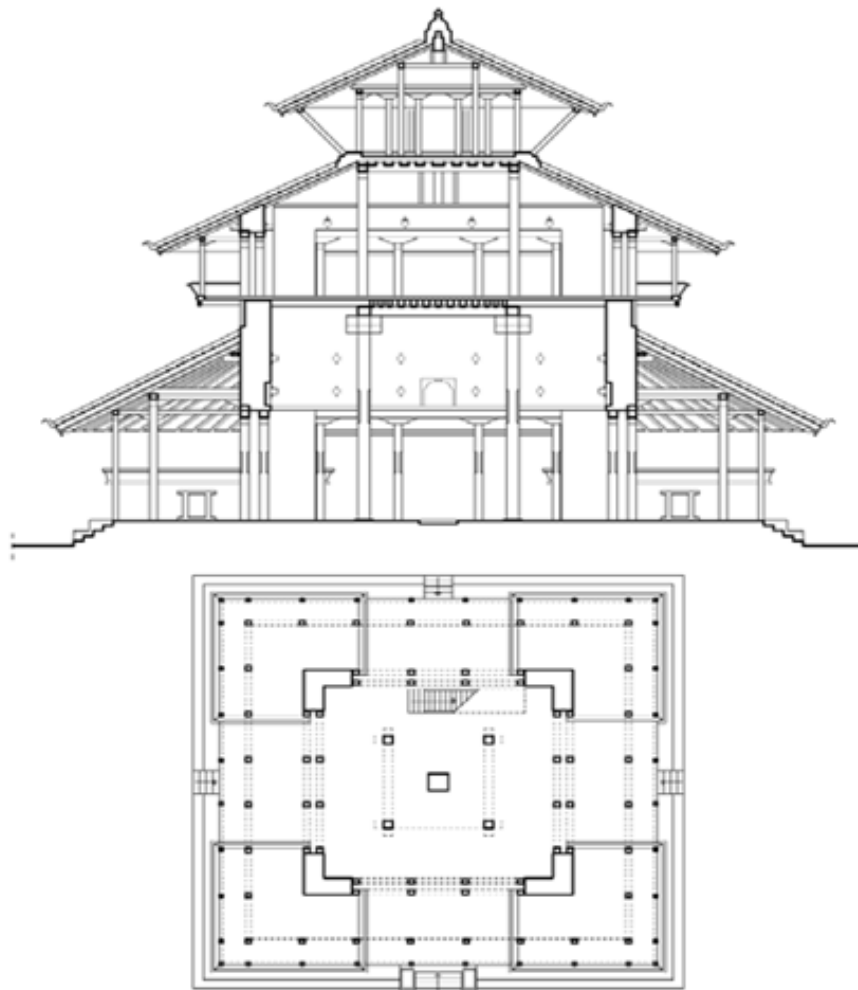


Figure 3 Ground floor plan (Bottom) & Section (top) of Kasthamandapa Source: (Bonapace and Sestini, 2003)

Joinery system

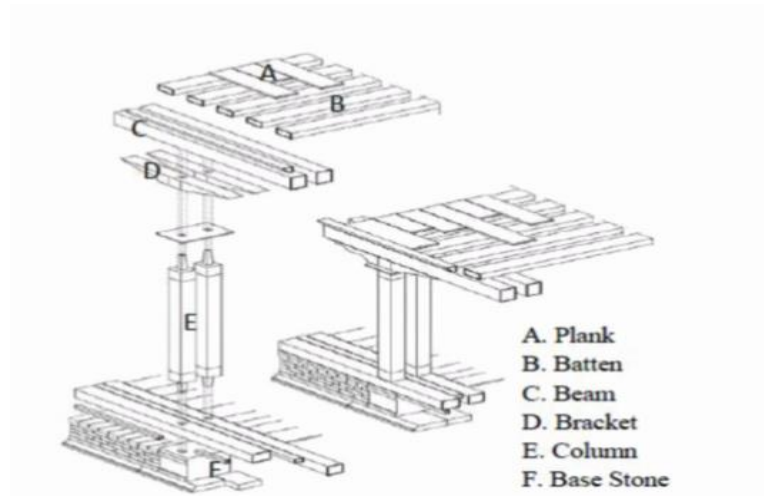


Figure 4 Connection of Structural elements

Source: (Bonapace and Sestini, 2003)

Wooden built heritage in Nepal is distinguished by its use of timber as the primary construction material. Timbers serve as essential structural elements, including windows, doorways, purlins, joists, batten, planks, brackets, posts (*tham*), beams (*nina*), cornices, and rafters, and struts are interconnected using interlocking joints and secured with wooden pegs (*Chukuls*), imparting flexibility and strength to the structures. Intricate wood carvings adorn the pillars, brackets, frames, adding to the aesthetic beauty of the structures. The timber structural system is not always visible, as the decorative carvings often conceal its essential support role.

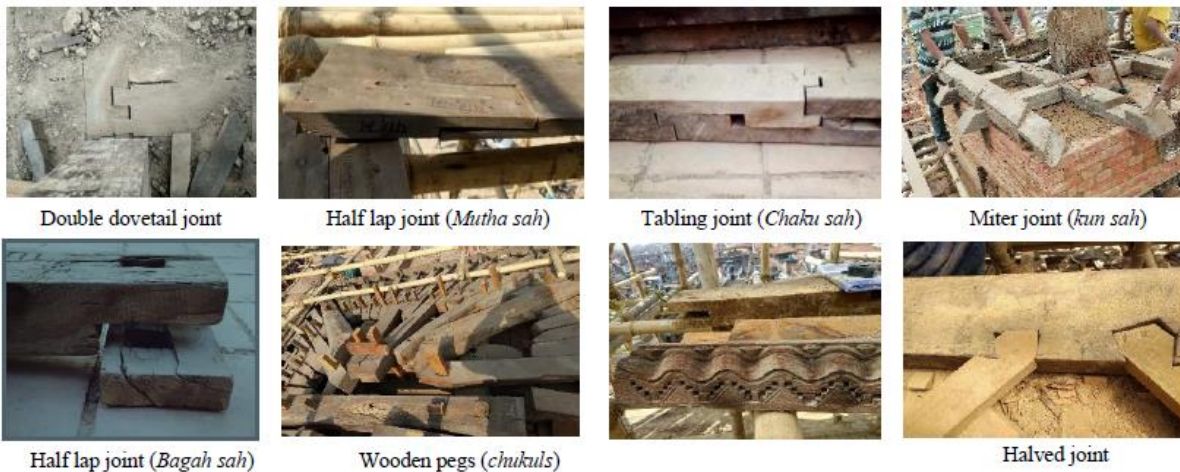


Figure 5 Different types of joints used in Newari Wooden built heritage

Source: (Shilpakar et al., 2021)

This meticulous wooden joinery enhances the structures' flexibility, bolstering their seismic resistance. A variety of woods, such as Gwaichasi (*SchimaWallichii*), Salla (*PinusRoxburghii*), Utis (*AlnusNepalensis*), and Sal (*ShoreaRobustus*), are employed, with hardwood species like Sal and Gwaichasi preferred for load-bearing components due to their exceptional strength and termite resistance, eliminating the need for additional treatments. Commonly utilized joinery systems include double notched, dovetail (for tying up to inner and outer wall plates), tabling/scrift (for ridge, purlin, and joists), dog matching (for beam joints), and mortise and tenon (for posts & meth), supported by the widespread use of wooden pegs in traditional construction.

Protection Challenges

The people of the Kathmandu valley in Nepal have a rich wooden built heritage that is renowned for its unique style and structural innovation. Despite the significance of the vernacular wooden built heritage, these structures face various challenges in their protection and preservation:

Issue 1: Urbanization, Gentrification, and Changing Urban Fabric:



Figure 6: Rapid Urbanization seen in Kathmandu City Source: The Himalayan Times, March 2017

The rapid urbanization and gentrification in Kathmandu are endangering the city's wooden heritage. Unplanned construction, modern building materials, and the changing urban fabric pose threats to traditional buildings. Strict zoning regulations and enforcement are essential to prevent further deterioration and maintain the historical integrity of the urban landscape.



Figure 7: Traditional wooden built heritages of Kathmandu

Issue 2: Lack of Skilled Manpower and Traditional Knowledge:

Preserving and restoring Kathmandu's wooden heritage requires the expertise of skilled craftsmen with extensive knowledge of traditional building techniques. However, there is a scarcity of such craftsmen, and the dwindling number of individuals who possess this specialized knowledge poses a significant challenge in effectively carrying out restoration efforts. The absence of a sufficient pool of skilled and experienced manpower hinders the accurate and authentic restoration of these heritage structures, potentially leading to the loss of traditional craftsmanship and architectural authenticity. To address this issue, efforts should be made to train and empower a new generation of craftsmen in traditional building techniques, ensuring the continuation of this valuable cultural heritage.

Issue 3: Preservation of Traditional Techniques and Materials:

The scarcity of skilled craftsmen and the dwindling knowledge of traditional building techniques pose significant challenges in restoration efforts. The absence of comprehensive documentation of these techniques makes it difficult to undertake accurate restoration, leading to potential loss of authenticity. Ensuring the preservation and transmission of traditional building methods and materials becomes crucial to maintain the authenticity of the vernacular wooden heritage.

Issue 4: Financial Constraints, Disaster Vulnerability, and Climate Change:

Preserving Kathmandu's wooden heritage requires substantial financial resources, which are often limited. The cost of restoration, especially for large and intricate structures, can be prohibitive, hampering preservation efforts. Additionally, the vulnerability of these structures to earthquakes, along with the challenges posed by climate change, necessitates urgent action to secure high-risk structures. The need for robust disaster preparedness plans and the incorporation of climate-resilient strategies are paramount to safeguard these cultural landmarks.

Issue 5: Inadequate Regulations, Enforcement, and Changing Ownership:

Weak implementation of building by-laws, coupled with inadequate enforcement, can lead to unauthorized development or inappropriate alterations to heritage buildings, compromising their authenticity and historical value. The encroachment of heritage spaces and changes in ownership can further exacerbate these challenges, necessitating comprehensive regulations to safeguard these structures and their historical contexts.

Preservation Strategies

To protect and preserve the Vernacular wooden built heritage in Kathmandu, the following strategies are proposed:

i. Public Awareness, Education and Training Course:

Raising public awareness about the cultural significance of these wooden structures can be achieved through engaging local communities, stakeholders, and policymakers in educational programs and various training course. By showcasing the historical value and architectural uniqueness of these structures, we can foster a sense of ownership and pride among the community. Also, conducting regular and thorough scientific research will further contribute to our understanding and preservation efforts. This approach will ensure that the cultural heritage embodied in these wooden structures is valued and protected for generations to come.

ii. Heritage Regulations and Incentives:

Implementing well-planned conservation and restoration projects, considering the historical significance and architectural integrity of each building, can help revitalize and safeguard these structures for future generations. National and International conservation agencies such as UNESCO, IUCN, ICCROM, ICOMOS, etc. can play a pivotal role by offering technical expertise, best practices, organizing training course, funding support for comprehensive conservation and restoration projects. Collaborative efforts with these agencies can ensure the implementation of globally recognized conservation standards while respecting the local cultural context. Proper mapping and the establishing of buffer zones around heritage sites can contribute to effective planning and safeguarding against incompatible development.

iii. Adaptive Repair, Reuse and Sustainable Management:

One approach to conserving these wooden buildings involves adaptive repair and reuse, where traditional structures are repurposed for contemporary use while retaining their historical and cultural values. Sustainable management practices, such as various surveys, regular repair, maintenance and monitoring, play a crucial role in ensuring their longevity.

iv. Public Participation on Wooden Heritage Renovation, Rehabilitation, and Reconstruction:

Engaging the local community in the renovation, rehabilitation, and reconstruction efforts of these wooden structures fosters a sense of ownership and responsibility. Involving local residents especially with active women participation in decision-making processes can lead to better preservation outcomes and a deeper appreciation for their cultural heritage.



Figure 8 Women participation in renovation

Conclusion:

The case study report on "Vernacular Wooden Built Heritage in Kathmandu: Joinery System, Protection Challenges, and Preservation Strategies" sheds light on the invaluable cultural and architectural heritage of the wooden buildings in Kathmandu. Through a meticulous analysis of their historical significance, distinctive joinery system, and the challenges they face in preservation, the report provides a comprehensive understanding of the unique architectural legacy of Nepal.

The report underscores the critical need for preserving these traditional wooden structures in the face of rapid urbanization, modernization, and the scarcity of skilled craftsmen. It emphasizes the urgency of enacting stringent heritage protection regulations and implementing incentive programs to encourage property owners to actively participate in the conservation and restoration efforts.

One of the key strengths of the report lies in its proactive approach to fostering public awareness and education about the cultural value of the vernacular wooden built heritage. By engaging local communities, stakeholders, and policymakers through educational initiatives, training courses, and awareness campaigns, the report aims to instill a sense of pride and ownership among the people of Kathmandu in safeguarding their heritage.

The proposed preservation strategies, encompassing conservation and restoration projects, adaptive repair and reuse, and sustainable management practices, present a holistic and balanced approach to protect and revitalize these iconic structures. Furthermore, the inclusion of public participation especially women in renovation, rehabilitation, and reconstruction efforts is pivotal in fostering a sense of community responsibility towards the preservation of their cultural legacy.

In conclusion, the case study report serves as a valuable resource for the government, policymakers, and local communities in their collective endeavor to preserve and celebrate the vernacular wooden built heritage in Kathmandu. By implementing the recommended strategies and fostering a deeper appreciation for their architectural heritage, Kathmandu can continue to cherish its cultural identity while ensuring the longevity of these remarkable wooden structures for generations to come. The case study report stands as a testament to the importance of heritage preservation and the vital role it plays in shaping a sustainable and culturally rich future for the city of Kathmandu.

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The Conservation and Rehabilitation of the General Emilio Aguinaldo Shrine

Ar. Donking O. Roque (Philippines)

The General Emilio Aguinaldo Shrine, standing at a total height of 24.00 units, is located in Kawit, the oldest municipality in the province of Cavite, Philippines. This shrine holds the distinction of being recognized as a National Shrine of the Philippines under Republic Act 4039, enacted on June 18, 1964. The act mandates the establishment of a National Shrine in Kawit, Cavite, named the Freedom Shrine or Aguinaldo Shrine, in honor of the country's first president, General Emilio F. Aguinaldo. The official residence of General Emilio F. Aguinaldo during his presidency, the Aguinaldo Shrine is a remarkable testament to Filipino Architecture, showcasing a blend of Hispanic and American Colonial influences. This historically significant edifice also marks the site where the proclamation of Philippine Independence took place, an event celebrated by Filipinos every June 12th.



Picture 1-2: Left, façade of Emilio Aguinaldo Shrine (2022), Right, Orthographic photo of Emilio Aguinaldo Shrine (2022)

The Aguinaldo Shrine is now under the authority of the National Historical Commission of the Philippines (NHCP, former National Historical Institute or NHI). Pres. Emilio Aguinaldo and family donated the house in 1963. The original house was built from wood and thatch and was reconstructed in 1849. A major renovation took place in 1920 and was later developed into a museum, and a park was added in 1998. The main building is now composed of three main components, the family wing, the main house, and the tower.

Although declared a National Shrine, the Aguinaldo shrine usually gets a minimal maintenance budget. Aside from the yearly operational costs, budgeting for the restoration and conservation of the site is usually subject to approval from the National Government. Proving that there is a need to protect the site always falls on the owners, and the prioritization of the budget for restoration is always up for debate by Congress. Due to this limitation on budget availability, the Commission reinforces all its efforts to provide minor works that need to preserve and conserve the site with the last repair works done in 2022, which includes the general repainting of the exterior sides of the building and replacement of damaged and weathered wooden components. This minimal conservation work helps the EAS thrive and survive its surroundings' fast urbanization and development.



Picture 2-4: From left to right (Emilio Aguinaldo Shrine circa 1970s, restoration work of EAS in 1984, EAS in 2023)

It is essential for National Agencies and local authorities to work together to find the balance between heritage protection and conservation with urban development. This will ensure that the future generations will still be able to look back, learn and enjoy their history through preservation of this historic site.

With all the matters discussed above, two problems are identified with three proposals stated as the site needs.

Problem 1: Protecting the site from Nature and Man-Made destruction.

The topography and slope of Kawit is generally flat. The nature of the topography is due to the fact that Kawit is a coastal municipality where the average land elevation is just over a meter above sea level. There was an increased occurrence of above-average high tide in the coastline barangays, which has been observed from 1990 to 2000. From the average tidal level of three (3) up to four (4) feet, this has increased by almost two (2) feet. The Above-average sea level rises were observed along barangays close to the coastline of the Municipality of Kawit. During flood occurrence in these areas under low-tide conditions, flood waters last up to eight (8) hours, but during high-tide conditions, the water level rises more and lasts longer. It usually takes about 24 hours before water levels subside. This is a significant threat to the protection and conservation of the site since the Emilio Aguinaldo Shrine is constantly subjected to high-tide flooding.



Picture 5-6: Left and right, inner streets that surround the EAS.



Picture 7-9: EAS complex flooded by high tide (July 2022)

The possibility of sinking of the site is yet to be studied by professionals, but with the signs of continual flooding and the current approved land use that surrounds Cavite, the natural ground level where EAS is built will be left behind since the majority of the main roads and inner roads that connects the surrounding site of EAS is already in the process of being elevated. There is an observed $0.40\text{m}\pm$ level difference compared to the national road and the natural grade line of Emilio Aguinaldo Shrine which makes the EAS lower compared to all the current existing natural grade lines.

Problem 2: Aging Infrastructure and Tourism Pressure.

Since establishing the EAS as a museum, it's rare for the establishment to take a long break to conduct thorough conservation and maintenance works. The museum schedule is every Tuesday-Sunday, with Mondays off for the staff and museum personnel. Since the site of EAS holds a significant role in the history of Philippine Independence, museum tours are booked throughout the year, making it impossible to be closed for an extended period. Even though there is a maintenance program approved and scheduled, the museum only closes a partial area of it, making the execution of work limited and slow. With these factors present, the continual aging of materials cannot be monitored vigilantly, making the conservation and restoration efforts retroactive rather than proactive.



Picture 10-12: Deteriorated wooden components at one of the rooms of at the tower of Emilio Aguinaldo Shrine.

Need 1: Formulation of Conservation Management Plan.

Based on the established cultural significance of the Emilio Aguinaldo Shrine, a thorough documentation procedure is needed as soon as possible. Creating a Conservation Management Plan is an ideal avenue for documenting every possible detail we can record on this structure. Successfully creating a conservation management plan of this site will give a nudge to heritage documentation practice in the Philippines. This can be a framework to other historical sites to follow this documentation procedure until it will be a norm in the practice of heritage conservation. The Aguinaldo Shrine architecture is a prime example of quality design execution and craftsmanship during the time it was built. Documenting the structure can help the future generation learn about the techniques and materials that may not be available anymore in the modern way of construction and conservation in the future.

Need 2: Declaration of Kawit Cavite as Heritage Zone.

There is a need to implement stringent heritage zone protection on at least the immediate surroundings of Emilio Aguinaldo Shrine. Suppose the National Government continues giving permits to reclamations of the different locations around the Cavite Province, there is a high possibility that the site of Emilio Aguinaldo Shrine will be subject to submerging within the next 50-100 years. This is the kind of threat that is irreversible and has big impact on the heritage protection and conservation not just in Cavite but also in the whole Philippines. It is important to note that Aguinaldo Shrine contributes to the people of Cavite to have a sense of pride and belongingness because, in comparison to the other structure that surrounds the EAS, it stands out and exudes an extravagant

Need 3: Constant Rehabilitation Schedule and Budget Allocation.

In relation to Problem No. 2 and Need No.1, if a Conservation Management Plan is established, a budget proposal for rehabilitation and a budget breakdown for conservation and rehabilitation needs will be made and can be a guide to the national budgeting office and NHCP to produce a conservation program for the whole Emilio Aguinaldo Complex say for 5-10 years as part of short- or long-term plans for conservation.

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THE UTILIZATION AND MANAGEMENT OF CONSERVATION - UMA LULIK (TIMOR-LESTE)

Joanita Soares do Rego

Timor-Leste is a new country with its own historical and cultural values, as well as its own diverse and rare cultural manifestations in the Southeast Asian region. Its people carry a strong cultural identity with its diverse expressions, both of cultural objects and of daily social coexistence.

The cultural identity element that is praiseworthy and the primordial support for the daily life of the Timorese people is *Uma Lulik* (Sacred House). Its presence is not only limited to the material, but its significance and meaning are obviously interconnected in all aspects of life. In addition, it is a very important space for family reconciliation, fraternization between generations, and is also considered a special place for communication and worship with the ancestors, and thus with the natural divines.

The settlement of *Uma Lulik* is deliberately strategic according to each ethnic group or indigenous tribe custom. The eastern region is mostly located in remote particularly on the mountain top, the central eastern region is mostly in a group and isolated by the community, and in the west there are predominantly two types of settlement: one is in a group located in the middle of the community and the other is isolated located in the middle of the community.

Traditionally, The physical structure of *Uma Lulik* been built with materials from natural resources, half of this architectural heritage is still maintained, however, the use of industrialized materials in the construction of *Uma Lulik* is now very common, especially in the west of the country. Its architectural style, both traditional and contemporary, varies from group to group and region to region.

Uma Lulik in East Timor is constantly being displaced by social, economic, socio-political, and natural factors. These alterations interfere immensely with its traditional essence of space (principle of spatial identity), which is *lulik* or sacred meanings.

The legal regulations implemented are still limited for the management on the conservation, restoration and promotion of *Uma Lulik* in Timor-Leste, while on the other the government have ratified the three UNESCO conventions to reinforce the safeguarding of the country's cultural heritage. These three cultural conventions were ratified in 2015 by the National Parliament of Timor-Leste: UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972; UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003; and UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expressions, 2005.

Furthermore, it reinforced with Decree-Law no. 15/2023 Legal Regime of Cultural Heritage. Base of these legal regulations, the government implements a number of programs to safeguard the country's cultural heritage. One of these programs that the government implements to preserve cultural heritage is through the financial support to the owners of a *lulik* for reconstruction and recuperation.

Overall, this case study aims to identify the problem of conserving the architectural structure of *Uma Lulik*, particularly some of the elements: pillar, roof structures and the technical management of conservation.

Architectural Model of Traditional House



Figure 1-Uma Lulik with the type of ground floor, in Aileu; Source: SEAC, 2021



Figure 2-Uma Lulik with Pillars raised/supported; Source: SEAC, 2021

The model of the *uma lulik* of Timor-Leste is originated from various forms that have been transmitted through the creativity of the peoples and the tradition in each place. In addition, the resource of nature is also considered the main element for the construction of this house. The disposition of these elements not only comes from the particular ecology of each place, but from the different symbolic formulations that materialize in the house. For this reason, the houses in East Timor are presented in various forms such as ground floor (in western part of Timor) or raised and supported on pillars (mostly in eastern Timor), circular or square plan, houses with terraces or without them, with one or several doors.

Therefore, on the study of the conservation of the *Uma Lulik*, is focus more in the part of the foundation structure and the roof. These two structures are also as the most important part for the support of a *lulik* in the long period. In Timor-Leste, there are many problems of the conservation of *uma lulik* particularly the deterioration of the roof which is caused by the growth of plants on top of the roof and the deterioration of the columns caused by physical and biological agents etc.

The problem of Utilization and Conservation of *Uma Lulik* in Timore-Leste



Figure 3Uma Lulik Latuloho with pillars cemented and painted, in Camea Dili/Capital, originated from Tutuala-Lautén; Source: SEAC, 2022



Figure 4Uma Lulik Katuas with pillars cemented, in Fahinehan-Manufahi Municipality; Source: SEAC, 2021



Figure 1Uma Lulik Asumeta with the roof used by Zinc and its column support by the Iron, in Camea Dili; Source: SEAC, 2022;





Figure 3- Uma Lulik Darlau Aimet and Berhunu with plants growth on the top of Roof in Manutasi, Ainaro; Source: SEAC, 2019



Figure 2 The roof of Uma Lulik Berhunu and Leouis Keruaton that were in a poor condition of repair; Source: SEAC, 2019



Figure 4 The condition of uma lulik of Leobesi Karketu Mota Ain: The Column that partially destroyed; The collagen of cement to the column; Partly structure that were painted by the oleo; Source: SEAC, 2023; .

Currently, some of *Uma Lulik* in East Timor is reconstructed or rehabilitated totally or partially by modern materials, especially regarding to the problem presented in this thematic, such as the utilization of the pillars/foundation, some of this was cemented and painted by the modern materials, and the roof covering as well, used by the zinc and iron materials, as result these industrialized elements don't represent values and customs of the significance of *Uma Lulik*, therefore, it is critical for this particular typical architecture of *Uma Lulik* to recognized and using resources that come entirely from nature, human beings and the divine.

Basically, the materials that are used for the major structural elements of the maintenances (Pillars, Clunes and beams) are vary depending on the regions and characterized by various types of forests such as: *ai-ru*, (*eucalyptus urophylla*), *ai-teca* (*tectona grandis*), *Ai-ná/ Ai-mean*, *Ai kadus/Ai-besi* and other robust woods such as *Ai-bubur* (*eucalyptus alba*) etc. This wood should be found above 25 years of age, according to *Lia Nain* /Owners of *Uma Lulik*, its more suitable for construction, but before finding this wood, it will proceed first to ritual ceremony (offer the animal to nature and worship the ancestors). So this is the way of people consensus to find quality wood. In Timor, the appropriation of the ritual tradition is the one which determines the endurance of the construction quality.

The first phase of starting the construction is to prepare the wood that have been cut based to the type of structure. Normally for the column, it has 4m the measure from the foundation to the roof, then the wood is covered and kept with the leaves in the appropriate place until it is dry and light before taking to the installation. The foundation usually consists of four (4) columns: two at the front (representing *Umane* and *Fetosan*) and two at the back (representing East and West of mountain and sea). Most of the foundation construction is the responsibility of the *Umane*. After putting the column/Pillars , there is an entire ground floor covered by the house that is slightly raised and protected from the rain penetration by a small of loose stone.

With this long process, both in terms of technical construction and ritual, has caused some of the houses to be rebuilt with modern materials. For examples, the *Uma Lulik* Leobesi (Fig. 8) is in poor condition and they have used a bit of a cement to support the column, and partly structures have also been painted with oils to keep the resistance of wood until they are rebuilt again. In other case, like the *Uma Lulik* Latuloho (Fig. 3), in Dili, its base/foundation used by cement and painted as such as said the generations, in Dili as the city/Capital it is difficult for accessing the local material and the distance is also far, so, the generations that came to concentrated in the capital built themselves *Uma Lulik* as a symbol to be able to reunite and celebrate the importante ceremonies while staying away from their original *Uma Lulik* in Municipality. In the Municipality as *Uma Lulik* of Katuas in Manufahi Municipality (Fig. 4), its column was built with cement,

but the Government, through the Secretariat of State for Art and culture, is still emphasizing the generations to change the structure of the base by using local materials, because this *Uma Lulik* is already as a SEAC beneficiary.

The other structure is the roof, which is one of the elements facing the same problem as the foundation in East Timor. The process of finding the forage and palm leaf for the roof covering is also the same as for the foundation, it starts with the ritual ceremony to protect from animal and fire. There are two basic types or roof covering. The first consists of using forage /grass to cover the house with a larger amount. To cover the roof, the forage is laid out in the bundles, which are called boan in Mambae. The boan are then placed in rows of several superimposed layers on the roof, fitting one row with the other as if they were roof tiles. The cover formed by the boan varies in thickness from 25 to 40. Somehow, the good insulation from the heat due not only to the nature of the material but also to its thickness, which reaches around 0,5meters and is made up of alternating layers of grass/forage and Gamuti /*Tali Metan*.

Basically, the rood in Timor-Leste is usually laid in on layer, but in some Municipalities such as Ossu-Viqueque, the roof is in seven layers. The roof structure consists of a base of thin trunks called *ai-Tuar* in Tetun. They are arranged vertically and radially from the upper part where there is a roof to the lower part, joined transversally by several levels of rings formed by more resistant flexible plant elements (certain types of branches, thin trunks, in some Bamboo etc.), which allow the radial structure forming the *ai-Lua* to be fixed and joined . These radial trunks are usually of *ai-Ru* or other similar species. '

The second type is the palm leaf which has two separate leaves. The way of putting this leaf is to lay one side to the right and another one to the left of the roof. The process of using this palm leaf is to cut and divide them into two separate parts, and bathe them in salted water before drying. The process of fitting the structure is also the same as the first one.

With all this if this process, noted that, the use of local materials for foundations and roofs is less common by local people. And the utilization of industrial materials is now considered as the biggest problem that Timor-Leste has been facing for several reasons, mainly in Municipalities, where communities no longer use local materials due to a lack of traditional knowledge of techniques and ritual practices and insufficient funding; in contra to the City or Capital, everything has been renovated with industrial materials due to a lack of acces to lcal materials and long distances. Such as the utilization of modern roof material of *Uma Lulik Asumeta* (Fig. 5), located in Dili, is also made of zinc and pinned with iron. It's surprising that spreading modern materials such as zinc cause more leaks than this traditional system. In the other case, as presented in (Fig. 6, 7)is in a poor state of repair because the roof has been partially destroyed by the weather; the plants growth etc.

Management for the Conservation of *Uma Lulik*;



Figure 5-The pillars covering by *arenga pinnata* palm (*tua metan* or *tali metan* in Tetun), of *uma lulik* Hatumeo Koluli in Motalun Bazartete, Likisa; Source: SEAC, 2023



Figure 6 The seven alternating layers of grass and tali metan/arenga pinnata palm (*tua metan* or *tali metan* in Tetun), in Ossu Viqueque ; Source: SEAC,2018;



Figure 7 The materials that are not used and kept beside the house/*Uma Lulik* Katuas, Fahinehan-Manufahi; Source: SEAC,2022

With this problems mentioned above, it's supposed to be applied some methods that are considered appropriate for the conservation plan of *Uma Lulik*. This implementation is based on an example of *Uma Lulik* that has the resistance and durability of being almost a hundred years old. The structures of some examples of this *Uma Lulik*, particularly the roof and foundation, are described in the following methods: For the roof and the foundation, both of which require the use of braided fibras of arenga pinnata/palm (*tua metan* or *tali metan* in tetun) as the covering to better impermeabilize the roof of the house, making the roof endure for more years by preventing water from entering through the grass, preventing it all from rotting.

As well as covering the base of the pillars (Fig. 9) that are in contact with the ground, using tali metan to protect them from destructive agents, thus prolonging their durability.

The technique for using this arenga on the roof, is to place it in the covering of upper part of the vault, interlace it with each of the layers of grass that cover the roof; overlapping up to seven alternating layers of grass and arenga/*tali metan* to get great thicknesses as shown in (fig. 10) also place it in the closing of the roof or part of the ridge.

In addition of using *tali metan*, it is proposed that all the materials of *Uma Lulik* that are already damaged and not used (Fig. 11), instead of being kept under the *Uma Lulik* in respect of the sacred, should be recovered and reused for other functions so it can be preserved and maintained in its originality.

Possible Solution:

- Conduct a data survey in the area to identify the problems of *Uma Lulik* that is damaged, the alteration of its structure, and the cultural objects that have all been taken to other destinations.
- Create coordination services between the relevant entities that handle both cultural heritage and tourism in order to develop the country's economic sustainability through socialization and community awareness, and promote *Uma Lulik* for its tourist destination.
- Local materials are the base for the construction of *Uma Lulik*. For this reason, to conserve and protect the origin of *Uma Lulik*, the Secretariat of State for art and Culture, in collaboration with the Secretariat of State for Land and Property, to create space for the cultivation of trees; the industry's Centre for the production of local materials; and the protection of forest or trees that are used as raw materials for construction. The protection can be created through the strict law of *Tara Bandu*, which is a traditional law of our ancestors to protect all the resources that exist from each owner. This

protection action is significant for facilitating and encouraging the community to build or rehabilitate their *Uma Lulik* that have been destroyed or damaged by wars and climate change

- The Ministry of Education and the Secretariat of State for Art and Culture need to create training in the conservation of material heritage (Tangible and Intangible), especially the management of wood conservation.

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Development of woodcarving in Uzbekistan

Tokhir Norkobilov

Wood carving has been progressive since time immemorial. Widespread in the Ancient East, in the architecture of the ancient world, a wide range of styles emerged in the countries of Europe, Asia. In the territory of Uzbekistan, wood has also been widely used in architecture and rye products since time immemorial. The manufacture of wooden sanams flourished in Movarunnahr until the spread of Islam. The scholar-historian Narshahi writes in his work "History of Bukhara" that doors were decorated with carved images in the 8th century.

The Uzbek land has long been famous all over the world for its rich cultural heritage, ancient traditions, folk and applied arts. Masterpieces created specifically in the direction of wood carving have not lost their value for several centuries.

Unfortunately, ancient examples of wood carvings have not survived due to the fact that wood is much more resistant to the environment. The oldest surviving one dates back to the 9th-12th centuries. These are the mausoleums of Kusam ibn Abbas, Rukhabad and Amir Temur in Samarkand, the mausoleum of Saifiddin Bokharzi in Bukhara and the Ulugbek Madrasah.

In the applied art of Uzbekistan, wood carving is characterised by originality, as its masters were active not only in household items, but also in the fact that, in addition to the architectural part (column, door, wicket door, etc.), the design of household appliances became extensive.

The extensive use of wooden posts, door gates and other architectural details can be seen in the architecture of Khiva, Bukhara, Samarkand, Shakhrisabz, Kokand and Tashkent, which are considered ancient cities of our country.

There are mainly four schools of woodcarving in Uzbekistan (Kokand, Samarkand, Tashkent, Khiva), which differ in their styles and directions.

In particular, the art of Khiva woodworkers are the columns and doors of the structures of the Ichan-Kala complex (for example, the monument of the Friday Mosque with carved columns in the interior). In the 19th century the flourishing of Khorezmian style is noticeable in the stonework of Khiva balconies, in muqarnas, in the decoration of doors worked on the protrusions of columns in their rooms. Mahogany wood carving is widespread in Khiva, characterised by subtlety of pattern, sparseness of covering, playfulness, masters preserved the natural colour of the wood.

The traditions of the Kokand school of wood carving include various everyday objects such as doors, panels, friezes, architectural elements in the form of columns, carved table, cures, book stand, pencil cases.

In the 19th and 20th centuries, Tashkent was a major centre of wood carving. Artistic finishing and household carving of large architectural structures occupied a significant place in the work of Tashkent masters. Tashkent masters widely used flat relief, baseless designs in carved patterns.

Samarkand masters varnished the bases and the ledge. The door in Kokand and Fergana is varnished after decorating the columns with deep flat relief patterns giving the surface of the pattern a darker colour.

Bukhara masters decorate carved patterns with gold, silver water, paint the base of the pattern with colours.

The craft of woodcarving requires the craftsman to study several fields to perfection. He must be a technologist well versed in the quality of wood, an experienced carpenter, a skilled engraver with sufficient knowledge of mathematics. The wood goes through several complex stages until a wood carving product is ready to be made.

The most commonly used woods in this art are spruce, caragach, walnut, mulberry, apricot, chinara, willow and poplar. Since they contain a lot of resin and do not rot quickly, the board turns out straight and long, smooth and easy to work. All the more that the equipment made of nuts is resistant to water, various weather conditions, it will last for many years. Usually, experienced craftsmen choose a tree that has grown in a sunny place and has a low bush for processing. Products made of solid wood (lug) may crack after years.

The wood is available in two different versions: hollow or cut to measure with special equipment. The timber is soaked in water for three to six months to make the colour appear uniform, and it is cleaned of various waste materials. Then, over a period of six to ten years, a chess-shaped shade is applied to the spot. The most important thing in wood carving is to dry the wood thoroughly. Today, some masters dry the wood in special kilns brought from abroad..

To make a product from moderately dried wood, boards of the required size are cut and glued together. The surface of the semi-finished product is then sanded with fine sandpaper and wiped with a velvet cloth. There should be no scratches or gaps between the logs. Depending on the complexity of the work, it takes the craftsman two to two months to create a single work of art..

Initially, the craftsman draws a pattern template based on the size of the piece, designed for hard and heavy paper, and transfers the sketch to special Chinese paper. Then pierce the dots one by one, using the needle over the patterns. The Chinese paper will stick to the piece, and rub charcoal powder wrapped in a cloth into it. This will create a pattern on the surface of the wood. When the carving is finished, the piece is varnished twice.

In wood carving, doors, columns, fences and tabletops are decorated in the style of "islimiy" (a composition formed from images of plants, i.e. leaves, flowers, branches), "pargori" (a type of pattern applied to wood with a whirlpool and then carved), "Baghdadi" (a set of patterns consisting of the sum of various geometric figures). The more carefully and tastefully worked out the pattern, the more elegant and unobtrusive the product will be. In a variant of pattern execution, girih and Islami patterns are used harmoniously, independently of each other girih is rarely used.

There are more than 50 specialised tools used in the art of woodcarving. Including scoop chisel, straight chisel, club, etc. After the base of the pattern is carved, it is pierced with a pin.

The restoration of wooden objects. The restoration of wooden objects refers to the conservation of works of art and artefacts made of different types of wood. When preserving wooden objects, their chemical and physical properties such as strength, structure are very important. The strength of wood varies according to its type. In general, the wood core, regardless of the type of wood, is

more durable than its bark because the wood core contains many extractive substances, including tannins.

Rotting and deterioration of wooden objects is mainly caused by microorganisms, insects and sea moths such as fungi and bacteria. Microorganisms often penetrate wood where the moisture content is above the cell saturation point, but insects attack not only wet wood but also air dry wood. Insects such as termites end up eating a wide range of wood, from live trees and weakened trees to green wood (undisturbed wood) and dried wood. Insects such as long-horned beetles (anobiidae or áicydae) can even feed on completely dried wood.

When exposed to air, wood undergoes physical and chemical decay caused by exposure to light, moisture, pollutants, wear, heat and other factors, also known as weather-related degradation. This type of deterioration is characterised by rapid discolouration along with cracking and surface erosion. Almost all of the changes in wood composition caused by exposure to air will be due to ultraviolet rays.

Objects that may belong to dry wood found in archaeological excavations include columns and beams of traditional buildings, wooden sculptures, etc. Wood, as an organic matter, is damaged by pests such as fungi, termites and wood-boring rodents (lyctus). Fungi and pests reduce the strength of wood, resulting in phenomena such as bending, twisting.

Conservative treatment of cultural heritage objects made of wood, i.e. taking into account the fact that the original form of the artefact is not disturbed and is durable, implies painting such heritage objects with natural varnishes or oil paints rather than chemical reagents. However, in order to keep the monument stable for a long time, it is necessary to find a new way of managing cultural heritage objects. Therefore, preservation is applied to dry wood.