Group Training Course 2025

Case Study Reports

Identification of the problems and the required measures for a wooden structural element. (Bangladesh)

On 19 March 2022, in Italla village of Cumilla district, a wooden pillar was discovered by local people during mud collection beside a pond. Subsequently, Mr. Murshade Rayhan, a faculty member of Cumilla University, and his students collected the pillar and handed it over to the Department of Archaeology on 6 January 2023. At present, the wooden pillar is preserved in the Chemical Conservation section of the Department of Archaeology, Bangladesh. This case study aims to identify the problems and propose a conservation and restoration plan, along with future management strategies for this wooden object.

The wooden pillar, which appears to have been part of an architectural structure, measures 4.65 meters in length. Three distinct sections of the pillar can be identified: the base, the shaft, and the capital. The base is quadrangular, decorated with petal motifs and 65 cm in length, each side measuring 50 cm wide. The shaft is octagonal, decorated with flower motifs and 3.25 m in length, the width of each side of this octagon varies from 15-20 cm. The capital is quadrangular, decorated with flower and petal motifs and 3.25 m in length. The majority of the capital is decayed.

Although the pillar was exposed accidentally, it holds archaeological importance. The finding place is located within a cluster of archaeological sites. Around eight sites were recorded during the archaeological exploration in this area. Recently, Department of Archaeology has conducted an excavation at a site named *Panchthubi Monther Mura*, which is very close to the finding place of the wooden pillar. Structural remains of temple contain four different structural periods and recovered artifacts from the excavation suggest the area was in the territory of *Devaparvata*[1] (a capital city of Chandra dynasty, c. 10th century CE). Therefore, the pillar could be the evidence of wooden elements used in architectural structures during that period.

Fig 1: Wooden pillar, after primary treatment

Fig 2: Pillar base

Fig 3: Pillar shaft

Fig 4: Pillar capital

Fig 5: Pillar capital (top)

Problem 1: Conditions during recovery

The pillar was originally embedded in moist soil alongside a pond. Due to prolonged exposure to moisture, softening and swelling of the wood are quite visible. After primary recovery, unfortunately it was kept in the open air for a few months. As a result, moisture was removed and cracks widened. By the time Department

of Archaeology received the pillar, it had already been affected by termite attack. A large portion of the internal part of the wood has been lost.

Problem 2: Burn condition
It is not confirmed that it was burned but physical properties of the base suggest a probable burn event of this wooden pillar. Charred cell like structures is visible on the surface of the base. The overall wooden pillar appears lighter than it should be.

Problem 3: Present condition
After receiving the pillar, the chemical lab of the Department of Archaeology has removed all the soil elements from the surface of the pillar using distilled water. Polyethylene glycol 4000 and 6000 were applied to prevent shrinkage, warping and cracking. Subsequently, dammer has been applied to stabilize and strengthen the wood. Following the primary chemical treatment, the surface of the wood appears glossy and has changed its color.

So far, no architectural wooden elements like this pillar have been reported. Department of Archaeology, Bangladesh has plans to conserve and restore this wooden pillar and display it in a museum. Based on the above mention problems and aims some measures are required.

Required Measures 1:
We already have applied some primary chemical treatment of the wooden object. But it is not enough to restore its previous conditions regarding its color, decoration and composition. We have to make a conservation and restoration plan for the wooden pillar.

Required Measures 2:
Following the conservation and restoration plan a management plan is necessary for museum display, monitoring and maintenance.

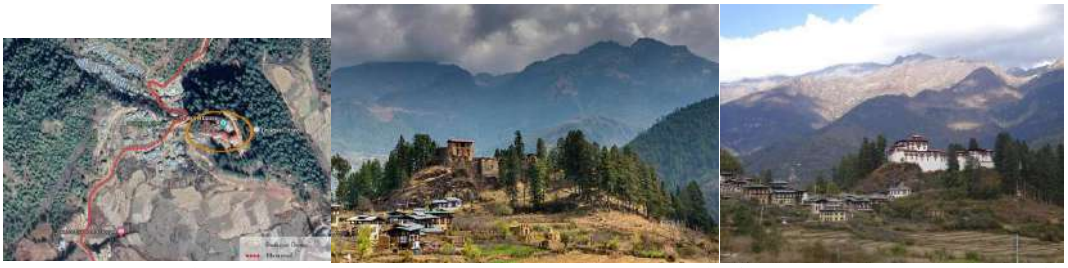
References:

[1]Rahman, Saifur A K M (2024), *Panchthubi Monther Mura, A Preliminary Report on Archaeological Excavation* [in Bangla], Regional Directorate office, Department of Archaeology, Cumilla, Bangladesh.

Case Study Report

Reconstruction of Drukgyel Dzong and Restoration of Tango Dzong: Preserving Wooden Structures with Associated Challenges and Issues in (Bhutan)

Summarize Background of the Project:
Drukgyel Dzong, built in 1649 to mark victory over Tibetan invasions and destroyed by fire in 1951, was reconstructed from 2016 to 2023 under the Royal Command, with a Nu. 500 million budgets. The project restored its original architectural form, led by the Heritage Sites and Archaeology Division, with a team of 130 workers, including carpenters, masons, and laborers, and myself as Project Engineer.



The images (1,2 &3) *show Drukgyel Dzong's location in Tsento Gewog, Paro (14 km from Paro town), its ruined state before reconstruction, and its appearance after restoration.*

Challenges:
The Royal Command directed the reconstruction of Drukgyel Dzong to restore its former glory, focusing on its architectural design and form. A major challenge was the uncertainty of its future functions, so the design was made adaptable for various uses. Traditional materials like stone, mud, and timber were primarily used, while modern materials such as cement and steel were limited to toilets and Phase IV structures to address slope challenges and ensure stability.

Assessment Before Construction:
The Drukgyel Dzong restoration included detailed archaeological documentation of its defensive features, geotechnical investigations to assess soil and slope stability for foundation design, and a comprehensive 37.6-acre topographical survey, producing precise maps to guide the restoration planning.

images show: (1) soil stability and foundation tests conducted by DGM,in Drukgyel Dzong.

1. Issues in The Protection System:
The seven-phase Drukgyel Dzong reconstruction prioritized traditional materials and craftsmanship but faced challenges like legal gaps, expertise shortages, and harsh high-altitude conditions. These issues led to replacing original timber, joinery, and roofing with modern materials. Similarly, the Tango project struggled to reuse wooden components due to inadequate surveys and stakeholder conflicts. The cases underscore the need for stronger legal protections, artisan training, thorough documentation, and preventive maintenance to preserve Bhutan's wooden heritage.

images (1) *show Drukgyel Dzong's reconstruction using CGI sheets and modern clamping instead of traditional timber, (2) shows the surrounding area where modern development has overtaken neglected residential buildings.*

-With Drukgyel Dzong's reconstruction complete, locals are increasingly choosing modern concrete buildings over traditional houses, influenced by potential use of the Dzong as the Gyalsung Head Office and income opportunities from rentals. This trend threatens the cultural landscape and authenticity of the historic area.

2.Issues in The Conservation and Restoration:

The reconstruction work began with the central tower, a four-storied structure with an attic featuring arrow slits for defense and ventilation, which was reconstructed to its former glory. Work then continued on the adjoining structures, maintaining their original dimensions. In some areas, the old walls were preserved and extended upward using the toothing method, employing local materials and craftsmanship to uphold Bhutanese traditional building techniques.

The images (1,2&3) show various types of arrow slits in the Utse identified during the archaeological survey, (2&3) shoes a historic 1905 photo of a traditional corridor by John Claude White, which was replicated in the Phase III reconstruction.

However, in most area, due to instability, the entire structure had to be dismantled to the foundation before rebuilding. As a result, the original fabric is no longer visible, with only a small portion of the semicircular wall surviving, creating a break in continuity and authenticity. This limits opportunities for the younger generation to connect with past craftsmanship, making modern construction seem more reliable and appealing. The loss of visible historical layers also reduces the site's cultural and educational value, weakening heritage identity. Without strong documentation, awareness efforts, and adaptive yet respectful conservation policies, wooden heritage risks losing its authenticity and significance for future generations.

Most Bhutanese dzongs were built on hills for defense, and although the structure was restored to its original form, the steep slope required a foundation supported by beams. Originally, timber beams were used, visible before reconstruction. In the recent work, timber was replaced with concrete due to durability concerns, this substitution raises significant concerns for conservation, as it compromises traditional authenticity and highlights the challenges of balancing structural stability with heritage preservation.

Picture1,2,3(left to right): *illustrates Phase IV, depicting the ruined structure of the Dzong along the cliffside, highlighting its condition during the reconstruction process and progressing towards the finishing stage.*

Drukgyel Dzong's reconstruction restored key functional and defensive elements, including entrance structures, arrow slits, and internal walls, while adapting certain areas like the former horse stable. The final phase added lower courtyard structures with rooms, a conference hall, and public toilets, preserving access to the old footpath as an emergency exit.

The images (1) show the main entrance to Drukgyel Dzong's after reconstruction, and (2) the old fortified footpath tunnel once used to fetch water, stored in large circular stone tanks.

while efforts were made to restore structures faithfully, unexpected discoveries of foundations up to 5 meters below debris caused major design and construction challenges. Clearing ruins required revised drawings, delaying the project and raising concerns that frequent design changes could compromise the Dzong's authenticity and integrity.

Requirement: Guidelines for the selection and use of construction materials:
During reconstruction, some original materials were replaced with modern ones. Due to the Dzong's circular layout, work was phased, and wall junctions were later joined with concrete bonding, fritz stones, and flat stones. Since concrete has a shorter lifespan than traditional wood and mud-mortar, are there alternative traditional methods for joining walls may offer better integrity, authenticity, and durability.

The images (1) show: a wall junction awaiting interconnection, and (2) shows the overall completed structure.

Reference: Heritage Sites and Archaeology Division, Department of Culture and Dzongkha Development, Ministry of Home Affairs, Royal Government of Bhutan.

The Restoration and Conservation of the Construction of the main sanctuary Wat Tuol Khsach also known as Wat Koh Pdao

1. Executive Summary

The comprehensive restoration and conservation project undertaken on the main sanctuary of Wat Tuol Khsach, an ancient Buddhist temple also known as Wat Koh Pdao, located in Kampot Province, Cambodia. Constructed in the early 20th century, the sanctuary, a vital national heritage site, had fallen into a state of severe disrepair due to a combination of age, natural decay, and extensive damage incurred during its use as a tailoring workshop and rice warehouse under the Democratic Kampuchea regime. By the 2010s, the sanctuary was deemed unusable for religious ceremonies, prompting the local community to build a new one nearby. Recognizing the urgent need to save this historical structure, a formal restoration project was initiated on May 14, 2021, by the Ministry of Culture and Fine Arts. Spearheaded by the Department of Conservation and Preservation of Monument, the project focused on structural reinforcement, meticulous repair of architectural elements, preservation of ancient murals, and the restoration of the building's aesthetic and functional integrity. The successful completion of this project has not only salvaged a significant cultural artifact but also returned it to its original purpose as a place of worship, ensuring its survival for future generations.

Picture 1. (left) Area map of Wat Koh Pdao, base on Google Map. Picture 2. (right) Condition of Wat Koh Pdao

2. Condition Prior to Restoration

A thorough assessment of the sanctuary revealed its severely dilapidated state. Key issues identified included:
Structural Damage: The foundation had sunk, causing extensive cracking in the brick-and-mortar walls, particularly on the northern side. The entire structure was fragile and at risk of collapse.
-*Roof and Water Damage:* The wooden roof structure was rotten and termite-infested in many places. This led to significant roof leaks, which allowed water to penetrate the interior, damaging the murals and leading to widespread moisture issues. The traditional "srakalinh" tiles were missing or broken.
-*Architectural Ornaments:* Most of the sanctuary's intricate architectural ornaments, including the frieze, Jephua, Naga, and gable carvings, were severely damaged, broken, or missing. This not only compromised the building's aesthetic integrity but also its structural stability.
-*Interior and Exterior Elements:* The original wooden doors and windows were almost completely destroyed. Interior tiles were damaged, and the exterior paving was in disarray. The ancient murals, a central feature of the sanctuary, were faded, soiled by termite nests, and partially whitewashed during the Khmer Rouge period.
The combined effect of this damage rendered the sanctuary a deteriorating shell of its former self, with the murals in particular facing irreversible loss without immediate intervention.

Picture3-6. (left to right) Showing the damage of the wooden structure from the inside of the building.

Picture7-10 (left to right) Showing the damage of the wooden structure from the outside of the building.

3. Restoration Methodology

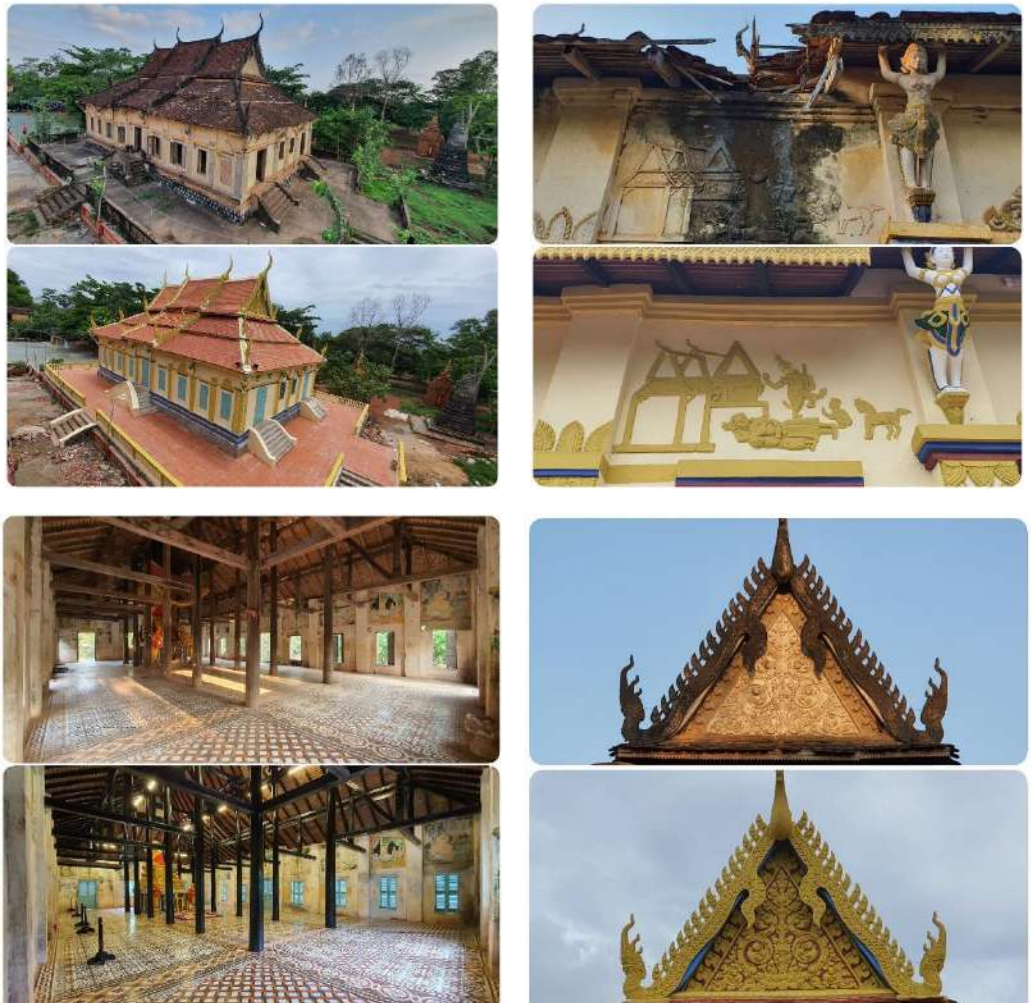
The restoration project was executed by a specialized technical team composed of architects, engineers, archaeologists, and sculptors. The methodology was comprehensive, combining traditional techniques with modern conservation principles to ensure the longevity of the structure. The key phases of the project included: Site Preparation and Ceremonial Inauguration: The project began with a formal ceremony attended by local authorities and religious leaders to mark the commencement of the restoration.
-*Structural Reinforcement:* The first priority was to address the structural integrity. The team carefully patched and reinforced the cracked walls, shoring up the northern wall where the foundation had settled.
Mural Conservation: To protect the ancient murals, the team meticulously cleaned them to remove termite nests and other debris. The murals were then carefully covered with plastic to prevent further damage during the subsequent construction phases.
-*Roof and Wooden Structure Repair:* The entire roof was dismantled to allow for a full assessment. Rotten and termite-damaged wooden components were replaced with new, treated wood. Missing and damaged roof tiles were replaced, and the wooden structure was treated with varnish to protect it from future insect damage.
-*Restoration of Architectural Ornaments:* This was a highly skilled task. The team, using their expertise in sculpting, repaired damaged Garuda and Kinnara figures, as well as the gable and Naga carvings. Where ornaments were beyond repair, new ones were meticulously copied and cast to match the original designs, ensuring the aesthetic and historical integrity of the sanctuary was maintained.
-*General Repairs:* New wooden doors and windows were installed to replace the original destroyed ones. The interior floor tiles were repaired according to the original pattern, and new exterior paving was laid. The entire sanctuary was sanded down, and a new coat of paint was applied, carefully matching the original color scheme to restore the building's original appearance.
-*Modern Systems Integration:* The project also included the discrete installation of a new electrical system to light the sanctuary for continued use.

4. Results and Project Outcomes

The restoration of Wat Koh Pdao was a resounding success. The project successfully addressed the severe structural and aesthetic challenges, transforming the dilapidated sanctuary into a robust and beautifully restored monument. The meticulous work of the technical team has yielded a structure that is not only sound but also aesthetically true to its original form.
The project's key achievements include:

a) The structural reinforcement of the foundation and walls, which has secured the building against future decay.
b) The successful preservation and cleaning of the ancient murals, which are now a protected cultural asset.
c) The complete repair and replacement of the roof, eliminating the source of water damage that had plagued the building for decades.

The faithful restoration of all architectural ornaments, which has returned the sanctuary's magnificent facade to its former glory. The completion of this project is a powerful testament to the value of cultural heritage and the importance of conservation efforts. The sanctuary of Wat Koh Pdao has been returned to the people of Kampot Province as a cherished place of worship and a proud historical landmark, reminding them of both the challenges of their past and the resilience of their culture. It stands as an example of how dedicated restoration can not only save a physical structure but also preserve a nation's history and identity for generations to come.



Picture10. Showing the comparison before and after restoration from interior and exterior.

5. Reference

Department of Conservation and Preservation of Monument. (2021). Reports on the Restoration and Conservation of the Construction of the main sanctuary of Wat Tuol Khsach also known as Wat Koh Pdao. Ministry of Culture and Fine Arts, Cambodia.

Group Training Course for Young Professionals
on Cultural Heritage Protection in the Asia-Pacific Region 2025
Conservation and Management of Wooden Built Heritage

Fiji Case Study
Setoki Tuiteci
Architect
(ETHOS EDGE)

Fig 1. The World Heritage Port Town of Levuka

Levuka Town on the island is the first capital of Fiji established after Fiji was ceded to Great Britain from the 1830s until 1881 when the capital city was shifted to Suva. Levuka was inscribed as a World Heritage Listed Port Town in 2013. Three years after the inscription of Levuka, Tropical Cyclone Winston, a category 4 cyclone hit Fiji and Levuka was one of the towns that experienced the damaging winds and storm surges. As a result, a lot of the heritage buildings within the World heritage zone were damaged with a few completely destroyed.

Fig 2. Damaged Home

Fig 3. Damaged Church

This case study covers a residential property that was built probably between 1900 and 1930. The original property was owned by the Eastgate Family from around 1895. Over the years and after Tropical Cyclone Winston, the condition of the house has deteriorated and this has been compounded by the poor drainage system that exists in many of the areas in Levuka Town which have not been repaired or cleaned out over the years which has in turn allowed storm water to flow on the ground causing pockets of soggy areas that are damaging timber buildings from the foundations.

Fig 4. Case Study Residence

Fig 5. Case Study Residence

Problem 1: Infrastructure Maintenance and Upgrades

Since the inscription of Levuka into a World Heritage Site, there has been little done in the maintenance of the infrastructure in the town. Infrastructure such as roads, sewerage, storm water drainage systems and coastal protection have deteriorated. In the recent years, works have been carried out on coastal protection and the roads around the island of Ovalau and most recently with the upgrade to the main street that runs through the town. The underground storm water system has not been upgraded for may years and this has contributed to flooding in a few areas as there are overflows during heavy rainfall.

For this case study, one of the key contributors to the deterioration of the building is the absence of proper storm water drainage in front of the house which has caused the building foundations along the front of the building to rot and deteriorate rapidly over the years. The main drain that needs to remove water from the area has collapsed and causes water to collect in front of the residence and remain there until it is slowly soaked into the soil and eventually soaks up all the ground in front of the residence. Over time this has caused the timber piles of the foundations to rot and deteriorate and also drop the floor level along the front as the ground continues to be inundated with water.

Problem 2: Building Maintenance, Repairs

Building Maintenance and repairs have been slow to happen and with the impact that Tropical Cyclone Winston had in 2016, it made it more difficult especially with the financing requirements for the restoration and conservation of the buildings in Levuka. Local residents found it difficult to repair or maintain their homes especially with the access to good builders, materials and the understanding of the requirements for the World heritage Status within the town. There is only one major hardware supplier in Levuka as everything else is shipped in from the main island of Viti Levu which also increases the cost of hardware and materials by the time it arrives in Levuka.

In the case study, there has been a lack of maintenance carried out on the subject residence, however it is now one of the selected buildings to undergo repair and restoration works with the program that is funded by government. This will enable the team of carpenters together with the team of Japanese experts and local expertise carry out the necessary work to repair and restore the residence while maintaining the relevant requirements for authenticity and quality.

Problem 3: Finance / Funding

Finance and funding is always an issue for Levuka since its inscription, which is why there needs to be more awareness campaigns conducted for the township to understand the importance of the maintenance of the authenticity and quality of the buildings and monuments in Levuka. Over the years Levuka had not been a priority but in the last 2 years the Department of Culture and Heritage together with the Ministry of Itaukei Affairs and the assistance of Japanese experts through JICA have embarked on the survey of selected buildings to begin a program of repair and restoration works which will be funded by the Government of Fiji. The selected buildings consist of quite a few residential buildings which are all wooden structures. This program is the beginning of the work to revamp Levuka Town and would then pave the way to look at some of the significant buildings that are not wooden but are monumental.

In the case study building, the owner is an elderly gentleman so carrying out any maintenance work or restoration work is difficult and having access to finance for any work is also difficult. The rising cost of timber as well the accessibility for skilled carpenters or craftsman trained in intricate timber joinery is scarce so the cost of bringing skilled and experienced carpenters from the mainland is high because of the transportation and accommodation. As the years have gone by and the absence of prosper maintenance, the conditions of buildings worsen so the cost of repair and restoration is far greater than what it would have cost if regular maintenance was carried out periodically.

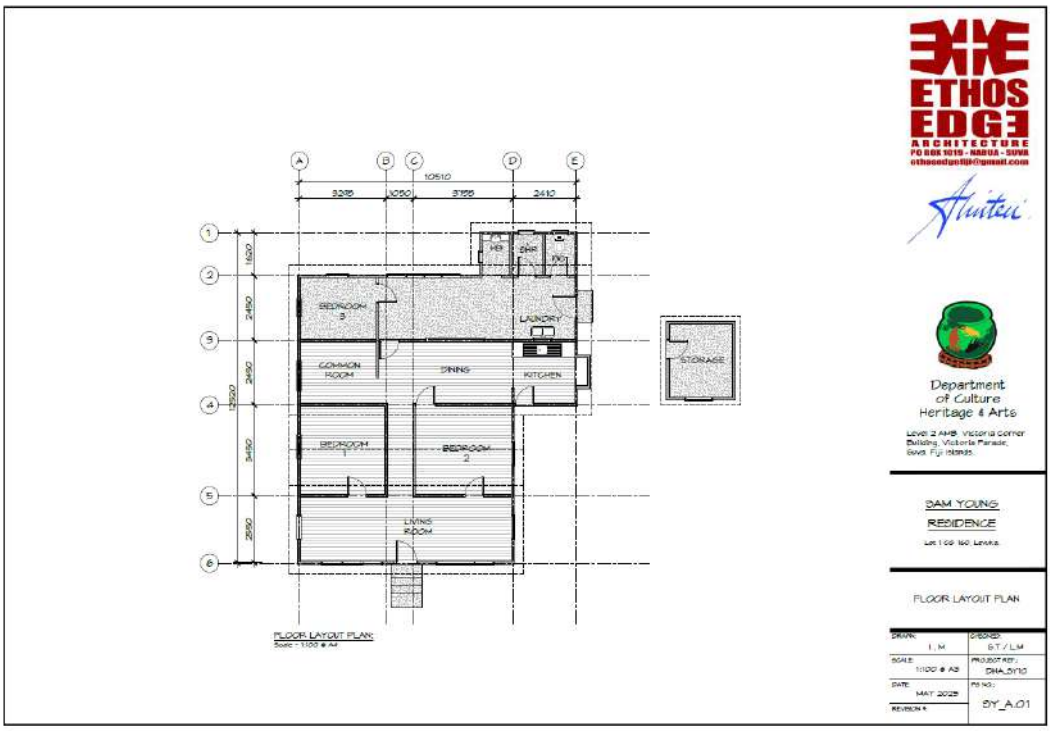


Fig 6. Case Study Floor Plan

This case study is one of the listed buildings to go through repair works through a government funding that has been approved for the first 10 buildings. After those 10 buildings the repair program will identify the next lot of buildings that require assistance for their buildings. The Heritage buildings in Levuka are mostly timber / wooden buildings.

Fig 7. Case Study Building – Building Survey team in front of the residence.

Fig 7 shows how the water collects in front of the house as described in ‘Problem 1’. This is a result of the underground public storm water drain not being able to take the surface water because it has collapsed over the years and as a result all the water collects on the surface, forms a significant pool of water which remains in front of the residence for a few days until it is soaked into the ground or evaporates. The case study building has been severely affected by this water issue as demonstrated in the photograph, where the front of the building clearly shows the moldy walls and foundation timber posts and floor bearers have deteriorated

rapidly over the last few years. The issue of the drainage is an issue that will involve the local authorities as it is part of the stormwater drain network that takes stormwater discharge to the creek and eventually out to sea. The roots of the tree in front of the house may have also contributed to the interference of the underground drain as it has grown over the years.

Need 1: Detailed Architectural drawings for all World Heritage buildings in Levuka.

At this stage there are no detailed architectural drawings of the buildings within the World Heritage zone in Levuka. There are basic floor plans that were prepared for some buildings by the Japanese specialists that were attached with JICA. It would be advisable to measure and document each building within the zone and these drawings could used for future repairs, maintenance and conservation. Each building should have a complete set of as built documents, with material specifications, architectural description, color coding, building services drawings as well as photographic records of the existing building for interior and exterior.

For this case study, measurements have been carried out for the overall building and specifically the areas that need repair, there have been a lot of photographic evidence recorded to ensure all the areas that need to be repaired are well covered and documented. Construction joints and details can be clearly drawn up to assist carpenters during repair and conservation work. There has been some training carried out through the JICA program and it would beneficial for more training to be done with local carpenters using the drawings and illustrations to guide them.

Need 2: Adaptation and use of the Levuka Manage Plan with Relevant Authorities

There is already a Levuka Management Plan for that was developed through the assistance of Specialists from Japan and the assistance of JICA that was put together with the Department of Culture and Heritage. It has always provided guidelines for the township as well developers. This document should now be really put to good use and together with the Heritage Act, would enable the work in Levuka to be more responsive to the reequipments of conservation and adherence to international requirements for heritage and culture.

In addition to the detailed architectural documentation and specifications, the Levuka management plan must be a reference for all and any repair works, maintenance and conservation for this case study as it is an integral part of the management of the Levuka World Heritage Port Town.

Need 3: Develop a Hybrid Conservation / Restoration for Fiji

There needs to be a Hybrid guideline or system for Maintenance, repair work and conservation development and adapted, based on the Japanese model but tailor made for the Fijian setting that still fits within the requirements of UNESCO and does not impeach on the requirements of World Heritage conditions. This system should work with local materials, systems and knowledge to maintain the authenticity and relevance of the qualities that contribute to the conservation of the buildings or monuments.

This is an area that may need to be really explored so that maintenance and conservation work in Fiji can be tailor made to suit the materials available in Fiji with the repair techniques used in Japan to be studied in detail to see if there are possibilities of developing a hybrid version for the repair of the case study residential building to suit the Fiji condition and materials but to stay within the requirements of the World heritage Standards. This case study would be an opportunity to see if this would work.

Need 4: Training of Architects, Engineers, Draftsmen and Carpenters

There is a need for more training to be conducted for Architects, Engineers, Draftsmen and carpenters in Levuka. Currently there are no architects in Levuka, there are very few drafting technicians and a few carpenters. Architects are only on the mainland and only come to Levuka on a needs basis or when there are major projects happening on Ovalau Island. There are workshops and training sessions conducted sometimes but this is mostly when there are international experts in the country and mostly JICA has conducted training in Levuka for carpenters. The nature of the economy and location of Levuka is such that a lot of young people leave the island for the mainland for education and employment. Many also leave Fiji to work offshore in Australia and New Zealand. Training must be supported with good remuneration for those that choose to stay back in Levuka to work within the World Heritage town.

The Case Study Building as well as the 9 buildings that have been selected for the Government funded repairs and restoration is part of a training program for the local carpenters in Levuka that involves specialists from Japan through JICA, specialists from the mainland as well as officials and trainers from the Ministry of forestry in Fiji, National Trust of Fiji, Department of Culture and Heritage as well the government departments that are on the ground in Levuka such as the Provincial office, the National Fire Authority and the Levuka Town Council. The participation of all the stakeholders demonstrates a collaborative effort from government to ensure that this first repairs begin a process that will continue into the future.

References:

Levuka Mangement Plan, Department of Culture, Heritage and Arts, 2009, 2010.
Levuka Ovalau Heritage Register, National Trust of Fiji and Department of Culture Heritage and Arts.

Empowering Communities: Conserving Living Knowledge of Javanese Vernacular Architecture (INDONESIA)

Background

Java, Indonesia's most densely populated island, has long been a center of cultural and architectural innovation. Javanese vernacular architecture reflects centuries of adaptation to geography, climate, and social life, embodying a balance between humans, nature, and community (Koentjaraningrat, 1984; Oliver, 1997; Prijotomo & Rachmawati, 1995). These traditions remain visible today, but rapid urbanization and tourism-driven development increasingly challenge their survival.

While vernacular forms carry deep cultural and ecological knowledge, they are often dismissed as outdated or reduced to decorative symbols for tourism (Weichart, 2020). This shift risks detaching architecture from its living context, eroding both meaning and community ownership. Understanding Javanese vernacular architecture as a living cultural form rather than a static heritage asset is therefore crucial to sustaining its relevance in contemporary society.

Issues and Action

a. Tourism and Architectural Conservation: Magelang, Central Java

Tourism and conservation strategies tailored to cultural heritage must be developed according to the unique traits of cultural assets and the types of hazards prevalent in a particular region. This requires collaboration between communities, scholars, and policymakers, ensuring that conservation planning also addresses community needs. Successful heritage conservation depends on all actors working toward shared goals rather than fragmented interests.

Around Borobudur Temple Compound (BTC) there already exist community that depend on their live being from agriculture, tourism, and office workers. In general, they support tourism and conservation as their community identity. With the BTC listed as national priority on tourism development since 2014, the central government has heavily invested in the BTC and surrounding. However, many strategies were introduced through top-down planning without meaningful consultation with residents. As a result, communities give variant responses, ranging from openly accept it to dismiss it by not accepting it in any way. As we discuss with the communities to understand their perspective, we understand that communities are willing to conserve their area and follow the direction from central government as long as they were involved in each stage, but with the reality they were not involved directly. they emphasize the need for continuous consultation rather than one-way communication from the central considering BTC is World Heritage Site.

Figure 1. (above) the typical house that subsidized by the government to bring the ambience of Javanese Cultural Landscape, (below) actual architectural expression of Borobudur Cultural Landscape

One of the top-down intervention is beautification of houses buffer zone of BTC. Government subsidized each house to be look like preferences they brought. All houses were required to follow

predetermined architectural preferences, which often failed to reflect the authentic of BTC Cultural Landscape. Moreover, as we look for the regulation regarding this, we cannot find it, even the ministry officer that we meet can't provide us with proper explanations. From a conservation perspective, this strategy prioritized tourism aesthetics over safeguarding cultural identity. For scholars conducting Heritage Impact Assessments, we observed that such approaches left local communities uncertain about their role in conservation. The top-down approach impacting local communities in bias on what should they done, even though they deep down understand and willing to do the conservation.

b. Living Community: Magelang, Central Java and Special Region of Yogyakarta
Since 2004, the Center for Heritage Conservation (CHC) and Kyoto University (Kanki et al., 2015) have collaborated in Candirejo Village, Magelang, to conduct field schools that highlight both tangible and intangible aspects of conservation. These initiatives stress that heritage is not only about physical structures but also about sustaining community practices and cultural wisdom.
By this annual event, the community growth stronger together, not just conserving the tangible but also living the intangible as their main focus. Which these efforts going along with increasing the tourism to the village, where they offer eco-tourism. The program that we conduct annually help them understand more about their living environment and how to conserve it without exploit. Until now, when the program has been done for several years, the community still intact even there are some issues brought in between, because they have the same goals they will work on it and support each other.

Figure 2. Dwelling environment of Javanese Vernacular Architecture in Rural Area
Source: (Adishakti et al., 2020)

For another case study, in 2006 after the earthquake, with Jogja Heritage Society and CHC working together in documenting the tangible aspect along with intangible aspect that still can be documented in Kotagede are after the earthquake. This resulting a book that published by UNESCO talking about manual book on documenting and conserved a building in Kotagede. Beside published a book (Jogja Heritage Society et al., 2007), CHC also contributed in educated the community about preservation and working with tourism while keeping the cultural wisdom alive in the area.
The case studies of Candirejo and Kotagede illustrate that when communities are directly involved in heritage management, conservation outcomes are more sustainable and meaningful. These initiatives show that community-based approaches not only safeguard tangible and intangible elements of heritage but also ensure that traditions remain embedded in daily life. In contrast, externally imposed, top-down strategies often prioritize short-term tourism goals, risking the loss of authenticity and weakening the community's sense of ownership.

c. Stored and Transfer the Knowledge: Magelang, Central Java
In 2025, we just finished the first book (Saputro et al., 2024) talking about local daily activity around Javanese, from they start the day till sleep, from birth till they died. Many wisdom that gradually vanish by the push of urbanization and modernization in daily life, but it happened before the local wisdom are stored and prepared to be taught to the others or next generation. In this book we work together with Pusat Dokumentasi Arsitektur and UNESCO – Japan Foundation. A long the way writing the book, we

conduct several workshops with the community to gain the knowledge from the source directly. Gaining local phrase that we cannot found suitable words in other languages awoke us that the knowledge itself unlimited, there are a lot we still don't know. This experience illustrates how community-driven **knowledge transfer** can capture cultural depth that formal policies often overlook.

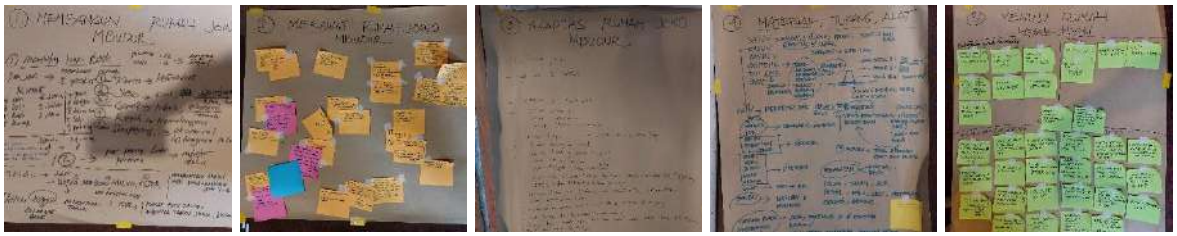


Figure 3. Focus Group Discussion of Javanese Daily Practices surround the house

These cases reveal a recurring pattern: while communities possess both the willingness and knowledge to conserve their cultural landscapes, their efforts are often constrained by top-down interventions, uneven resource allocation, and limited consultation. In contrast, initiatives that emphasize community participation and knowledge-sharing as seen in Candirejo and Kotagede have shown greater success in sustaining both tangible and intangible heritage. This contrast underscores the need for a more collaborative and sustained approach to conservation, where government, scholars, and local communities act in concert rather than in isolation. Building on these insights, the following section outlines recommendations for future directions in empowering communities to conserve Javanese vernacular architecture.

Further works.

a. Building a Collaborative Strategy

There is should clear strategy that elaborate works between each sector for empowering communities in supporting Javanese vernacular architecture conservation. From the government, academia, and communities itself should agree in the same vision and actions steps. The real that have been found in the field was they walks one by one, not together or integrate. As we agree that working on conservation is not one-man work.

Effective conservation of Javanese vernacular architecture requires an integrated strategy that aligns the roles of government, academia, and local communities. Field observations show that these actors often operate in isolation pursuing parallel efforts rather than working together. Conservation, however, cannot be achieved by a single sector alone; it demands a shared vision, coordinated planning, and collective responsibility. Establishing a clear framework for collaboration is essential to avoid fragmented initiatives and to ensure that heritage management balances cultural authenticity, community needs, and tourism development.

b. Sustain Community Workshop and Mentoring

Sustain and consistent in conservation are the keys achieving the goals. Held annual workshop, training, or just public hearing should be conduct as the light spirit on living the conservation in the community, If the community already strong enough they can manage such activity inside, but initiation from the government body or scholar must exist there. With long-term masterplan on educating the community, the workshop and training could help increase the ability of the community to living their living heritage as part of conservation and preservation.

Long-term conservation depends on continuity and consistency rather than one-off interventions. Regular workshops, training programs, and public consultations can strengthen community capacity and ensure that conservation becomes embedded in daily practices. Over time, communities can take ownership of these initiatives, but initial support from government bodies and scholars is crucial. A long-term masterplan for education and mentoring would help local residents not only preserve tangible and intangible heritage but also integrate conservation into contemporary community life.

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Problems and Needs Identified Before, During and After the Conservation and Relocation of Rumah Degil, Kuala Lumpur. (MALAYSIA)

Introduction

Rumah Degil, also known as Rumah Pusaka Chow Kit, stands as a testament to Malaysia's rich architectural heritage. Built in 1926 by Haji Jaafar Sutan Sinombar, a descendant of Sutan Puasa, the founder of Kuala Lumpur, the house is a rare example of traditional Malay timber construction. Its resilience through historical events and urban development earned it the nickname "The Stubborn House." However, with the rapid urbanization of Kuala Lumpur, the house faced imminent demolition in 2013. This report delves into the conservation efforts undertaken to preserve Rumah Degil, highlighting the initiatives, challenges, and needs identified during the process.

Picture 1, 2 and 3 (left to right): Area map of Rumah Degil at Chow Kit, Kuala Lumpur, Malaysia. Source: Google Map, 2026

Picture 4 and 5 (left to right): Original photo of Rumah Degil, 1926 and 2014.

The picture above shows the house in its original form in 1926, and later in 2014 before the conservation works began. The conservation of Rumah Degil was initiated by a collective of heritage enthusiasts, architects, and community members who recognized the house's historical significance. The conservation of Rumah Degil was a collaborative effort involving multiple organizations and experts.

The Rumah Pusaka Chow Kit Working Team spearheaded the initial efforts, focusing on documentation and advocacy to raise awareness of the house’s cultural significance. KC Tan, as the lead architect, oversaw the technical aspects of the conservation, ensuring that the restoration maintained both structural integrity and historical authenticity. Yayasan Hasanah played a crucial role by providing funding and strategic support to facilitate the project’s execution. The National Heritage Department contributed regulatory guidance and assisted with the complex relocation process. The National Art Gallery became the new home for Rumah Degil, integrating the house into a broader cultural landscape where it could be appreciated by the public. Additionally, Pertubuhan Akitek Malaysia (PAM) offered architectural expertise and resources, further supporting the successful conservation of this important heritage structure. Together, these entities collaborated to dismantle, transport, and reconstruct Rumah Degil, preserving its historical and architectural essence.

The case study summarizes some of the affected situations and the process of conservation and relocation. Three key issues were identified, categorized by their level of severity:

Problem 1: Structural Degradation

Rumah Degil, constructed with traditional Malay timber joinery, has experienced significant structural wear over time. Its original design, relying on interlocking wooden joints without nails, is vulnerable to moisture, termites, and natural aging of timber. Foundation beams and floorboards show signs of rot and weakening, while roof trusses have small fissures affecting load distribution. Past untrained repairs using incompatible materials like metal brackets or cement have also worsened stresses in the structure. Restoring structural integrity requires careful reinforcement using traditional methods such as wooden dowels and pegged joints to maintain authenticity while ensuring safety.

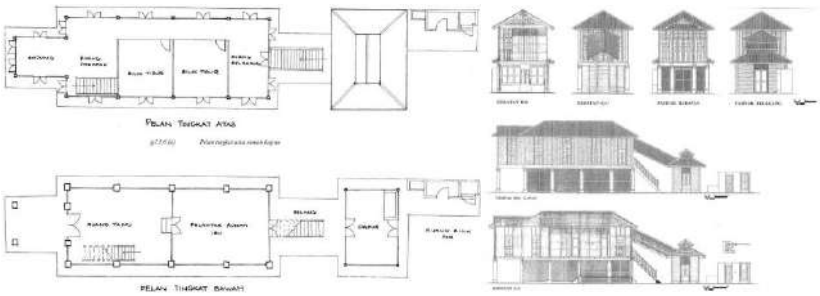
The timber structure, built in 1926, had been left largely unattended for decades. Termite infestation, together with rot and weathering, had weakened many of the original timber members. When dismantled in 2014, several beams were found to be badly infested with termites, requiring selective replacement using matching cengal timber. The fragile condition of its timber was one of the reasons the dismantling process in Chow Kit had to be done manually, beam by beam, instead of using heavy machinery. The relocation also revealed weaknesses in the original stilts, prompting reinforcement during reconstruction at the National Art Gallery.

Picture 6, 7 and 8 (left to right): Rumah Degil timber structure showing partial damage and salvaged sections.
Picture 9 (right): Entrance view facing outward.

Problem 2: Loss of Traditional Craftsmanship

The conservation of Rumah Degil revealed a scarcity of skilled artisans familiar with traditional Malay timber construction. Techniques such as mortise-and-tenon joinery and pegged connections are specialized skills, passed down orally through generations. With modern construction methods dominating, few craftsmen remain to carry out authentic restorations. During Rumah Degil's reconstruction, the project relied heavily on one or two remaining master carpenters, highlighting the fragility of this knowledge base. Even with expert carpenters involved, some replacement joints had to be simplified because the original level of detailing could no longer be fully replicated. Without systematic transfer of skills, future conservation of similar Malay timber houses may face insurmountable obstacles.

Lack of appropriate training programme, apprenticeships, and active community participation are critical. Engaging younger generations, supporting artisans, and fostering local stewardship ensure sustainable preservation of both tangible structures and traditional knowledge. This gap risks introducing modern shortcuts that compromise the house's architectural integrity. Preserving these skills is essential not only for Rumah Degil but also for safeguarding broader heritage knowledge for future projects.



Picture 10 and 11 (left to right): The measurement drawings done by Universiti Teknologi Malaysia in 1997.

Pictures 12: (Above) shows the documentation inventory and original and later added element identification during dismantling.

Problem 3: Environmental and Urban Pressures

Rumah Degil faces threats from both environmental conditions and urban development. High humidity, rainfall, and occasional flooding accelerate timber decay, while changes in urban infrastructure, including road expansion and commercial development in the Chow Kit area, once endangered the house with demolition. Before relocation, the house stood in a dense urban pocket of Chow Kit, where rising land value and development pressure made its survival highly unlikely without urgent intervention.

Relocating the house to the National Art Gallery compound provided protection but also removed it from its original context, affecting its intangible heritage value. Additionally, modern urban conditions introduce pollution, vibrations, and increased visitor traffic, all requiring careful management to balance preservation with public accessibility. The relocation saved the house structurally, but separated it from its social and cultural environment in Chow Kit where its meaning was deeply rooted. Today, its interpretation depends on curated exhibitions, rather than the lived experience of the original community.

Picture 12 and 13 (left to right): shows the urban pressures of modern shop offices development around the Rumah Degil.

Based on the above case study problems, I concluded two possible needs, which are:

Need 1: Comprehensive Conservation Guidelines

The conservation of Rumah Degil underscored the necessity for comprehensive guidelines specifically tailored to traditional timber structures. These guidelines should include standardized assessment protocols to evaluate the condition of timber accurately, as well as restoration techniques that uphold traditional craftsmanship while ensuring structural integrity. Recommendations for materials compatible with traditional construction methods are also essential to prevent future deterioration. In addition, strategies to mitigate environmental factors, such as humidity, rainfall, and pest activity, must be incorporated to protect the timber over time. Implementing such guidelines would establish a robust framework for future conservation efforts, ensuring consistency and quality in preserving Malaysia's wooden heritage.

The absence of clear national standards meant that Rumah Degil's conservation team had to rely on case-by-case judgment, combining traditional methods with modern conservation science. A formal guideline would have provided consistency and avoided the need for ad-hoc decision making during dismantling and reconstruction.

Need 2: Skill Development and Community Engagement

The success of Rumah Degil's conservation highlighted the critical role of skill development and community engagement in heritage preservation. To sustain these efforts, it is essential to establish training programs through institutions that offer courses in traditional carpentry and conservation techniques. Apprenticeship opportunities should also be provided, allowing experienced artisans to mentor younger generations and pass on specialized knowledge and skills. Equally important is the active involvement of local communities in conservation projects, fostering a sense of ownership and pride in their cultural heritage. By investing in both skill development and community engagement, Malaysia can ensure the ongoing preservation of its wooden heritage for future generations.

Rumah Degil's rescue was made possible largely by passionate individuals and private initiative, showing how community awareness can drive heritage action even without government leadership. Future projects would benefit from structured collaborations where communities, artisans, and institutions work hand in hand.

Conclusion

The conservation of Rumah Degil serves as a model for preserving traditional timber structures in Malaysia. Through collaborative efforts, traditional craftsmanship, and community involvement, Rumah Degil has been successfully preserved and integrated into the cultural landscape. The challenges encountered during the conservation process underscore the need for comprehensive guidelines and skill development to sustain heritage preservation efforts. As Malaysia continues to modernize, it is imperative to balance development with the preservation of its rich cultural heritage, ensuring that structures like Rumah Degil continue to tell the stories of the past for future generations.

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Case study: Challenges in Community-Led Re- construction of *Shantighat Bajradhatu Harati Ajima* Temple, *Shri – Gha, Nahghah (*NEPAL)

Community-led conservation through User's Committees (*Upabhokta Samiti*) has become a central approach for heritage preservation in Kathmandu, particularly after the 2015 Gorkha Earthquake. This case study focuses on the reconstruction of the *Shantighat Bajradhatu Harati Ajima* Temple at *Shree-Gha*, Kathmandu, examining the opportunities and challenges of this participatory model.

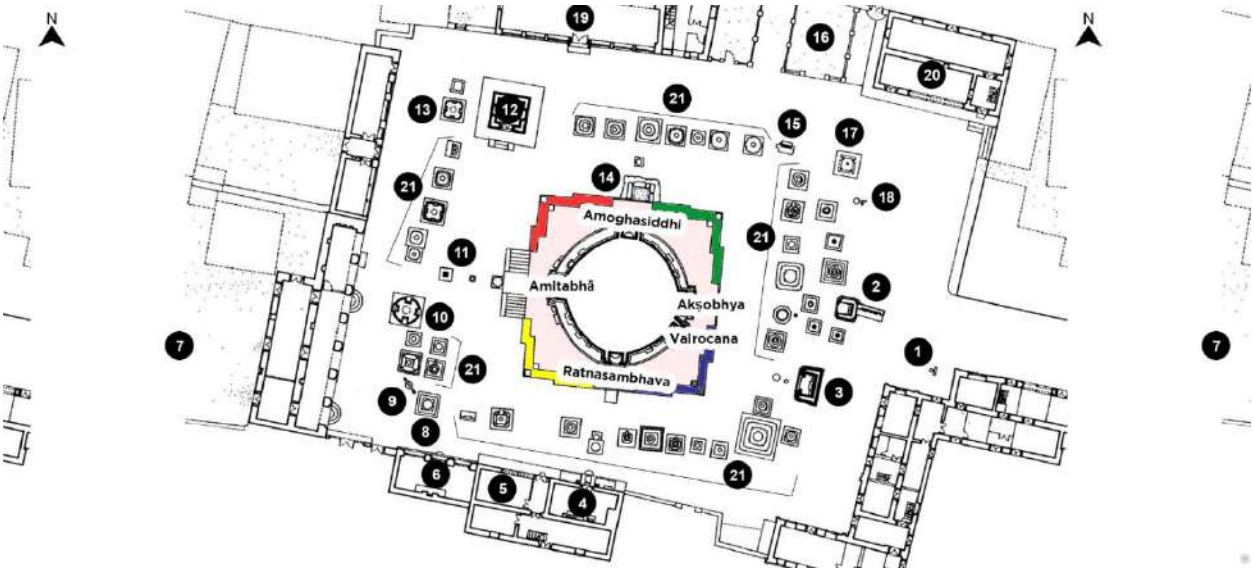

Figure 1: Shri Gha Bah premises with location of harati ajima temple at no 12 (MONA,2024)

Figure 2: Shri gha Chaitya (MONA,2024)

On the December of 2022, a user's committee by the name of "*Shri Shantighat Vajradhaatu Chaitya Mahabihaar Samrakshyan Samiti*" applied for their interest in reconstruction of *Shantighat Bajradhatu Harati Ajima* Temple located at *Shri – Gha.* It is part of *Shantighat Baha* courtyard in the inner core city sector of Kathmandu Metropolitan city. At the center of the court lies *Shrigha Chaitya,* a large dome shaped mound of brick, plastered on outside with lime and painted white. Resting on two level of brick plinths, it is topped with wooden *trayodashabhuvana* covered with copper and crowned with gilded parasol for protection. It is also known as *Kathe Swayambhu* referring to its wooden construction and replication to *Swayambhu Chaitya*. Adjacent to *Shri gha chaitya* is the temple of Goddess *Harati* resembling the presence of goddess at *Swayambhunath*. The temple of *Harati Ajima* is a pagoda-styled, small, two-storied temple with gilded copper roof resting on intricately carved struts. The need for conservation of this monument emerged from its severity of damage from the Gorkha Earthquake of 2015, the west wall of first window had shear cracks and North wall was weak, there was an overall drift of the structure towards the left side. The wooden ceiling of the ground floor was budging down and pigeon droppings could be found everywhere. Overall, the temple structure was damaged due to the disaster and lack of the maintenance.

Figure 3: completed photo of Harati ajima Temple (MONA,2024)

The locality inside the courtyard is mainly *Buddhists* especially belonging to *Shakya* clan. The User's committee was also a group of people belonging to the same clan and locality as the provision in the procurement act the user's committee needed to be the ones who directly benefit from the implementation and operation of the project. The committee was formed by formally registering in the municipality and a contract was signed where the responsibility of the committee was to build, operate, manage and maintain the project. The funding model allocated 95% of costs to the municipality and 5% to the community. I was involved in this project as a project Architect who was assigned for supervising the project and providing technical assistance during the whole implementation phase. This type of participatory program is considered to be effective in delivery of high quality, technical compliance, building ownership, community engagement and capacity building in decision making within the principles of sustainability. Local involvement also ensures that socio-cultural rituals and traditional practices are respected during the conservation. This system is similar to Japanese System, where the finance in borne by the government and the community in the proportional basis. However, there are limitations in this type of modality, first being limited financial capacity on the part of committee and legal provision that uses cap in the budget for similar community -led projects.

The reconstruction of *Shantighat Ajima Temple* is a success story in terms of authentic heritage conservation. The user's committee adhered to traditional conservation principles, ensuring the project maintained cultural and historical integrity. Despite its success, the project was not flawless due to internal and external factors. Issues were raised at the beginning, during implementation and after the completion of the project such as insufficient funding emerged during the project, post- project maintenance issues and installation of iron railings to address local trafficking concerns emerged which deviated from traditional aesthetics. The issues emerged are outlined as below:

1. **Issue 1: Lengthy administrative procedures and unclear legal issues**

   As provisioned in the procurement Act, the procurement of works through participation of user's committee model has its limitations. Firstly, this type of participatory program should be aimed to create employment at the committee level, limited to the estimated within 10 million rupees (with V.A.T, overhead and contingency) but payment is to be made to the committee after deducting value added tax (13%), overhead (15%) contingency (2.5%) amount and portion of public participation (5% in this case). This provision has already diminished the maximum amount that the committee could have received since after the deduction the contribution is diminished to (100-13-15-2.5-5 = 64.5%). The committee complained about the high valuation of the project is reduced after the deduction as mentioned in the procurement regulation.

   At the beginning of the application process, the user's committee has to go submit citizenship card, tax clearance certificate, user's committee registration, project application form, recommendation letter from

the ward, etc. The procedure for submission is manual and they have to visit the institution in person every time unless the application is complete. Even after the completion of application they have to wait for 1-2 weeks to delineate the percentage of their contribution which is decided by the head of organization. As the result whole of the process takes time and is lengthy. After the submission, they have to deposit the amount in the respective bank account then file application for signing contract. Similarly, for taking installments of the project, they have to visit the office for application, wait until the bill is approved before receiving any amount.

As per procurement act, all the works to be done under user's committee needs to be finished within a year. However, practically all the conservation works takes more than a year pertaining to mandatory intangible customs or *puja*/ worship to be performed for good luck during all the major steps involved. In this case study, there were at least 8 such ceremonies (*Kshama puja, Praisara puja, Nyasa* dismantling *puja, Jaga puja, Pata puja, tonasin, Dhalin puja)* were performed. Similarly, in the committee's experience, setting time taken for traditional lime-*surkhi* (brick powder) mortar is time consuming in comparison to modern cement mortar and absence of labor during holiday season also asks for extra time extension for completing the project on time. The committee hence finds the bureaucratic process manual, lengthy multi- step application process, non- transparent and inefficient.

Need 1:

a) Revision of the provision of regulation in case if the committee volunteers for project valued greater than 10 million rupees and removal of time constraint.
b) An online portal could reduce time, cost and improve accountability.

2. **Issue 2: in competitive government rate and hidden cost creating insufficient funding for the community**

All the conservation project requires to use government approved rate. During the handing over function, the community complained that there is a disparity between government- approved rates and the actual market prices for labor and materials. The non-regulated market in the absence of monitoring is exerting financial burden for the community. Unique project requirements such as specialized brass lamp (*dalucha*) for the temple and sometimes needs specific intervention for which there is no official rate (cost required to perform cultural rites while carrying out the conservation works) creates hidden cost straining the committee for extra finance. Unlike traditional *guthi system,* where user's committee were self-reliant to sustain expense for socio -cultural ritual, the committee's now have to rely on metropolitan city for finance, creates heavy reliance towards the government funding which in turn diminishes community ownership and financial burdens to perform maintenance and operation performance. In this case, the user's committee had to add extra one third of the cost from donation to finish the conservation work as the government funding was not enough to sustain the hidden cost.

Need 2:

a) Update government rates to reflect actual market prices and include provision for hidden costs to reduce financial strain.
b) An online portal could reduce time, cost and improve accountability.

3. **Issue 3: Absence of comprehensive conservation planning and management framework**

The time cap on the user's committee procurement project creates time constraint due to which most of the projects are started without proper conservation plan. This also suggest lack of technical capacity of technical engineers in the field of conservation and also the institution is not well equipped with laboratory to put up a realistic picture in construction projects Without careful analysis, the re use of the materials was unscientific and therefore resulted in an estimate where there were many hidden costs involved. During dismantling and during conservation works carried out, there was no provision for documentation for future

reference and usually the conservation works are performed in complete privacy and public entry is restricted. During the dismantling process, the user's committee from their past experience, recorded and created inventory of every element which made the reconstruction work systematic. But this is not always the case. There is lack of proper guidelines for maintenance of the structure Although this project was a true conservation project, the user's committee could not refrain from putting iron railings around the temple for security reasons to prevent from local traffickers. This suggests weak documentation and transfer of knowledge, unscientific material reuse, inadequate engineering expertise and absence of quality-control laboratories creating inefficiency.

Need 3:

a) Implementation of standardized documentation processes to facilitate knowledge transfer and improve future project outcomes.
b) Establish mandatory maintenance framework to ensure long-term up keep of conserved structures.

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Photographs source: Museum of Nepali Arts Kathmandu website url : https://mona.com.np/srighah/

Challenges and their remedies of Tripureshwor Mahadev Temple, *Sattals* and Garden Area, Kathmandu (NEPAL)

Tripureshwor Mahadev Temple is a three-tiered temple, Malla style architecture built in 1818 A.D. by a Shah dynasty queen in the memory of her husband king Rana Bahadur Shah. It is one of the third biggest temple of Nepal. The temple premises covers a main temple with a surrounding long sojourn buildings called *sattals* on all four sides and a garden area on the south facing Bagmati River. On 2015 earthquake, this heritage premises was devastated and in the state of disrepair even before the earthquake.

Kathmandu University Department of Music led by Dr. Lochan Rijal initiated a vision of amalgamation of tangible and intangible cultural musical heritage on this site in collaboration with the Government of Nepal, Guthi Sansthan and Department of Archaeology. The main purpose of the project is to transmit the knowledge of oral tradition we have in music of Nepal to academia. Also, to adaptive reuse this heritage site for the Department of Music to revive the culture, music, traditions back to its original state.

Picture 1: Tripureshwor Mahadev Temple after restoration.

There were various challenges amongst them the important ones are mentioned.
Challenges in restoration:

1. Governance: The restoration project faced long delays due to complex governance procedures. Although the preservation and protection of heritage sites and monuments are the responsibility of the Department of Archaeology, Ministry of Culture, and Guthi Sansthan, the monument in question remained neglected for over 50 years. When Kathmandu University stepped forward to initiate restoration using its own resources through concerts and fundraising events, it took the Government of Nepal more than three years just to decide whether the project leadership could be entrusted to the University.

Multiple permissions were required from various institutions: the Ministry of Culture, Ministry of Education (as KU is an academic institution), Ministry of Finance, Kathmandu Metropolitan City (since the monument lies in Kathmandu District), Department of Archaeology (as the monument is over 200 years old and falls under the Monument Act), Guthi Sansthan (as the land and property are registered under it), and later the National Reconstruction Authority (NRA), which was formed after the 2015 earthquake caused further damage.

The bureaucratic delays meant that despite continuous follow-ups, securing government approval took nearly three years. Such processes should be made more efficient, as many cultural heritage sites in Nepal still await restoration. Institutions willing to take the initiative should be given priority, and governance should facilitate rather than hinder restoration efforts, while ensuring compliance with the relevant rules and acts.

2. Illegal Settlements and their management: This site had long been occupied illegally by nearly 80 families who had lived there for generations, and the government was unable to address the issue effectively. Since the property belonged to Guthi Sansthan, Government of Nepal, it was their responsibility to manage the relocation. According to the agreement with Guthi Sansthan, reconstruction could only begin once the squatters were removed. However, Kathmandu University's project director, Dr. Rijal, had to personally take the lead in this process.

Picture 2: Illegal settlement on buildings in the state of disrepair, Bagmati riverbank.

It took almost 10 years from the start of the project in 2015 to relocate 76 families, though some still remain. Weak government policies and management meant that many of the residents did not comply with relocation directives. To overcome this, Dr. Rijal adopted a unique strategy by living among the squatters for eight years, gradually building trust. He also engaged some of them in the restoration work by offering jobs as heritage builders, laborers, and security guards under KU. This approach made much of the progress possible, but the presence of remaining families continues to delay the project and create obstacles.

3. Heritage Artisans: Nepal is rich in historic monuments, cultural traditions, and traditional craftsmanship, but much of the knowledge and artistry that built these spaces has been lost over time. During the post-2015 earthquake reconstruction, we faced a critical shortage of artisans skilled in traditional techniques required for rebuilding monuments. Only a few individuals from older generations still carried this expertise, making the rebuilding process extremely difficult. Adding to the challenge, younger generations often preferred pursuing modern professions shaped by college and university education, rather than following their ancestors' traditional crafts.

Picture 3: An experience heritage artisan (carver cum carpenter) in repairing one of the struts of temple.

To address this gap, we engaged younger generations and descendants of families with ancestral knowledge in heritage construction. By encouraging them to participate as artisans, we revived traditional skills, ideas, and techniques while also offering them meaningful opportunities in heritage preservation. This not only enabled the reconstruction of damaged heritage buildings but also helped bridge the divide between modern education and traditional craftsmanship, ensuring the continuity of cultural knowledge and artistry for the future.

4. Sal wood (*Shorea robusta*), one of the most important timbers of Nepal, is a key component of the country's natural forests and community forestry programs. Known for its exceptional strength and durability, it is highly valued and often chosen for heritage restoration works. As a protected species under Nepalese forestry law, its trade and use are strictly regulated.

Picture 4: Salwood in use as rafters for sattal building roofs and new generation on work.

Despite being the best available timber in terms of quality, restoration projects often require large quantities of wood in varied shapes, sizes, and dimensions, which created significant challenges. Obtaining large sections of sal wood in the required measurements proved difficult. To address this, we had to enter into an agreement with the Nepal Forest Institution (*Nepal Ban Nigam*) to ensure access to good-quality timber at a reasonable cost. However, the process remained time-consuming and required extensive effort, particularly in sourcing timber from forests located across the southern regions of Nepal.

Reflections on the 2016 Restoration Project of the Sibonga Convent in Cebu, Philippines

In 2013, a 7.2-magnitude earthquake hit the provinces of Bohol and Cebu where many cultural properties were devasted, most of which are religious buildings constructed during the Spanish colonial period. The national government allotted budget for the restoration of select cultural properties. Savings from this budget under the National Historical Commission of the Philippines (NHCP) was then allocated to restore other structures including the convent of the Nuestra Señora del Pilar de Zaragoza Parish in Sibonga, Cebu.

The Sibonga convent, built in 1839, is an example of a *bahay na bato* (literally translates as stone house) made of coral stones and wood. Its wooden components include the floorboards, windows, doors, truss and the *volada* – an overhanging gallery which is a distinct feature of a bahay na bato. Before the restoration, the old convent was in a dilapidated state with many alterations and interventions that damaged its original fabric, though it may be done in good faith to repair and sustain its function. The project aimed to (1) restore all intact original parts of the structure such as the masonry walls, doors and windows; (2) reconstruct parts are useful for its end users such as the reconstruction of the rear volada; and (3) rehabilitation of the parts which posed danger such as the replacement of roofing sheets and the rehabilitation of the dilapidated truss system. Aesthetically, the project aims to restore the structure as much as possible to be close to its original design by highlighting its prominent features which are the masonry walls and the volada walls. New materials and methodologies were used in reconstructing the rear volada but similar materials were still used for the walls.


Figure 1 (left) showing the façade of Sibonga convent before the restoration and Figure 2 (right) showing after the restoration.


Figure 3 (left) showing the rear part of Sibonga convent before the restoration where the original volada does not exist anymore. Figure 4 (right) showing restoration of the volada with new materials.

I handled this as my first project when I started with NHCP nine years ago and there are many things to realize as I look back which should be noted. To briefly discuss some of the issues we encountered, I will focus on the matters affected Sibonga church concerning proper documentation, protection system, and management.

First is the issue with **lack in proper documentation**. Part of the scope for this project is the rehabilitation of the second flooring materials wherein the dilapidated original floorboards were replaced. The flooring raised concern to the priests and its users since it is unstable and creaking. New hardwood floorboards were procured and installed by the contractor while the dilapidated floorboards were piled up and turned over to the convent personnel at the time. It was agreed upon with the stakeholders that these wooden components shall be secured by the parish. Unfortunately, it was not monitored that the contractor was not able to provide a documentation that the floorboards were turned over to the parish. Problem arose when the floorboards went missing and the contractor, along with the NHCP, was blamed for it.

Second, a thorough investigation should have been conducted to **provide better preventive measures for disaster risk reduction**. In 2021, Super Typhoon Odette (international name, Rai) hit the

Philippines and affected many cultural properties in Cebu including those restored after the Bohol-Cebu earthquake and the Sibonga convent. Just three years after the completion of its restoration in 2018, the old convent is needing an even greater and immediate roofing repair. The roof of the Sibonga church and convent was reported to be severely damaged that the church was closed to the public and the convent considered to be not livable. Although Typhoon Rai was known to be an extremely deadly typhoon, better **countermeasures could be studied** to be applied to the protection of cultural properties at large and invested on to avoid such aftermath. To this day, no major interventions were made yet, but design and engineering studies were conducted for possible rehabilitation.

Figure 5. Aftermath of Super Typhoon Odette

Lastly is the concern on establishing **proper property management to ensure the conservation and protection of its attributes**. As mentioned, the volada is a distinct feature of a bahay na bato. This area functions as a protective buffer to the heat of the sun and, originally, as a passage area for servants to go across the rooms without passing through the main hallway. Before the restoration project, it was found that the original wooden floorboards were covered with concrete, and toilet and bathrooms were constructed in it. These were removed and a new toilet and bathroom was constructed adjacent the reconstructed rear volada. With proper understanding of the structure and better property management system, I think it could be avoided to implement such interventions that would compromise the integrity of a cultural heritage and to promote a better approach to its protection and conservation.

Figure 6 (left) toilet located along the volada and Figure 7 (right) the volada hallway after the restoration.

A Case Study of the Gabaldon School Building at
Placido del Mundo Elementary School, Quezon City, NCR, Philippines

Identified Problems and Needs in the Preservation and Rehabilitation of the Gabaldon School Building at Placido del Mundo Elementary School, Quezon City (PHILIPPINES)

In September 2023, the Quezon City Planning and Development Division (QCPDD) sent a letter to the National Commission for Culture and the Arts (NCCA) requesting technical assistance to inspect and evaluate the current condition of the Gabaldon school building at Placido del Mundo Elementary School, in line with the proposed rehabilitation and improvement of the said cultural property. The school plans to celebrate their 100th anniversary of the Gabaldon school building in 2024; hence, the school aims to restore the structure to its pristine condition.

Picture 1. (left) Main facade of the Gabaldon school building. Source: C.Bautista, 2023
Picture 2. (right) Concrete stairs for the entrance to the school building. Source: C.Bautista, 2023

According to Section 5 of Republic Act No. 11194, known as the Gabaldon School Buildings Conservation Act, any changes to Gabaldon school buildings in the Philippines are strictly prohibited. This includes modifications, destruction, demolition, or relocation. In cases needing conservation measures, the Department of Education (DepEd), in coordination with the NCCA, the National Historical Commission of the Philippines (NHCP), and the National Museum of the Philippines (NMP), is mandated to provide technical assistance to school heads to ensure that the original architectural design of the school buildings is preserved. In October 2023, personnel from the Declaration and Public Heritage Section of the NCCA, together with a conservator-architect from the NMP, conducted a technical inspection and evaluation of the cultural property. The assessment was limited to visual evaluation and photographic documentation.

Description of Structure

The Gabaldon school building in Placido del Mundo Elementary School is located along Quirino Highway, Novaliches, Quezon City, NCR, Philippines. It is situated at the center of the compound and can be seen immediately upon entering the school premises. The structure is bounded by the school library building on the left and the school stage on the right. Its design is similar to the Standard Plan Type No. 10, which typically consists of six (6) to nine (9) rooms, including a storeroom and an office.[1] However, it was observed that the configuration of this structure forms a "T" shape, which differs from the Standard Plan Type No. 10 designs approved by the Bureau of Education in the early 20th century. The Gabaldon building has a footprint of approximately 632 square meters, with dimensions of around 52.7 meters in width and 31.9 meters in length. It is a wooden-type structure constructed entirely of hardwood, including its posts, beams, walls, floors, ceilings, and roofing system.[2] The building originally consisted of six (6) classrooms measuring 7.00 x 9.00 meters each, but these were later subdivided into 12 rooms to accommodate the increasing number of students. The *silong* (ground level) was also converted into a classroom since the elevation of the structure was high enough to accommodate young students. At

[1] Segovia, M.K., Lareza, A.L., et.al. (2021). *The American Colonial Public School Buildings in the Philippines: The Archival Materials.* National Commission for Culture and the Arts.
[2] Department of Education. (2022). *Gabaldon Schoolhouses: DepEd's Preserving Heritage and Patrimony.* Department of Education.

present, the building is used as an administrative office, an audio-visual room, and a storage area, as its current condition has been deemed unsuitable for classroom use and unsafe during the rainy season.

Picture 3. (left) Interior of the classroom converted into an office and clinic. Source: F. Quito, 2023
Picture 4. (right) Wooden jalousies closed due to the conversion of the structure into an audio-visual room. Source: F. Quito, 2023

Problem 1: Absence of Archival Documentation of the Gabaldon School Building

During our inspection, the main issue raised with the Department of Education (DepEd) and the Quezon City Government was the lack of archival documentation and original or as-built plans. No documents were provided prior to the site visit, which made it difficult for the inspection team to assess the historical development of the property in relation to the proposed rehabilitation works. Proper documentation is essential to identify the original portions of the building and to verify whether the construction materials used since its establishment remain intact.

The inspection further revealed significant alterations, particularly in the flooring materials, as well as modifications in the configuration of interior spaces to accommodate the building's new functions. However, due to the lack of records regarding the replacement of flooring and reconfiguration of spaces, it was not possible to identify when these modifications were carried out or determine the condition of the property at the time such changes were implemented. This information was deemed crucial in guiding the recommendations and approval process of the national cultural agencies for the proposed rehabilitation project.

Picture 5. (left) Change of wood flooring. Source: F. Quito, 2023
Picture 6. (right) Damaged flooring covered with phenolic board. Source: F. Quito, 2023

Problem 2: Absence of a Conservation Management and Rehabilitation Plan

Our inspection also highlighted that it was not clear whether the school administration and local government intended to restore the Gabaldon building for classroom use or keep its current function as an office and audio-visual room. The absence of a clear rehabilitation plan poses challenges in determining

the appropriate conservation approach, as the intended function of the building directly influences the scope of rehabilitation and the level of intervention required.

The lack of a Conservation Management Plan (CMP) further complicates the process of identifying which areas may be altered and which must be restored to their original state. In accordance with Republic Act No. 11194, the original architectural design of Gabaldon school buildings must be maintained, with the façade and other defining features preserved. Such compliance cannot be achieved without a thorough study of the property. This issue stems from the weak enforcement of the law and the limited number of conservation architects and firms qualified to prepare such documentation.

In 2024, the Department of Education (DepEd) initiated efforts to provide Conservation Management Plans (CMPs) for all listed Gabaldon buildings under its jurisdiction. However, the specific CMP for Placido del Mundo Elementary School has not yet been completed due to the prioritization of other structures as determined by the government. This gap poses a significant risk of delays in the proposed rehabilitation project and raises the possibility of non-compliance with RA 11194 if interventions proceed without the necessary conservation framework.

Problem 3: Limited Institutional Capacity and Compliance with the Gabaldon School Buildings Conservation Act (RA 11194)

One of the major issues I see behind the absence of archival documentation and conservation management plans is the shortage of professionals and technical personnel with the necessary expertise in heritage conservation. Since the enactment of the National Cultural Heritage Act in 2009, conservation practice in the Philippines has continued to evolve, but significant gaps remain. The limited number of conservation experts increases the risk of further deterioration of wooden heritage structures, particularly as the country's tropical climate exposes timber to high levels of moisture and weathering. Without trained professionals and proper documentation, interventions may compromise the architectural authenticity and historical integrity of the Gabaldon buildings. Moreover, the lack of specific conservation guidelines for the structures presents a further challenge to the effective implementation of the law. The existing Implementing Rules and Regulations (IRR) of RA 11194 do not provide clear procedures for the proper conservation of these structures which might result in inconsistencies in practice and uncertainty in compliance.

Based on the above problems, I concluded three (3) possible needs, which are:

Need 1: Comprehensive Study and Documentation of the Gabaldon School Building

It is necessary to begin with a thorough study of Gabaldon school buildings, prioritizing those in need of repair and restoration. As the Gabaldon building at Placido del Mundo Elementary School has been identified as requiring rehabilitation to become fully functional, a comprehensive study must be conducted to guide the proper implementation of interventions. This study should begin with complete documentation, including archival research, as-found drawings, geotechnical assessments, and material analysis. The resulting documentation will serve as the foundation for preparing a Conservation Management Plan (CMP), which will define the overall heritage value of the structure, outline acceptable interventions, and establish policies for its maintenance and adaptive reuse. Together, the documentation and CMP will provide the necessary framework to ensure that rehabilitation efforts are compliant with RA 11194 while preserving the building's authenticity and architectural integrity. Furthermore, this process will guide property owners in maintaining the structure and addressing issues promptly, even with minimal external technical support.

Need 2: Strengthening Institutional Capacity and Compliance Mechanisms

We need to strengthen institutional capacity by increasing the number of conservation professionals, training DepEd architects and engineers, local government units, and school administrators, and developing clearer policies for conserving Gabaldon school buildings. Creating a heritage charter specific to Gabaldon structures would provide step-by-step procedures and technical guidance for

conservation architects in carrying out restoration works. In addition, monitoring and evaluation mechanisms must be established to ensure compliance during rehabilitation projects. The government should also appoint a project manager to oversee restoration efforts and submit regular progress reports for proper documentation and accountability. By enhancing institutional capacity, conservation practices will become more efficient, accurate, and legally compliant while reducing delays and preventing further deterioration of Gabaldon school buildings.

Need 3: Regular Monitoring and Preventive Restoration of Gabaldon Buildings

I believe there is a strong need for the Philippines to practice regular monitoring and preventive restoration of Gabaldon school buildings. Given that wood, which is the primary material used in the construction of Gabaldon buildings, is highly vulnerable to moisture, pests, and tropical weathering which accelerates its deterioration. Routine inspections should be institutionalized to track the condition of wooden-built structures, especially its posts, beams, walls, flooring, and roofing systems, allowing issues to be addressed before they deteriorate further. Preventive conservation measures, such as termite control, proper ventilation, and protective coatings, must also be implemented as part of a long-term maintenance program. Establishing scheduled restoration works will not only prolong the lifespan of Gabaldon buildings but also reduce the need for costly large-scale repairs in the future. The government must also take the initiative in conducting repair works to ease the financial burden on property owners and encourage them to maintain their structures. If property owners see the government's efforts in helping to preserve their structures, they may develop a stronger sense of responsibility for protecting and conserving their cultural properties, recognizing their significance not only to themselves but also to the nation.

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Conservation and Management of Wooden Built Heritage in SRI LANKA:

Identification of Problems and Needs in the conservation and restoration of 'Danthapaya Tampita Vihara' (Temple on Pillars) at Ambulugala, Kegalle.

Since the Anuradhapura period, different materials have been used in the construction of Buddhist monastic complexes in Sri Lanka, and by the time of the last kingdom of Sri Lanka, the Kandyan period (15th–19th centuries CE), and the use of wood had gradually increased. The *Tampita Vihara* represents one of the most unique forms of Buddhist architecture in Sri Lanka, especially prominent during the *Kandyan* period. The term *Tampita Vihara* literally translates to *"image house on pillars."* These shrines are built on a raised wooden platform supported by stone pillars, on that wooden platform there is a small wooden image house. It contains Buddha statues, wall paintings, and painted wooden ceilings. Access to the shrine is provided by a short wooden staircase. The use of stone pillars serves not only a structural purpose protecting the wooden platform from moisture, insects, and flooding but also gives a symbolic meaning. By elevating the image house above the ground, it creates a sense of spirituality and sacred separation, distinguishing the holy space from the earth below. There is a wooden floor has been constructed on wooden beams laid across stone pillars. Wattle-and-daub walls on this wooden floor while the roof is supported by wooden columns. The Clay plastering and wooden ceiling provided a base for paintings. Within these *Tampita Viharas* can be seen a wealth of traditional paintings in the Kandyan style, represent various episodes from the life of the Buddha as well as ornamental patterns and decorations.

The *Ambulugala Danthapaya Tampita Vihara*, believed to have been built in 15th century, is an important monument in Sri Lankan Buddhist heritage. The archaeological and written evidence reveal that the Sacred Tooth Relic of the Buddha was once kept in this temple during the period of King *Parakramabahu VI*. Because of this reason that the shrine became known as *Danthapaya*, a name came from the *Pali* word *"Dantha,"* meaning *tooth*.

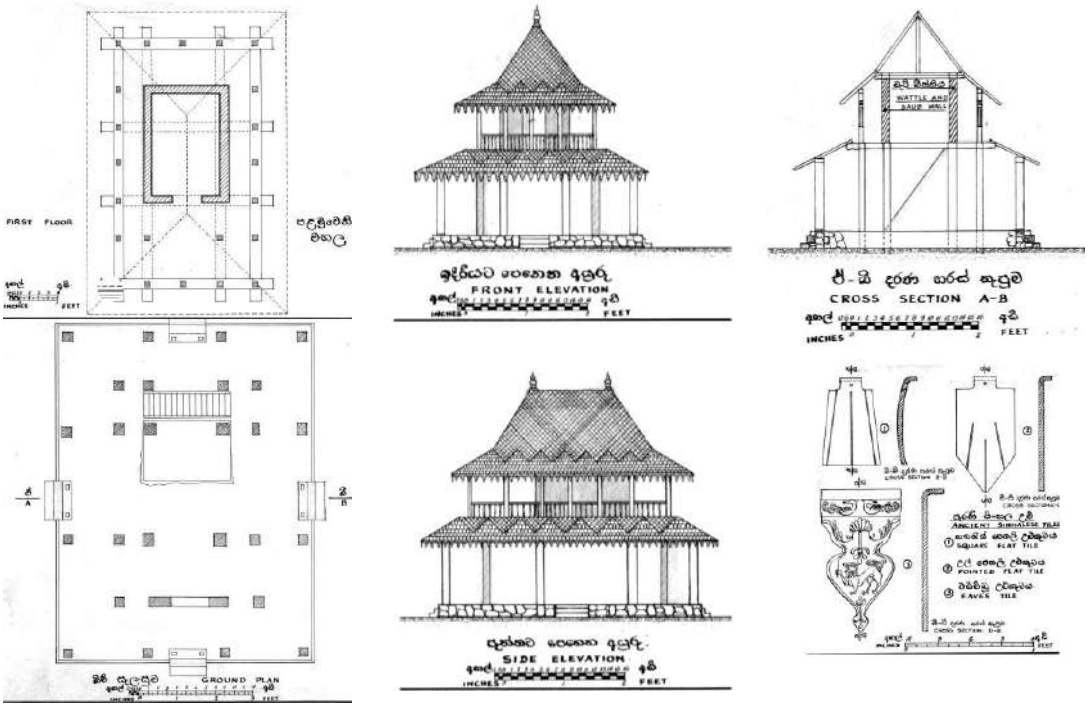

Figure 1,2,3,4,5,6 Plans, Elevations, Sections and tile Details of Ambulugala Danthapaya Tampita Vihara (Source: Conservation report, Department of Archaeology, Sri Lanka. 2024)

This temple was declared an archaeological monument by the government through Gazette Number 1223 of 2011. According to the archaeological administration report of that time, it was first subjected to conservation in 1961–1962. The temple was maintained by the Department of Archaeology, local Buddhist community and the monks. But due to continuous exposure to the environment over the years, damage such as decayed wooden beams on the upper floor, wooden decorated railings, roof structures, and cracked wall paintings became evident. Furthermore, in 2018, part of the temple was severely damaged when a branch of a nearby *'Na' tree (Ceylon Ironwood - Mesua ferrea)* fell onto the structure during heavy rainfall, creating an urgent need for immediate conservation. There was an urgent need to develop guidelines to preserve the authenticity of the bulding in the same time.



Figure 7: Before conservation ***Figure 8:*** After first conservation in 1961 ***Figure 9:*** After the damage has occurred (Source: Conservation report, Department of Archaeology, Sri Lanka. 2024)

A private organization consisting of Buddhist monks and members of the Buddhist community has provided funds for the project, enabling the Department of Archaeology started immediate conservation work on the *Tampita Vihara*.

Assessment of the current condition

Due to the fall of a branch of *Na tree*, the image house constructed by using Wattle and daub walls on the wooden platform has faced to the structural damage and it was in a completely cracked and unstable state. Large portions of the clay components of the Wattle and daub walls have detached, while the interior paintings have developed cracks and were flaking. Several rafters of the roof have decayed, and in the section where the *Na tree* fell, the main rafters, wooden beams, and purlins have been destroyed. The roof tiles in this area have also been broken. In addition, the painted walls and Buddha statues have suffered direct damage from the impact of the fallen tree. Many of the decorative roof tiles on both levels of the *Tampita Vihara* are broken, further decreasing the structural and architectural value of the monument. Moreover, the painted wooden ceiling inside the temple are deteriorating rapidly and were at risk of collapse, posing an urgent threat to the preservation of the structure, its architectural value and authenticity. In this situation, the foremost task that should be undertaken is the removal of the hazardous *Na tree* from the premises.Following a detailed survey of the existing damage before conservation and restoration process, several problems have been identified, which are outlined as follows.



Figure 10, 11: Decayed wooden beams & joineries ***Figure 12:*** Cracked walls with paintings (Source: Conservation report, Department of Archaeology, Sri Lanka. 2024)

Problem No.1: Structural damage and cultural conflict over sacred trees.

The Buddhist community regards the *Na tree* as a sacred tree, worthy of veneration. Although the presence of this tree has placed the *Tampita Vihara* in a state of danger, the community strongly opposed its removal due to its sacred status.

Problem No.2: Availability and authenticity of materials.

Since approximately 90% of the *Tampita Vihara* is wood including the wooden flooring, staircase, handrails, columns, beams, doors and windows, and roof structure. The process of carefully dismantling and labeling the original reusable timber required the removal of many wood components that had been damaged by termites and other pests. The subsequent challenge was finding suitable trees to provide the required quantity of timber. On the result of inspection, conservators determined that the wood obtained during the initial phase was of substandard quality, and consequently, it was rejected and consider as unsuitable for use in the restoration process.



Figure 13, 14, and 15: assembling of wooden joineries
(Source: Conservation report, Department of Archaeology, Sri Lanka. 2024)

Need No.1: Stakeholder and Committee Involvement

There was a committee of experts of multiple stakeholders, each with specific roles and responsibilities for the *Ambulugala Danthapaya Tampita Vihara* conservation project. This group consisted of conservation architects, structural engineers, local community and the professionals skilled in traditional building techniques. They were responsible for conducting surveys, documentation implementing conservation work while maintaining the authenticity and structural integrity of the *Tampita Vihara*. The local Buddhist community has traditionally accorded a special place of reverence to sacred trees, particularly the *Bodhi tree* and the *Na tree*. In this case the *Na tree* is not registered under the Department of Archaeology. All the properties of temples legally protected under Buddhist Temporalities Ordinance (No.10 of 1931). In such circumstances, local community makes decisions guided by their customs and beliefs rather than by the cultural and historical value of heritage buildings. As a result of the guidance and ongoing discussions of the well-organized committee, the local Buddhist community initially hesitant to remove the nearby *Na tree* that was causing damage to the *Tampita Vihara* gradually agreed for its removal. Accordingly, the hazardous *Na tree* was successfully removed as an initial and essential step in the conservation process.

Need No.2: Community participation

Sri Lankan heritage wooden buildings of Buddhist architecture have been preserved for centuries within the Buddhist cultural environment, largely through the regular maintenance and devotion of the local community. They often hold cultural and spiritual connections to this building. Their involvement ensures that conservation work respects traditional practices, religious customs, and local values, fostering community support. In principle, the wood used for repairs or replacements in *Tampita Viharas* must respect authenticity by matching the species and specifications of the original materials. For generations, the wooden elements of these structures have been repaired and safeguarded by the community itself. In recent conservation efforts, the

Department of Archaeology has also actively collaborated with the local community in preserving this *Tampita Vihara.* Therefore they have involved to the conservation work by giving their traditional techniques and skills with spiritual feeling. Such participation also fosters a strong sense of responsibility among the community to safeguard the building. They also made a significant contribution to solving the problem of finding the species of wood required for the conservation work of the *Tampita Vihara.*



Figure 16 and 17: School children, monks and other local community participation for the project
(Source: Conservation report, Department of Archaeology, Sri Lanka. 2024)

Need No.3: Enhancements while Preserving Authenticity

During the conservation, the structure is carefully dismantled while recording and documenting each step. Detailed investigations are conducted on the roof, wooden components, and wattle-and-daub walls, painted surfaces to identify construction techniques, modifications, and parts to be change. All the original wood and roofing tiles that could be used in this conservation process were carefully numbered and safely stored in a temporary shed. Only parts that could not be reused were added. The painted clay walls had been damaged by the fall of the Na tree, and the wooden frame inside the walls had been destroyed, and the first step to be restored was those where the walls were damaged. The Assistance was received from the Chemical Conservation Division of the Department of Archaeology for this. When conserving the paintings, they were preserved without altering their original appearance, and only the cracked and peeling parts were treated. Later, the wooden staircase, wooden beams, joinery, damaged parts of the wooden floor, the roof, and other decorative wooden elements were preserved. Finally A sophisticated lighting system was also installed a feature that was not available before.Illuminating a wooden heritage building after conservation work holds significant importance in attracting the Buddhist community. By linking conservation outcomes with living traditions, lighting ensures that the monument remains both authentic and meaningful within the cultural landscape. This *Tampita Vihara* also highlighted with these additions while protecting the authenticity.


Figure 18, 19: The Tampita Vihara after the conservation and restoration work
(Source: Conservation report, Department of Archaeology, Sri Lanka. 2024)

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Arpichart Kittimethaveenan (Thailand)

Challenges in Conserving Timber Structures at the Holy Rosary Church and the Jim Thompson House Museum, Bangkok *by* Arpichart Kittimethaveenan, Thailand

The Holy Rosary Church in Bangkok, built between 1891 and 1894, is a Gothic Revival building with a massive timber roof structure and one of the tallest historic timber spires in Thailand. The roof covers a span of approximately 36 x 13 meters and supports a spire of 50 meters in height, which carries 16 bells. Much of the original timber structure remains intact, retaining carpenters' marks from the late 19th century. However, later interventions have compromised its integrity. During the restoration of the 1990s, one-third of the timber section at the gutter line was cut to widen drainage, weakening the load transfer system. The roof structure now channels forces directly into adjacent masonry walls, causing stress and damage at critical joints. A recent gutter repair exposed water infiltration and timber decay, leading to localized failure of both the wooden members and the attached historic plaster.

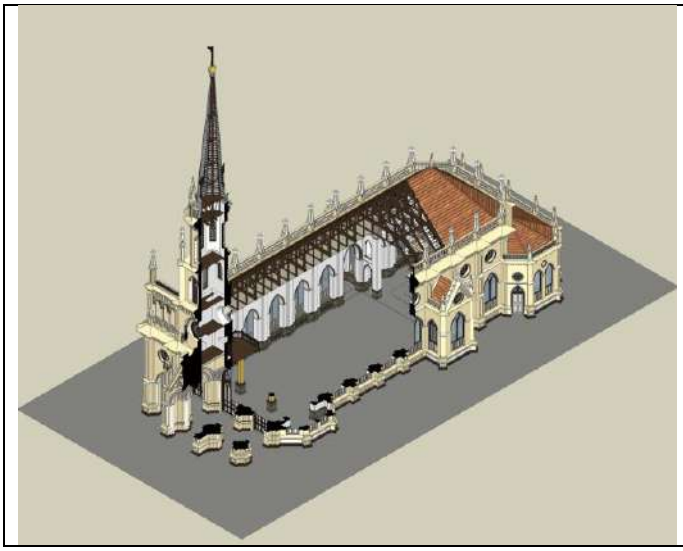

Fig. 1 Isometric drawing of the Holy Rosary Church showing roof and spire structure.

Problem 1: Challenges in Repairing the Roof Structure of the Holy Rosary Church, Bangkok

The key conservation challenge lies at the junction where the timber roof structure rests on the brick masonry walls. This interface combines several functions: structural loading, rainwater drainage, ceiling decorations, and the lath-and-plaster framework of the ornamental finishes. Past alterations have created vulnerabilities in this system, raising questions about both structural integrity and material preservation.

Structural Loading and Alteration of Rafters: During the 1990s restoration, one-third of the timber rafter cross-section was cut away to widen the rainwater gutter. This intervention changed the way loads are transferred from the roof into the masonry. Some engineers have warned that structural failure could occur within decades, yet the modified structure has already stood for nearly thirty years. Still, without formal structural analysis, it remains uncertain whether the current system is sufficient to bear the combined loads of roof tiles, the ceiling, and the spire.

Dampness at Rafter Ends: The widened gutter has also increased exposure of rafter ends to moisture where they abut the masonry wall. This has resulted in persistent dampness, leading to decay of the timber fabric. Rotten timber has already been observed, though systematic strength analysis and repair proposals remain pending. The ongoing deterioration of these connections further threatens the stability of the entire roof system.

Arpichart Kittimethaveenan (Thailand)

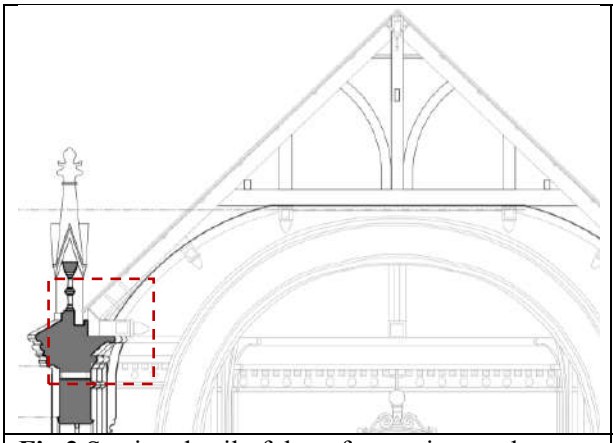

Fig.2 Section detail of the rafter resting on the brick masonry wall, showing cross-section cut for gutter widening.

Fig.3 Close-up of the timber–masonry junction affected by moisture ingress.

Damage to Lath and Ornamental Plaster: Moisture infiltration has spread from the gutter into the timber frames that support the lath and plaster of the interior ceiling. As these timber elements weaken, the ornamental plasterwork they carry has begun to fail. This issue is not limited to structural repair alone but also involves conserving delicate craftsmanship. Repair methods must therefore address both the stability of the timber framework and the preservation of traditional plastering techniques, ensuring that future conservation enhances understanding of workmanship.

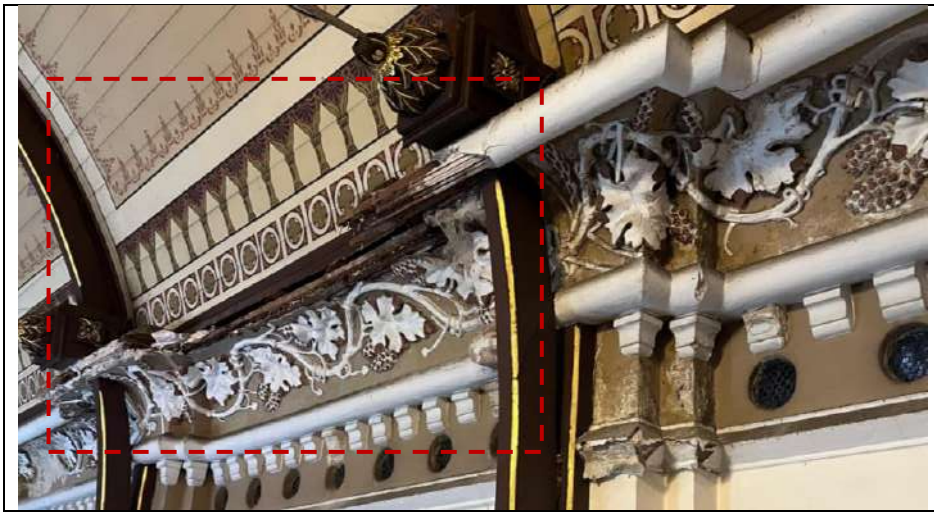

Fig.4 Deteriorated lath and plaster ceiling at the Holy Rosary Church caused by roof leakage.

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The Jim Thompson House Museum in Bangkok, established in the 1950s, is an assemblage of traditional Central-Thai teak houses that were dismantled, transported, and reassembled on site. The structures showcase modular timber architecture, with mortise-and-tenon joints and wall panels designed for relocation. This system reflects the adaptability of Thai wooden heritage but also presents distinctive conservation challenges.

Although the museum buildings retain their historic timber fabric, decades of exposure in a dense urban environment have accelerated deterioration. High humidity and fluctuating microclimates have led to biological growth, surface erosion, and joint loosening. Past maintenance practices relied heavily on surface coatings and patch replacements, which sometimes obscured original carpentry details or introduced incompatible materials. Furthermore, increased visitor traffic has intensified wear on floorboards and structural joints, raising questions about balancing conservation with public use. These conditions emphasize the need for preventive conservation strategies and compatible repair methods tailored to tropical timber heritage.

Arpichart Kittimethaveenan (Thailand)

Problem 2: Challenge in Conservation of Living Heritage, as a House Museum

The Jim Thompson House Museum, as a living heritage site, requires a balance between preserving historic timber structures and accommodating its role as a public museum. The conservation principle of minimal intervention is central to this challenge. Original finishes, carpentry marks, and surface patinas are essential carriers of authenticity, yet they are also the most vulnerable to deterioration under tropical climate conditions and heavy visitor use.

Routine maintenance practices—such as surface coatings, selective patching, and reinforcement of structural joints—must therefore be carefully evaluated. Over-intervention risks erasing traces of craftsmanship and historical use, while under-intervention could lead to progressive decay and functional instability. The dual role of the site—as both a museum and a collection of traditional dwellings—complicates decision-making, since conservation measures affect not only material preservation but also interpretation of Thai timber heritage for the public.

This situation highlights the need for a *conservation framework* that integrates preventive maintenance, compatible repair methods, and clear interpretive strategies. Such an approach ensures that minimal intervention does not become neglect, but instead supports long-term sustainability of the living heritage value of the museum.

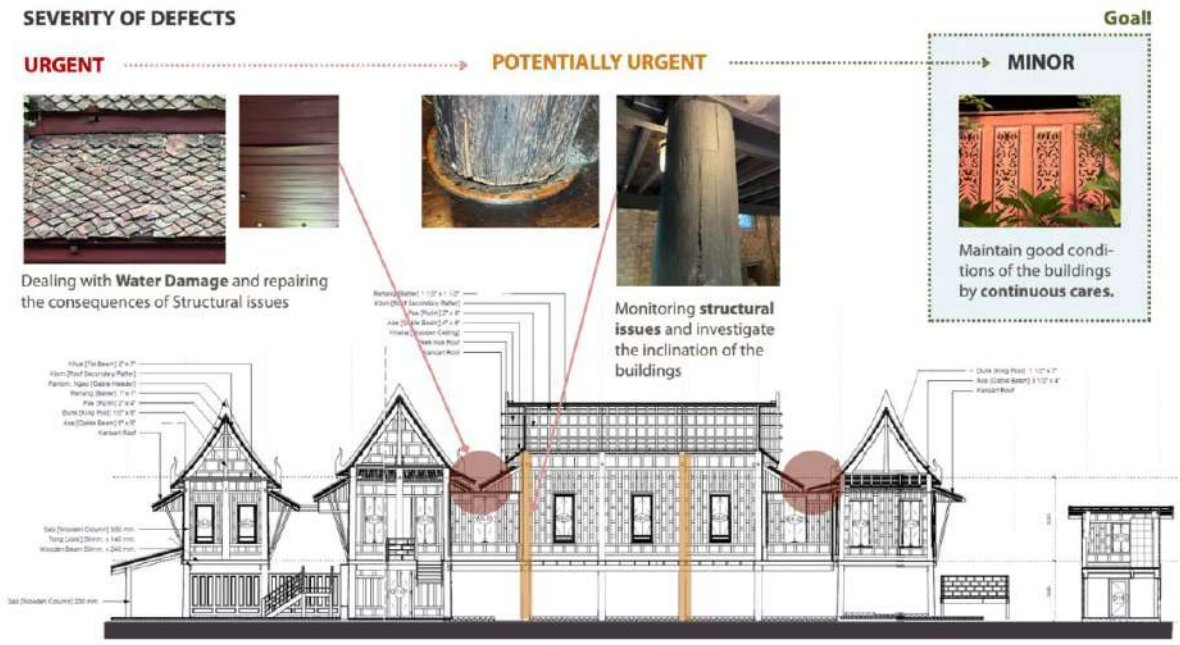

Fig. 5 Longitudinal section of the main house at the Jim Thompson House Museum.

Problem 3: Conservation of Historic Timber Finishes

The finishes of historic timber surfaces represent both cultural expression and technical heritage. At the Holy Rosary Church, the painted timber ceiling contributes to the overall Gothic Revival character of the interior, with layers of pigment applied directly to the wooden boards. At the Jim Thompson House Museum, blackened interiors and reddish exteriors of the teak walls illustrate traditional Thai practices of surface treatment that protect the timber and define its aesthetic value.

These finishes are now highly vulnerable. At the Holy Rosary Church, moisture infiltration from the roof has caused discoloration, flaking, cracks, and localized loss of painted layers. In some areas, timber decay beneath the paint has further compromised adhesion, making conservation difficult without addressing the underlying structural problems. At the Jim Thompson House Museum, prolonged urban exposure has led to fading, uneven weathering, and surface deposits that alter the intended appearance of the timber. Increased visitor traffic and cleaning routines also risk unintentional abrasion of original coatings.

The central challenge lies in developing conservation methods that safeguard both the physical stability of the timber and the authenticity of its finishes. Overpainting or replacement would diminish historical value, while leaving surfaces untreated risks continued loss. Preventive maintenance, careful cleaning, and material analysis are needed to guide appropriate interventions. In both cases, the finishes are not only protective layers but also carriers of meaning that link the buildings to their historic and cultural contexts.

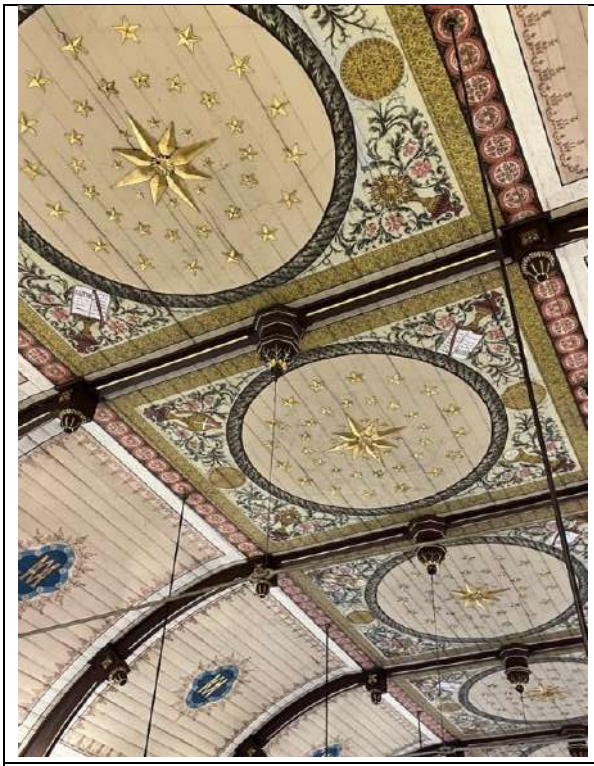

Fig. 6 Painted timber ceiling of the Holy Rosary Church interior.

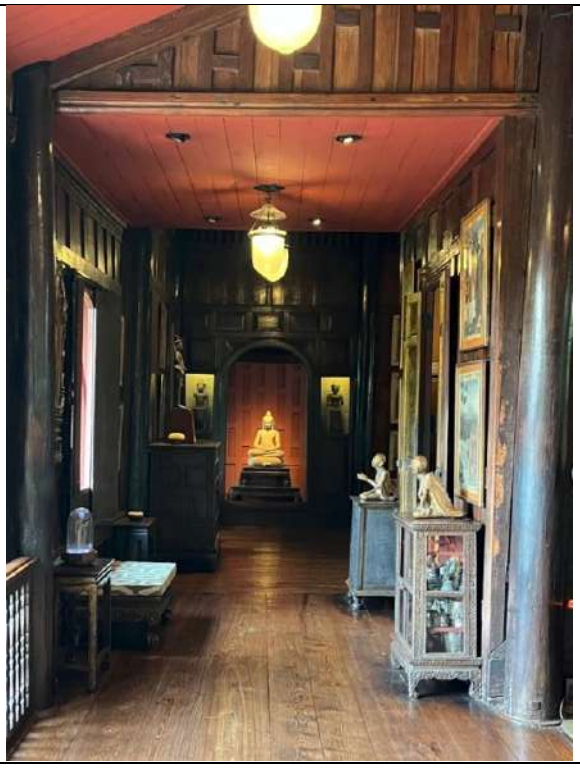

Fig. 7 Blackened interior timber finishes of the Jim Thompson House Museum.

Conservation Approaches

Conservation Approach 1: Comprehensive Restoration of the Holy Rosary Church Timber Roof Structure

The junction between the timber roof and masonry walls requires a carefully designed restoration program. **A structural investigation** should first determine whether the altered rafters and load-transfer system can sustain long-term stability. Based on the findings, **appropriate strengthening methods** can then be introduced, ideally retaining as much original timber as possible while ensuring durability. Repair solutions should also address moisture ingress by **improving gutter details and protecting rafter ends**, thereby preventing further decay. At the same time, conservation of the ornamental lath and plaster ceiling must be integrated into the restoration strategy, ensuring that both structural and decorative values are safeguarded together.

Conservation Approach 2: Conservation Management Plan Based on Preventive Strategies

For the Jim Thompson House Museum, a conservation management plan is needed to **guide routine care**, align interventions with the **principle of minimal intervention**, and balance public use with material preservation. Preventive measures should include environmental monitoring, systematic inspection of joints and floorboards, and visitor impact management. **Documentation of traditional carpentry and finishing techniques** should accompany these practices, so that every repair contributes to long-term understanding of the site. A preventive approach would minimize the need for heavy future interventions and sustain the museum's role as a living heritage site.

Conservation Approach 3: Investigation and Conservation of Historic Timber Finishes
Both case studies highlight the importance of historic timber finishes—painted ceilings at the Holy Rosary Church and traditional surface treatments at the Jim Thompson House Museum. Before interventions, **scientific investigation of paint layers and surface coatings** should be conducted to understand original materials, deterioration processes, and possible conservation treatments. Repair proposals should then be developed with an emphasis **on retention and stabilization, avoiding unnecessary overpainting or replacement.** Preventive maintenance and compatible cleaning techniques will also be critical for protecting these fragile finishes. Such investigations not only guide practical repair but also expand knowledge of traditional craftsmanship and its cultural meaning.

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Restoration Project of the Ordination Hall Building, Wat hong Kai (Cockscomb Temple), Samut Sakhon Province, Central Thailand

In 2022, the Fine Arts Office 1 Ratchaburi invited experts from the Office of Architecture, Fine Arts Department, to join a site survey in order to set guidelines for the conservation and restoration of the Ordination Hall building. Due to the owner reported that the historic building was in a deteriorated condition and at risk of collapse. If no action was taken, the temple would request permission to demolish the building. The working team had to act urgently to request emergency funds for the project.

The exact construction period of the building is not recorded. However, based on the artistic style, it is assumed to have been built between 1824 and 1851. Evidence from the structure shows that the hall was repaired and modified at least twice. There is also a record that both the front and verandah roof porches were added between 1934 and 1946.

The building is combination of brick and wooden structure. The layout of building is rectangular, it's bearing wall make by brick and decoration with lime stucco around doors and windows. Inside, have wooden columns support the roof structure. The roof is a multi-tiered gable style with wooden decorative elements in Thai style.

Survey

- The survey found that the building was heavily damaged. Almost the entire roof structure was destroyed. The surrounding area was abandoned and used as a site for many cremation stupas. Soil had piled up around the base of the building and even inside the floor area.
- Architectural and artistic elements remained only in small traces, but they were enough to assume the original style.
- After cleaning the area, it was found that the ground level around the courtyard was higher than the road, which was not the same as what Fine Arts Office 1 had assumed earlier.

At first, the local authority and the temple suggested lifting the building because of concern about flooding that might reach inside the Ordination Hall. However, the survey showed that the floor level inside the Ordination Hall is still higher than the average yearly flood level. Therefore, lifting the building is not necessary at this time.

Since the emergency funds is limited, lifting the building would make it impossible to complete the restoration. The conservation plan was therefore changed so that the restoration could be carried out more fully.

Left: Map showing the location of Wat Hong Kai
Center: Photo of the building before restoration
Right: 3D image of data recording before restoration

Conservation Guidelines and Actions

- Before starting the work, supports must be added to make the building and its weak parts stronger.
- The work was carried out as on-site repair.
- The building elements were classified into three levels of value for proper conservation, as follows:

Level 1: High Value

1.1 Lime stucco on doors, windows and painting traces: Restored the form according to assumed information, using the original material and technique. The new stucco will not be painted.

1.2 Roof structure design: Although heavily damaged, the original form, wooden joinery technique, and structure can be assumed the form. Restored will follow original materials, style, and methods.

1.3 Roof Ornaments: Restored based on remaining samples and old photos, using the same material and technique.

1.4 Boundary arch of the Ordination hall (stone): Repaired in its present state due to lack of reference and limited budget.

Top left: Supporting the gable lime stucco **Top center:** Strengthening the gable
Top right: Restoring roof decorations
Bottom left: Restoring and repairing the wooden roof structure
Bottom center: Restoring lime stucco decorations on doors and windows
Bottom right: Repairing the boundary arch of the Ordination Hall (stone)

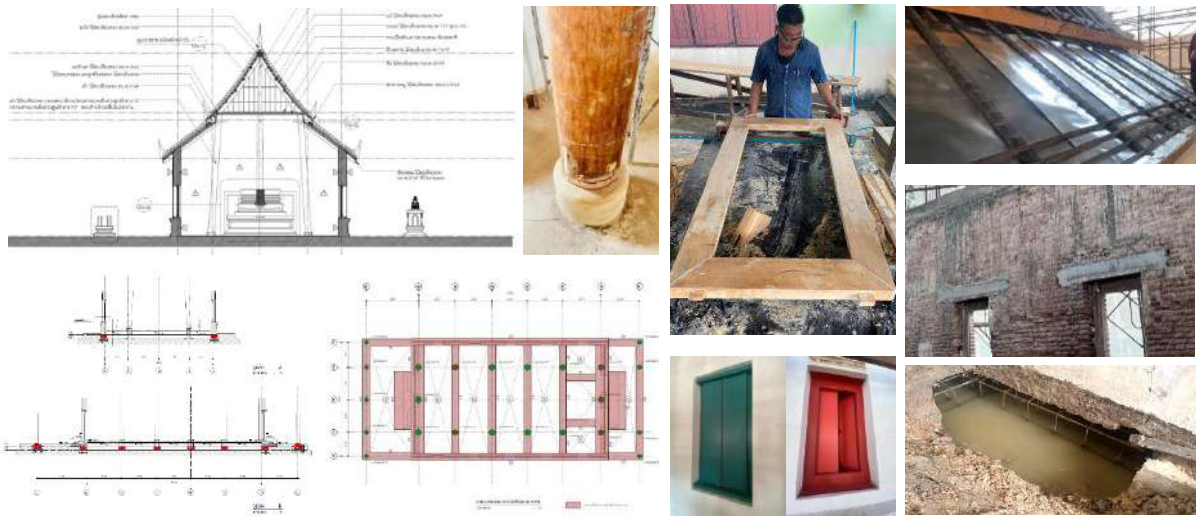
Level 2: General Value

2.1 Doors and windows: Almost completely damaged. Restored in original form with traditional installation technique, adding brass mortar equipment at hinge points.

2.2 Brick bearing walls: To strengthen the building and protect the gable, reinforced concrete structures were hidden inside the walls.

2.3 Original brick foundation base: To prevent settlement and lift the wooden columns above ground level (not bury wooden columns in the ground.), reinforced concrete beams were added

under the old foundation line, and new concrete pedestals were built to raise the wooden columns 20 cm above floor level.



Left image: Reinforcing with reinforced concrete and raising the wooden columns above the ground
Center image: Restoring doors and windows
Top right image: Installing zinc sheets under the tiles to prevent rainwater leakage
Bottom right image: Reinforcing with reinforced concrete under the foundation and above the door and window lintels

Level 3: Low Value

3.1 Roofing material: Previously large cement tiles, but traces of battens and roof curve show that the original was small clay tiles (large tiles could not bend to the roof form). Therefore, clay tiles were used again and add a zinc sheet under the tiles to prevent rainwater leakage.

3.2 Flooring material: Excavation showed no remains of the old floor. It is assumed to have been lime over compacted soil. For present use, two layers of bricks were laid, then covered with lime, and topped with clay tiles.

3.3 Building paint: The wall surface was originally covered with waterlime. Wooden parts showed modern paint o make future care easier for the temple, acrylic paint suitable for each material was applied.

3.4 Courtyard surface: A drainage system and emergency water pump were installed to reduce flooding in the area.

- Two fire extinguishers were installed inside the Ordination Hall.

Left and center images: Ordination Hall building after restoration completed.
Right image: Inside the Ordination Hall building after restoration completed.

Results

The work was completed in 2024. After restoration, the building returned to normal usable condition.

- The courtyard still had some flooding during rainy season, but water did not enter the Ordination Hall.
- The new drainage system around the hall helped protect from flooding and allowed faster water flow.

In early 2025, the temple painted the gable stucco and stucco around doors and windows. Investigation found that it was painted over without damaging the old paint layers.

Comparison of the conservation approach for lime stucco on door and window frames with the paint later added by the temple

Problems and Points to Improve

1. The related agencies did not create understanding with local people about the value of the historic site, both before and after the work. This caused a lack of cooperation in caring for the site.
2. The data recording was not detailed enough. For example, during the work, information was collected about the damage to wooden structures and the amount of new wood used, but mainly for cost estimation. There was no detailed record of specific damage or the wood repair methods. Such records would help future conservation work.
3. Work standards at the restoration site, such as orderliness, safety, and cleanliness, were not well maintained.
4. Conservation information was not shared with the public. Normally, the restoration report is given only to the site owner. These documents should be shared more widely through different channels.
5. There was no continuous study of long-term impact. Usually, monitoring lasts only two years under the building warranty. Problems from past restoration should be studied and used to improve future conservation work. At present, records exist, but they are not collected into a clear standard.