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The Twenty-fifth Regular Report

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Cultural Heritage Protection Cooperation Office, Asia-Pacific Cultural Centre for UNESCO (ACCU)

ACCU Nara International Correspondent

The ACCU correspondents periodically send reports on cultural heritage protection activities in which they have been recently involved. This is a collection of eight reports submitted by international correspondents in the Asia-Pacific region.

The Twenty-fifth Regular Report

Contents

Bangladesh

The Beautiful Nayabad Mosque and its Conservation

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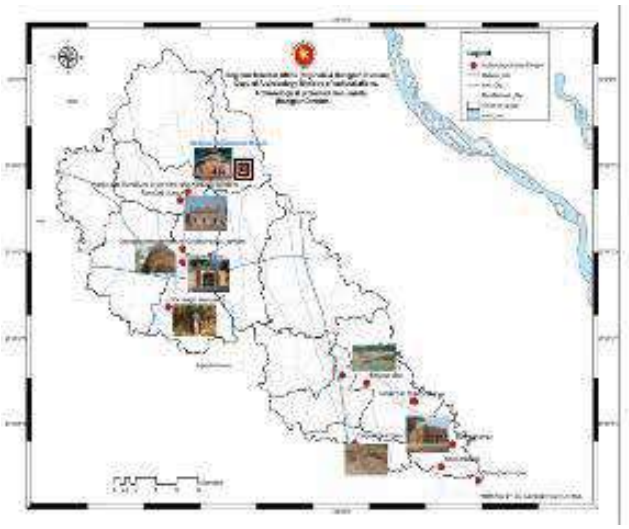
Department of Archaeology, Ministry of Cultural Affairs

Nayabad Mosque is located in Nayabad village in Kaharol Upazila (an administrative area), about 20 km from the Dinajpur district in Bangladesh. This ancient mosque, about 1.5 km south of the famous Kantanagar Temple, is situated on the western bank of the Punarbhaba (lDhepa) River. At present, it is a protected monument of the Department of Archaeology under the Ministry of Cultural Affairs, Government of the People's Republic of Bangladesh.

A map of Bangladesh



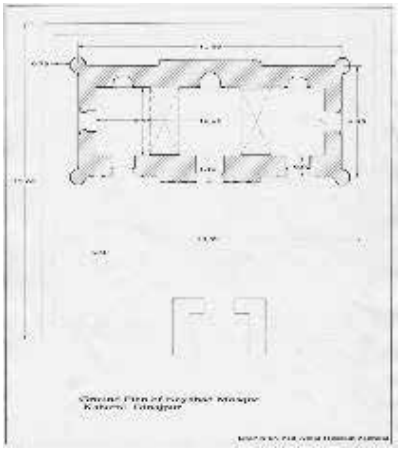
Archaeological sites in the Dinajpur district

Enclosed by a low outer wall, the mosque forms an oblong structure of brick and plaster. The mosque was constructed with octagonal turrets in the four corners and it has outside dimensions of nearly 12 m × 5 m. In the western (*Kiblah*) wall are three semi-octagonal arched *mihrabs*, with the central one being larger. The central doorway and the central *mihrab* have outward projections with flanking turrets on each side. The eastern wall of the mosque is penetrated with three arched doorways. The central one is larger than the other two. There is an arched window in each of the north and south walls.

The rectangular interior prayer chamber is 10.15 m × 3 m. It is divided into three unequal bays by two wide arches on brick pilasters. All this is covered by three domes, with the central one being larger than the other two. The domes are crowned with lotus and *kalasa* finials. Mughal features are seen in the cornices and parapets of the mosque.

A Persian inscription established on the central doorway of the mosque and its time period is 12 A.H. (1785 CE) during the period of the Mughal Emperor Shah Alam II.

The corner turrets are decorated with *kalasa* bases and kiosks with cupolas on the top. The eastern wall is richly ornamented with terracotta plaques. The motifs of these plaques consist of small trees, rosettes, creepers, flowers and twin peacocks.



General view of Nayabad Mosque and its ground plan

Terracotta plaques are used for decoration.

Conservation work of Nayabad Mosque:

Internationally, Bangladesh is often considered to be one of the most vulnerable countries to climate change. To maintain its archaeological sites and monuments, Bangladesh needs to adapt to climate risks and natural disasters such as annual flooding, extreme dry weather, sea level rise, storm surges, and coastal cyclones, with Bangladesh having a long history of severe floods, cyclones, storms, tidal surges, river and coastal erosion, etc. Climate change threatens to increase the country's exposure to these hazards in the near and distant future.

In ancient Bengal, ordinary houses were built of mud, but special buildings and religious structures were built with brick. Mud mortar or lime-*surki* (brick dust) mortar was the cementing material for building construction. That is why most ancient structures have deteriorated only gradually. Later, building construction techniques and methods changed with the passage of time. Ancient buildings have become relatively strong.

Due to climate change in the country, ancient buildings are now being eroded and facing damage. Nayabad Mosque was facing the same problem. The bricks, walls, domes and ornamentations of the mosque had been damaged. Climate change had also caused salinity, algae and fungal infection on the walls, corner turrets, ornamentations and domes of the mosque.

The conservation work of the mosque was carried out to protect the mosque from this damage. It is worth mentioning here that a small part of the conservation

The inner side and outer side of the mosque were infected with salinity, algae and fungi.

work was carried out in this mosque in 1977. After a long hiatus, the Department of Archaeology conducted the conservation work of the mosque in the 2018-19 budget year.

Nayabad Mosque was built in the late Mughal period and the principal building materials were brick, lime, *surki* (brick dust) and sand. Lime-*surki* mortar was used as the cementing material in the construction. At the same time, this lime-*surki* mortar was also used on the inside and outside walls and domes of the mosque. Stucco had been used for decorations on the front wall, domes, and the corner turrets of the mosque.

The mosque was fully documented (photographs and drawings) before the conservation work was carried out. Lime-*surki* mortar was used in the masonry and plaster work while the conservation work was being carried out. Stucco had been used in the ornamentation of the mosque and a white-coloured coating was added to the ornamentation to enhance its beauty.

Many archaeological monuments, including Nayabad Mosque, are facing multifaceted damage due to climate change, extreme dry weather, heavy rainfalls and dense fog in Bangladesh. Nayabad Mosque has faced similar problems. As a result, the government is trying its best to protect archaeological sites and monuments from such natural climate factors.

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3. Md. Abul Kalam Azad, photographer, Department of Archaeology.

During conservation of Nayabad Mosque

During conservation of Nayabad Mosque

Nayabad Mosque, after conservation

Cambodia

Human Resources Development in Sambor Prei Kuk Conservation Activities

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1. Introduction

Since 2017, the National Authority for Sambor Prei Kuk (NASPK) has been intensively working on the preservation, protection, and development of the World Heritage Site of the Temple Zone of Sambor Prei Kuk, which was listed on July 8, 2017, in Krakow, Poland, by the 41st Session of the World Heritage Committee. A series of interventions was conducted by a team from the Department of Site, Archaeology and Conservation (DSAC) of NASPK. Parallel with those activities, human resources development in the areas of heritage, archaeology and conservation/restoration was needed and undertaken. Notably, several of my previous reports introduce the conservation activities at the Sambor Prei Kuk site. Among those reports is the last report (Vol.22/2019) in which I described an intensive, hands-on training program I gave to students from the Royal University of Fine Arts. The training of RUFA students is only part of the effort of resource training and development.

2. Activities

In this report I will present the five keys of human resource development that support the conservation activities at Sambor Prei Kuk. Many variables are involved in such development. Those concepts are as follows:

2-1. Local community student training

NASPK was approached to provide a series of training programs to the local communities in the protected property area. Along with this vision, the DSAC, in cooperation with local educational institutions, the Technology Institute of Kampong Cheu Teal, and Prasat Sambor High School, contributed its expertise to a one-day training program to a hundred students with the theme: "Cultural Heritage of Sambor Prei Kuk." This program provided general knowledge to the high school students to understand more about the Sambor Prei Kuk site. The training also gave them an awareness of the notion "what heritage is," and encouraged them to join in the protection of the site. We hope, this program will protect heritage value and its place in the community. Unfortunately, the COVID-19 situation forced a postponement of these future activities. However, we are planning to design a small group training program and online educational materials, mainly focusing on communication via social media.

Site visit to provide general knowledge of Sambor Prei Kuk to high school students (Photo: DSAC)

2-2. University student training

As I already reported in the last report (Vol.22/2019), students from the Royal University of Fine Arts (RUFA) were selected to participate in a training program at the site of Sambor Prei Kuk. This program not only gave them the chance to learn with on-site practice, but also opportunities in practical research and conservation with specialists from NASPK. The program will also contribute to an increase in trained human resources for the continuation of archaeological research and conservation work. This program is a long-term vision and program of NASPK in the field of pre-Angkor studies, which has developed from a pilot project into an annual training program of DSAC.

2-3. On-the-job training

There was also on-the-job training for people from the local community. They were selected to work with various conservation projects based on their willingness and the proximity of their residences to the site. They were supported by the Royal Government Annual Budget, and the Angkor Conservation and Development Foundation. This program will also contribute to an increase in trained human resources that will be utilized to improve the level of local experience in brick temple restoration, excavation, and conservation.

Training program for a group of students from the Royal University of Fine Arts (left) and their presentation of a conservation proposal (right)

On-the-job training program for a group of local people (Photo(right): Em Phearak)

2-4. Tour to conservation sites

There is an annual academic tour for capacity building in conservation for DSAC's technical staff, focused mainly on archaeology and conservation/restoration. Visiting the various restoration sites in the Angkor Archaeological Park and the Ministry of Culture and Arts conservation sites is a principal part of this tour program. The improvement of skills and ability to overcome challenges have been observed and exchanged. Another benefit is that a much better comprehensive understanding and view of problems and restoration techniques has prompted an expansion of their knowledge in brick, lime stucco and plaster, sandstone, site maintenance and site monitoring.

Visiting at conservation site in Angkor (Photo: Seang Sopheak)

2-5. Exchange programs

Exchange programs were held to develop the capacity building of staff who work at NASPK, and to open a global vision in the fields of cultural property, archaeology, and conservation. Very recently, under cooperation between NASPK and Waseda University in Japan, a series of exchange programs with Japanese experts has been ongoing. Because of the effect of COVID-19 some activities have been postponed, however, a method of online exchange programs is in progress. Under this program, discussions and exchanges take place between experts from institutes in Cambodia and Japan, in order to talk more about Sambor Prei Kuk and Nara, two Asian cities of the 7th century.

3. Conclusion

The extended effects of this project will lead to a long-term framework of sustainability in the safeguarding, preservation, and conservation of monuments in the World Heritage Site of Sambor Prei Kuk and beyond. The programs of NASPK have contributed to an increase in trained human resources that will be available for future activities. As presented above, these progressive activities are not only for maintaining the monuments, but also for providing a new enhanced program of educational outreach to the next generation of archaeological research and conservation university students in the field of pre-Angkor studies. They also give a new conservation aspect to the monument visiting route without causing harm to the monuments, their authenticity, integrity, or value.

Remarks: *This report is part of the conservation activities which are being carried out by the Department of Site, Archaeology and Conservation (DSAC), National Authority for Sambor Prei Kuk (NASPK). Most of the photos in this report were taken by the reporter and the members of the project, except for the dedicated photos.*

Temporary Roof Systems in the Conservation of Heritage Buildings, Sarawak, Malaysia

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Introduction

In the practice of heritage building conservation in Sarawak, Malaysia, a temporary roof is usually installed to provide weather-proof covering for the building during roof repair and conservation work. The use of temporary roof systems has been observed in heritage building conservation projects over the past three years in the areas of Sibu, Kanowit, Julau and Kuching in Sarawak. Based on the building height, form, and site restrictions, the three most commonly used temporary roof systems in the conservation of heritage buildings in Sarawak are the scaffold roof system (SRF), portal frame roof system (PFRS), and steel truss frame system (STFS). This article discusses the installation of temporary roof systems that were used in the conservation projects of five selected heritage buildings in Sarawak, namely Al Qadim Mosque in Sibu, Fort Emma in Kanowit, Fort Brooke in Julau and the Old Sarawak Museum and Curator's House in Kuching, over the period from 2017 until 2020. Conservation of these heritage buildings involved close coordination and continuous monitoring among various government agencies and individuals, including the Sarawak Museum Department (Jabatan Muzium Sarawak), Sarawak Public Works Department (Jabatan Kerja Raya Sarawak), and expert consultants, contractors and building conservators registered with the National Heritage Department (Jabatan Warisan Negara). Due to their historical, architectural and cultural significance, these heritage buildings have been gazetted as Historical Buildings under the then Sarawak Cultural Heritage Ordinance 1993 (currently Sarawak Heritage Ordinance 2019). As more invaluable buildings come under the purview of the law, stakeholders are encouraged to enhance their levels of heritage awareness and to participate actively in heritage building preservation and conservation. All conservation work on gazetted Historical Buildings should be carefully recorded and documented by appointed consultants, registered conservators, and contractors based on the conservation guidelines and requirements as outlined by the Sarawak Museum Department and National Heritage Department, Malaysia.

Temporary Roof Systems in Heritage Building Conservation

Installing a temporary roof as a means to protect a heritage building is very important as buildings are often at their most vulnerable during the construction period of conservation work. When roof repair and conservation work are required, the entire building shall be vacated to allow for a temporary roof to be erected over the building. At the outset, installation of a temporary roof system should consider multiple factors, including detailed analyses of conservation issues, risks and costs estimation, meticulous project planning, and continuous monitoring. These are the critical success factors as far as protecting the building fabric and structure are concerned. Various types of temporary roof systems are available with diverse applications, ranging from weather protection for conservation work to the construction of new structures, and there are various applications for special events and functions. Subject to site conditions and constraints, a temporary roof system can be installed using mobile cranes. If crane access is not possible, a rolling system can be utilised instead. The most commonly used material for temporary roof is corrugated iron (CI), also known as metal sheet or tin sheet. Alternatively, waterproof materials such as fabric, canvas, or polyester coated with polyurethane (known as tarpaulin or tarp) are also used in providing temporary protection during conservation work on heritage buildings, structures, or monuments. Tarpaulin needs to be properly secured and reinforced at the building corners and along the sides to form attachment points for ropes, allowing them to be tied down or suspended. This is very crucial in rainforest regions such as Sarawak where heavy downpours and strong winds occur all year round. The use of plastic sheets for temporary roof systems over heritage buildings is not recommended because the material is flimsy and can be blown away during strong winds if not properly secured. Furthermore, pools of water can form on the plastic roofing following a heavy rainfall. This can lead to water leakage from the rooftop which requires more repair work and regular monitoring. The advantages of temporary roof systems in the conservation of heritage buildings are summarised in Table 1.

Installation of Temporary Roof Systems in the Conservation of Al Qadim Mosque, Fort Emma, Fort Brooke, Old Sarawak Museum, and Curator's House

The temporary roof systems used in the conservation of Al Qadim Mosque, Fort Emma, Fort Brooke, Old Sarawak Museum and Curator's House are discussed in turn in this section; they are either the scaffold roof system, portal framed roof system, or steel truss frame system. Metal sheet (also known as metal deck) is the most effective material to be used for temporary roof systems because it is sturdy, can be secured, and is easy to erect and dismantle. It provides protection from harsh weather and containment throughout the duration of the conservation project, usually lasting for 18 months. Despite harsh weather conditions and regardless of the time of day, the use of a weather-resistant temporary roof system can facilitate work on the conservation and repair of roofs within a safe and conducive working environment while maintaining levels of productivity. Installation of a temporary roof system is instrumental in preventing rainwater leakage and moisture damage to the building interior, structure, and internal fabric.

Al Qadim Mosque, Sibu

Built in 1861 using Sarawak's ironwood, locally known as *belian* (*Eusideroxylon zwageri*), Al Qadim Mosque or Masjid Al Qadim is one of the oldest mosques in

Table 1 Advantages of Temporary Roof Systems in the Conservation of Heritage Buildings

Temporary Roof Systems	Advantages
Metal corrugated iron or metal sheet (CI sheet): i. Scaffold roof system (SRS). ii. Portal framed roof system (PFRS). iii. Steel truss frame system (STFS). Fabric, canvas or polyester coated with polyurethane: i. Tarpaulin or tarp. ii. Rope or cable ties. It is noteworthy that the use of plastic sheet for a temporary roof system is not recommended in heritage building conservation, especially in tropical regions including Sarawak, Malaysia.	i. Provide a high degree of versatility, protection and encapsulation. ii. Encompass very wide roof spans and complex applications. iii. Enable work to carry on within a comfortable working environment. iv. Maintain levels of productivity. v. Safe methods of installation. vi. Efficient modular system which is fast to erect and dismantle. vii. Robust material against harsh weather conditions. viii. Reusable components. ix. Applicable to all types of buildings. x. Improved worker well-being. xi. Reduced risk of moisture damage to buildings. xii. Projects continue on schedule irrespective of weather conditions.

Sarawak, with a built-up area of 485 square metres. The mosque is located at the junction of two major roads, Jalan Kampung Nyabor and Jalan Tun Abang Haji Openg, in Sibu. Historically, the mosque played a significant role in the early settlement of the Malay-Melanau Muslim community in Sibu. The mosque's architectural style exemplifies a vernacular mosque of Javanese architecture with its distinct three-tier pyramidal form. Sibu's rapid urbanisation over the decades has witnessed drastic changes in the mosque's locality and surroundings. The mosque, originally located in a quiet small village, is now surrounded by tall modern buildings and a network of busy roads in the heart of Sibu. The floor space of the mosque has been expanded over time to meet the demands of an increased Muslim congregation or *qariah* in the local area. The mosque has undergone many stages of renovation, mainly in 1935, 1950, 1968, and most recently in 2017–2019, involving roof repair and conservation work at a contract cost of RM 2.22 million (USD 527,388). During the conservation period in 2017–2019, a temporary roof structure 16 metres in height was erected over the mosque at a cost of RM 120,000 (USD 28,766) to protect the building during the installation of new roofing material to replace the old roof. The scaffold roof system was installed as the temporary roof, supported by steel columns that were secured by bolts and nuts to concrete bases on the ground. The steel columns were also stabilized with cable tie bracing.

Fort Emma, Kanowit

The original Fort Emma was built in 1849 of bamboo with a nipa palm thatch roof, but was soon demolished. A new fort known as Kubu (Fort) Kanowit was constructed in 1851 on a hilltop facing the Rajang River, which gave good advantage to the Brooke administration in patrolling and securing the river and surrounding areas. Later, a big fire destroyed the fort in 1859, but by 1860 the fort was rebuilt in two storeys and renamed as Fort Emma after James Brooke's elder sister, Emily Brooke. With a built-up area of 379 square metres, Fort Emma was once used as the Brooke administrative centre before it was changed to the District Office for Kanowit, housing the Native Court, Kanowit Broad Band Centre, and Museum. The fort is renowned for its nine human skulls which have been well kept inside the fort until the present day. The fort has undergone several conservation projects, including a major one back in 1960s, and the most recent one in 2018–2020 at a contract cost of RM 2,983,192 (USD 704,602). In the recent conservation work, a scaffold roof system 10.5 metres high was erected over Fort Emma as a temporary roof at a cost of RM 75,000 (USD 17,985), giving the fort full protection from adverse weather conditions during the installation of *belian* roof shingles.

Fort Brooke, Julau

Built in 1935, Fort Brooke is strategically located on a hilltop overlooking the Kanowit River (Sungai Kanowit) in Nanga Meluan, Julau. The fort was once used as a base to halt a rebellion led by Asun Paing (born in the 1880s), who was a local headman from Entabai. According to history, Asun Paing headed a protracted revolt against the Brooke administration over a tax system introduced by Rajah Charles Vyner Brooke. The fort was originally built from bamboo with wooden roofing. However, in 1940 the Brooke administration directed the fort's building materials to be replaced with *belian* timber. Each longhouse in the area donated one pole and three *belian* planks for the construction. The work to replace the building material was completed three years later in 1943. With a built-up area of 535 square metres, the two-storey fort was used to accommodate the Julau District Council and Julau police station from 1954 to 1981. The fort has undergone several phases of conservation work, including repair and painting in 2012, and the most recent was in 2019–2020 at a contract cost of RM 3,792,019 (USD 909,357). In this recent conservation project at Fort Brooke, steel truss frames 12 metres high were erected for a temporary roof system at a cost of RM 70,000 (USD 16,786), providing a comfortable working environment during the installation of belian roof shingles. The temporary roof system protected the fort, particularly its roof structure, from adverse weather, dust, and other environmental damage throughout the construction period.

Old Sarawak Museum, Kuching

The Old Sarawak Museum (also known as Sarawak State Museum) is the oldest museum in Borneo. It was built during 1888–1891 on top of a prominent hill in Kuching city during the administration of Charles Brooke, the second White Rajah of Sarawak. This masonry and timber building was designed in European style with a symmetrical building layout, pitched roof, Dutch gables and dormer windows reflecting the architectural style of Normandy Town Hall in France and Sir Samuel Way Adelaide Children's Hospital in Australia. In 1911–1912, the museum underwent major modifications including the extension of a new wing which mirrored the old wing, building up new walls at the upper level balcony of the old wing, and the demolition of the double brick staircases at the front facade of the old wing. With a built-up area of 1,365 square metres, this two-storey museum houses and exhibits the natural history collection, and has displays on the petroleum industries and ethnographic artefacts of the indigenous people of Sarawak. The museum was temporarily closed in 2017–2020 for major conservation work that involved the restoration of the pitched roof, dormer windows, timber floors, masonry walls, plus new electrical wiring, the installation of new air conditioning systems, a new elevator, and other interior work at a cost of RM 8,081,392 (USD 1,937,983). During this conservation project, for the period 2019–2020 the museum was protected with a temporary roof using a portal framed roof system. At a cost of RM 349,591 (USD 83,834,772), the portal framed roof system incorporated concrete footings, galvanised light-weight steel purlins, fly bracing and printed netting or inkjet-mesh tarpaulin which displayed images of the building facade. At a height of 14.6 metres, this temporary roof provided a conducive and comfortable working environment during the conservation work.

Curator's House, Kuching

Built in 1892, the Curator's House is located close to the Old Sarawak Museum in Kuching. Like the Museum, the architectural design of the Curator's House reflects a European style. With a built-up area of 223 square metres, this single-storey building was later renovated in 1922 as the curator's workplace. In 1925 a two-storey building was built and connected to the Curator's House at the north side and later at the east side (rear) in the 1950s. The building was used to house the State library in 1934 before it was used by the British Council in the 1960s. Afterwards, it was taken over by the Sarawak Museum Department. In 2006, the building was converted into an Art Museum displaying art pieces ranging from paintings, carvings, and sculptures from the Brooke period to the present day. It was also used to hold temporary art exhibitions organised by government agencies, private bodies, or individuals. In 2019–2020, under the same conservation project as the Old Sarawak Museum, the Curator's House underwent conservation work including the installation of *belian* roof shingles at the cost of RM 596,683 (USD 143,089). During the conservation of the Curator's House, a temporary roof 6.5 metres high using a portal framed roof system was installed at the cost of RM 161,995 (USD 38,847) to provide a high degree of versatility, protection, and encapsulation. In the evening of 22 August 2020 (during the construction period), the temporary roof saved the Curator's House from destruction when a nearby tree fell down and hit the building during a heavy rainstorm. Only a small part of the temporary roof was damaged, and was later fixed.

Conclusions

As the conservation of heritage buildings involves a top-down approach, the installation of a temporary roof system is very important and gives many advantages. A temporary roof system is a cost-effective method of protecting the building from harsh weather conditions; thus, it provides guaranteed working hours. In heritage building conservation, roofing work usually involves the replacement of roof materials, the removal of old roof tiles and re-tiling, strengthening of roof trusses, and constructing a temporary roof system which requires careful planning and preparation. Project consultants including architects, structural engineers, and quantity surveyors have to work closely in considering the type of temporary roof system. Regardless of the height, size, and form of the heritage building, there are a number of considerations in selecting the type of temporary roof system for a conservation projecct. Firstly, the temporary roof system installed should be of weather resistant and robust material, and cover the building throughout the construction period. The joints between metal corrugated

Table 2 Summary of Temporary Roof Systems in the Conservation of Heritage Buildings in Sarawak

		Al Qadim Mosque, Sibu	Fort Emma, Kanowit	Fort Brooke, Julau	Old Sarawak Museum, Kuching	Curator's House, Kuching
1	Year of construction, original building	1861	1851	1935	1891	1908
2	Built-up area (square metres)	485	379	535	1365	223
3	Most recent conservation project	2017–2019	2018–2020	2019–2020	2019–2021	2019–2021
4	Cost of recent conservation project (RM)	2,220,000	2,983,192	3,792,019	8,081,392	596,683
5	Type of temporary roof system used	SRS (Scaffold roof system)	SRS (Scaffold roof system)	STFS (Steel truss frame system)	PFRS (Portal framed roof system)	PFRS (Portal framed roof system)
6	Height of temporary roof (metres)	16.0	10.5	12.0	14.6	6.5
7	Cost of temporary roof (RM)	120,000	75,000	70,000	349,591	161,995

iron or metal sheets need to be secured and properly installed to avoid rain penetration that would result from any gaps. Secondly, a heritage building that has site constraints requires ample space for setting up footings for a scaffold or framed roof system. Mobile cranes should be used to provide a safe system of work for installation teams. Other considerations in selecting the type of temporary roof system include how the temporary roof is going to be assembled and later dismantled within the allocated budget. In determining the appropriate type of temporary roof system, mainly in the early stage of construction, a structural engineer needs to calculate the roof span and roof height as well as the speed of installation. The installation of temporary roof systems at Al Qadim Mosque, Fort Emma, Fort Brooke and the Old Sarawak Museum and Curator's House, are good examples of best practices in heritage building conservation in Sarawak, Malaysia. All parties involved in these conservation projects have adopted a sense of trust and responsibility to ensure the success of the projects and thus prolong the lifespans of heritage buildings of Sarawak for future generations.

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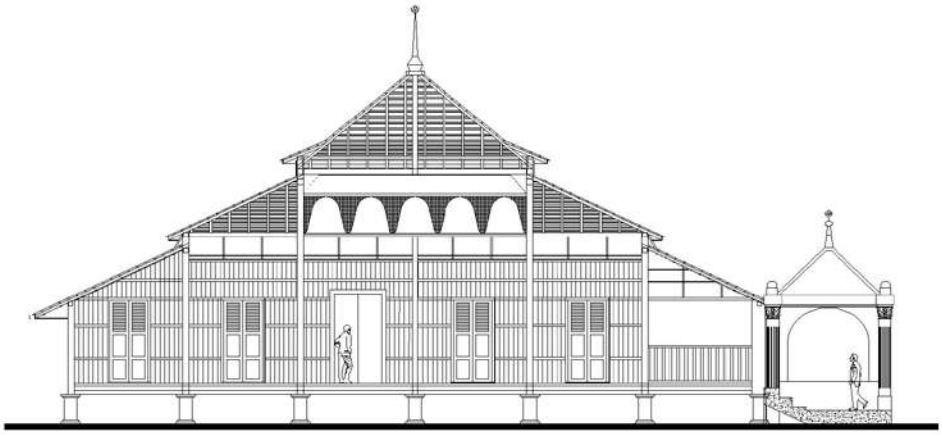
Location of Sibu, Kanowit, Julau, and Kuching, in Sarawak, Malaysia



The architectural style of Al Qadim Mosque exemplifies a typical vernacular mosque of Javanese architecture with its distinct three-tier pyramidal form (Drawing courtesy of UCTS Consultancy Services Sdn. Bhd.).

Al Qadim Mosque (under the temporary roof) is located at the junction of two major roads, Jalan Kampung Nyabor and Jalan Tun Abang Haji Openg, in Sibu, Sarawak.

The scaffold roof was the temporary roof system installed at Al Qadim Mosque, supported by steel columns that were secured by bolts and nuts to concrete bases on the ground. The steel columns were also stabilized with cable tie bracing.

A temporary roof 16 metres high was erected to protect Al Qadim Mosque when the new roofing material was installed to replace the old roof.

A scaffold roof system 10.5 metres high was erected for the temporary roof at Fort Emma.

Due to site constraints, a mobile crane was used in the installation of the temporary roof system at Fort Emma.

A frontal view showing scaffold roof system that covered Fort Emma, giving full protection to the fort from adverse weather conditions during the installation of *belian* (ironwood) roof shingles

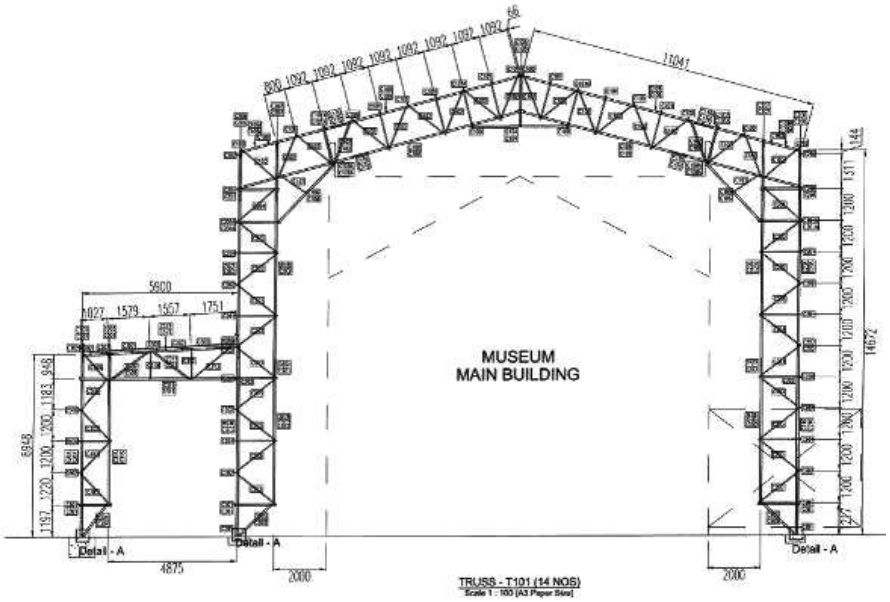
Aerial view of Fort Brooke before the installation of the temporary roof system

Steel truss frames of 12 metres in height were erected for the temporary roof system at Fort Brooke.

The temporary roof system at Fort Brooke provided a comfortable working environment, particularly during the installation of belian (ironwood) roof shingles.

Throughout the construction period, the temporary roof system protected the roof structure of Fort Brooke from harsh weather, dust, and environmental damage.

A close-up view of the newly laid belian (ironwood) shingles at Fort Brooke



Detailed drawing of the portal framed roof system installed at the Old Sarawak Museum (Drawing courtesy of PPES Works, Sarawak, Sdn. Bhd., and EcoSteel Sdn. Bhd.)

Installation of the temporary roof system at the Old Sarawak Museum

Printed netting or inkjet-mesh tarpaulin, displaying images of the Old Sarawak Museum building facade, installed to cover the building throughout the construction period. This was the first such printed netting introduced in a heritage building conservation project in Sarawak.

An aerial view of the Old Sarawak Museum showing its long-span temporary roof system

At a height of 14.6 metres, the temporary roof at the Old Sarawak Museum provided a conducive and comfortable work environment.

Roofers conveniently laid belian (ironwood) roof shingles under the temporary roof at the Old Sarawak Museum.

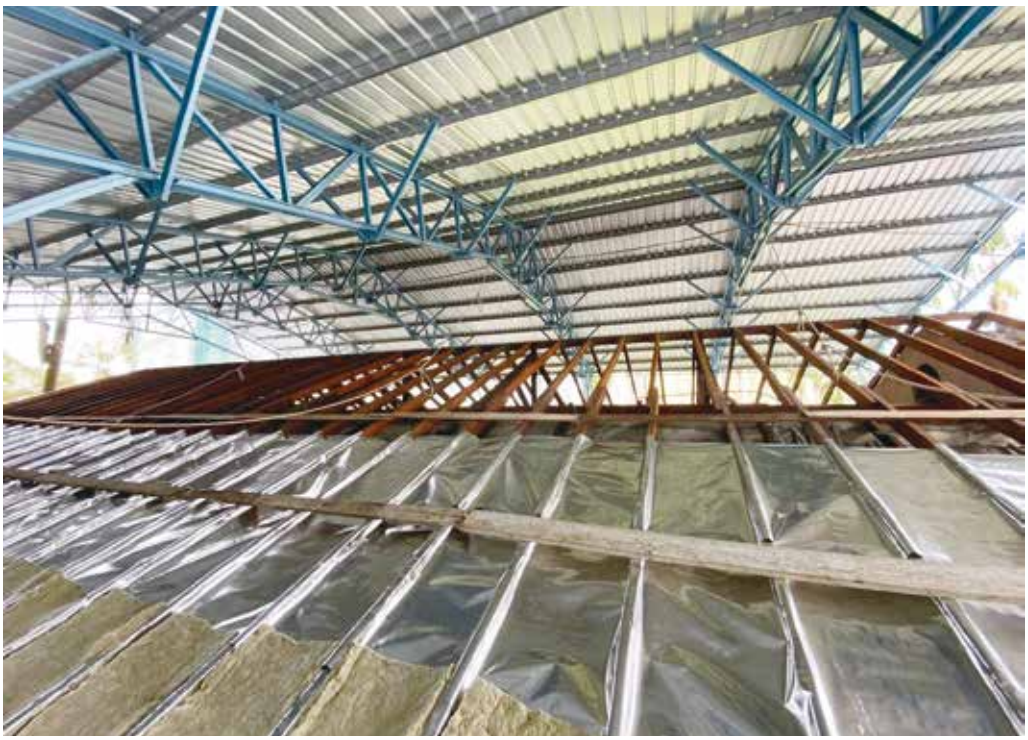
The portal framed roof system at the Old Sarawak Museum incorporated concrete footings, galvanised light-weight steel frames, and fly-bracing cables.

An aerial view of the Curator's House (far right) before installation of the temporary roof system

During the conservation of the Curator's House, a temporary roof 6.5 metres high using a portal framed roof system was installed.

The temporary roof system at the Curator's House provided a high degree of versatility, protection, and encapsulation. The Old Sarawak Museum is located on the far right.

A panoramic view of the Curator's House showing its wide-span temporary roof system



View of the temporary roof system at the Curator's House before the installation of new belian (ironwood) roof shingles

In the evening of 22 August 2020, the temporary roof saved the Curator's House from destruction when a nearby tree fell down during a heavy rainstorm.

A small part of the temporary roof at the Curator's House was damaged due to the fall of a nearby tree and was later fixed.

Mongolia

Protection of Medieval Burial Sites in Mongolia

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According to the Cultural Heritage Law of Mongolia, any ancient burial sites that are endangered by construction work should be excavated and documented by professional organizations only. However, ancient burial sites are still destroyed by unplanned and uncontrolled projects even in urban areas.

In this report, I will present evidence that the protection of medieval burial sites in Mongolia has not changed since the 1990s.

In 1991, the Government of Mongolia issued an order to implement the long-term "Gold Program." This order aimed to restore the Mongolian economy, which had collapsed shortly after Soviet technical and financial assistance stopped in 1990. As a result of this action, the government could gradually rebuild the country's economy by increasing gold mining. Although it had a negative effect on the ecosystem, immovable cultural heritage, and people's morale, it continues still today. Thanks to the above action, thousands of unemployed country people became able to work at the dozens of gold rush areas, which were mostly opened in virgin lands. The new 'class' of artisanal miners, mostly former state-employed herders, lived far from their homes and dug illegally in places where gold deposits and other natural resources had been discovered. Most of those places had never been used for mining, even for cultivation. In many cases, they dug in the most beautiful lands in Mongolia including specially protected areas, national parks, waterheads, and forests, and extracted the gold by using mercury and cyanide. Harsh conflict between the artisanal gold miners and major mining companies pushed the unfortunate amateurs to dig up ancient tombs and structures, in other words, the country's immovable cultural heritage. The new, spreading illegal antiquities market also fired the process. Since the lifestyle of the artisanal miners and their 'manner of working' influenced the local people, herders also began to dig not only for gold but also for ancient 'treasures' in the burial sites. They often used metal detectors and if it signaled the existence of something metal underground, they directly dug for it. Artifacts from the burial sites were sold to antiquarians. Many cultural heritages in the countryside were destroyed and looted in such a manner over the last 20 or more years.

Santyn Durulj Burial

Between September 18 and 21, 2017, I carried out fieldwork in Renchinlhumbe soum, Khuvsgul aimag. Renchinlhumbe soum is located to the west of Lake Khuvsgul and its center is 1,000 km to the northwest of Ulaanbaatar, the capital city of Mongolia.

On September 18, 2017, Mr. Battogtokh, a wildlife ranger at Ulaan Taiga State Special Protected Areas guided Mr. Chinbatsukh Dorj, an employee of the Cultural Center of Renchinlhumbe soum, and me to a recently looted burial site. Mr. Battogtokh said to us, *"The burial site was dug up in the autumn of 2017. When I suddenly arrived at the burial site, the looters escaped. There were some very skillfully-carved bone decorations near the burial hole"*. So we went into the burial site.

The burial site is located near the eastern edge of the eastern foothills of a mountain called Tsakhir, 20.2 km to the west of the center of Renchinlhumbe. The name of the foothills is Santyn Durulj. Therefore, this burial site was named the Santyn Durulj Burial Site.

There was a hole measuring 140 × 120 cm and piles around the edge of the hole (Figs. 1 and 2). It is obvious that the looters dug the hole and shoveled dirt and gravel from the hole to create the piles. We saw that there really were ancient bone decorations, as Mr. Battogtokh told us (Fig. 5). Also, we found human teeth, vertebrae, fragments of a birchbark quiver (Figs. 9-13), a femur, an iron buckle (Figs. 14 and 15) and a piece of wood on the ground which had come from the piles of dirt and gravel (Figs. 2 and 4).

The depth of the hole was 130 cm. At the bottom of the hole, there were two parts of a human skull, a piece of a birch-bark item, and large stones, undoubtedly from the burial mound (Fig. 3). This indicates that it was not the real bottom of the burial hole and that the burial site had just been fully destroyed. The stones and the human skull which were at the bottom of the hole had only been thrown in from the outside after the looters had filled the hole with the dirt and gravel from the burial site.

On the next day, we came again to the burial site and continued the documentation. We checked the piles of soil which were around the hole and found many finds such as human skeletal remains (Fig. 6), pieces of birchbark, and bone decorations. Consequently, we also cleaned the pile of soil in the burial hole and reached the level of the 'real' bottom of the burial hole. There were only a few bones such as the right rib bones, right radius, right hand bones, right sacrum, right hip bone, and right femur of a young adult or adolescent male individual in situ (Figs. 7 and 8). The other bones had already been disturbed by the looters, and as mentioned above, most of them had been scattered around the hole. The reconstruction of the human skeleton shows that only the metacarpals and phalanges remained from the left upper limb bones.

Some pieces of birchbark were revealed near and under the human bones in situ, but those had been preserved very poorly due to long-term degradation and the soil condition. The depth of the burial hole is 150 cm.

Although there are quite a few human skeletal remains in situ, it is possible to determine that the deceased's body was placed with his head pointed to the northeast at the bottom of the burial hole measuring 200 × 70 cm (Figs. 7 and 8). Tarsal bones of sheep such as talus and calcaneus had been placed in the right of the place where the right humerus of the deceased would have been situated (Fig. 16). After the field documentation, we reburied the burial hole and put the larger stones of the burial mound on top of it (Fig. 18).

Although the Santyn Durulj Burial Site was looted and almost fully destroyed, its characteristic features suggest that it was undoubtedly a Mongol burial from the 13th to 14th centuries. The pieces of birchbark are the remains of a quiver. Items such as birchbark quivers were often buried with a deceased in typical Mongol burials of the same period. Moreover, the skillfully carved bone pieces (Figs. 9-13) are decorations from a birchbark quiver. It should be noted that similar bone decorations from quivers have not often been found in Mongolia, and only from a few burial sites. Most of them belong to the burial sites of men who might have had a higher social status (Batbold 2020: 166).

Aguit Cave Burial

On September 20, 2017, Mr. Chinbatsukh and I went by motorcycle to a mountain called Aguit, which is located 9.9 km to the northeast of the center of Renchinlhumbe. Crossing three mountain rivers, we reached a local herder family. This family spends autumn in front of Aguit Mountain. From that family, Mr. T. Munkhbayar, who is a bag governor, guided us to Aguit Mountain (Figs. 19 and 20). He told us that in the winter of 2016, several people came in a van and looted a burial site which was in a cave of the mountain.

There are two little caves on the front slope and at a height of 30-40 m from the foot of Aguit Mountain (Figs. 21-23). The entrance of the upper 'cave' measures 100 cm high and 60 cm wide (Figs. 24 and 25). The next one is 140 cm high and 49 cm wide, located 40 cm to the lower right side of the upper entrance (Fig. 26). Both entrances lean to the left (Figs. 23-26). Indeed, the caves are joined to each other with a small narrow space (Figs. 30 and 31). In other words, they are are basically two separate chambers of one cave, and each of them has an entrance. The lower chamber is 190 cm long from the entrance to the back. Its height is 170 cm between the floor and the ceiling. The upper chamber measures 440 cm in length. Its height is 170 cm at the back. Its width is 100 cm at a distance of 1 m from the entrance (Figs. 27 and 28).

Too many bones were dispersed within the soil and stone deposits on the beds of the cave. Most of them are from sheep or goats and might have been gathered by birds of prey and other carnivores. Furthermore, some human skeletal remains including a mandible (Fig. 31), clavicles, left humerus, right scapula (Fig. 37), hip bones (Figs. 32 and 38), a right femur (Figs. 29 and 38), a right tibia (Figs. 34 and 38), a right fibula (Figs. 33 and 38) and a few ribs and vertebrae, were uncovered. The shape of the obturator foramen (Fig. 38) of the hip bone indicates that the deceased was probably a male.

Unfortunately, there were no artifacts other than a horn piercer with a hole and a bone belt buckle (Figs. 30 and 40). Some wood fragments were also found (Fig. 39). The human skeletal remains and artifacts confirm that there was a medieval burial in the cave, particularly in its upper chamber.

Burial in the street

At the beginning of December 2018, when I was walking from home to work, I found human bones such as a left clavicle (Fig. 45) and a rib (Fig. 43) on the southern edge of a cement road. There were also eight small pieces of wood. The road is located to the north of apartment No 87 in 15th Khoroo, Bayanzurkh District, Ulaanbaatar (Figs. 41 and 42).

On January 14, 2019, when I was also going to work, I found the head of a left femur (Fig. 46). On April 3, 2019, I also found a left radius (Fig. 44) and a little piece of a human bone in the place where I had previously found the abovementioned human bones. On April 11, 2019, a sheep (?) radius and a little piece of bone (of a sheep?) were found. The colors of the human bones clearly show that those had been underground for a long time and are probably remains of a medieval burial with a wooden coffin. The human bones were exposed with a cross trench that was excavated between two buildings at least three times over several months.

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Fig. 1: Santyn Durulj Burial Site

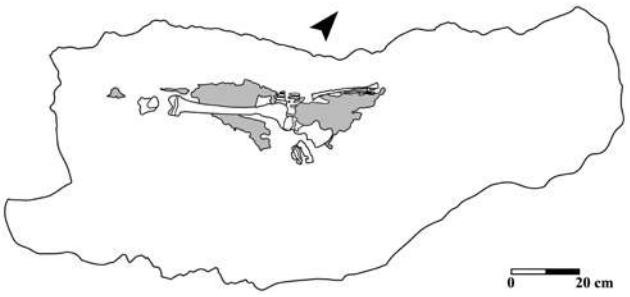
Fig. 2: A looters' hole

Fig. 3: A human skull and pieces of birchbark

Fig. 4: Fragments of a birchbark quiver

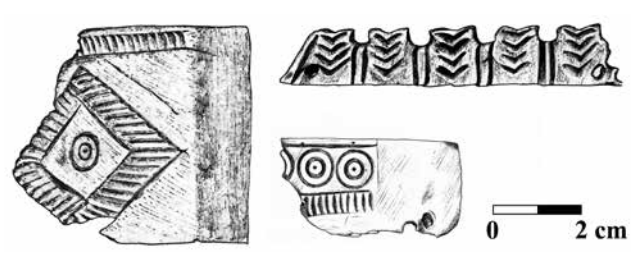
Fig. 5: Bone decorations of the quiver

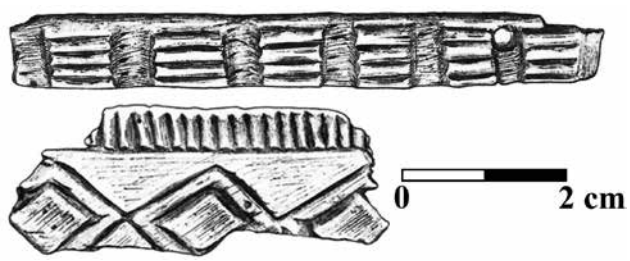
Fig. 6: Human bones



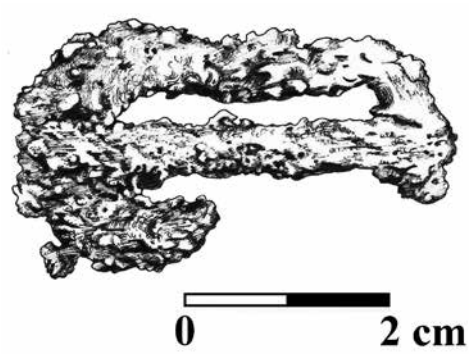
Figs. 7 and 8: Human skeletal remains *in situ* on the bottom of the burial hole

Figs. 9-11: Bone decorations of a quiver





Figs. 12 and 13: Bone decorations of a quiver



Figs. 14 and 15: The iron buckle

Fig. 16: The talus and calcaneus of a sheep

Fig. 17: A human skull from Santyn Durulj Burial Site

Fig. 18: Santyn Durulj Burial Site after reburying

Fig. 19: Aguit Mountain, from the south

Fig. 20: Aguit Mountain, from the south

Fig. 21: The Aguit Mountain cave, from the foot of the mountain

Fig. 22: The cave, from the south

Fig. 23: Entrances of the cave

Fig. 24: The upper entrance of the cave

Figs. 25: The upper entrance of the cave

Fig. 26: The lower entrance

Figs. 27 and 28: The interior of the upper chamber

Fig. 29: A human right femur near the upper entrance

Fig. 30: A bone belt buckle near the space between the two chambers

Fig. 31: A human mandible

Fig. 32: A human right hip bone

Fig. 33: A human right fibula

Fig. 34: A human right tibia

Fig. 35: The bed of the cave, the upper chamber

Fig. 36: The lower chamber

Fig. 37: A human right scapula and a rib near the lower entrance

Fig. 38: Human leg bones

Fig. 39: Wood fragments

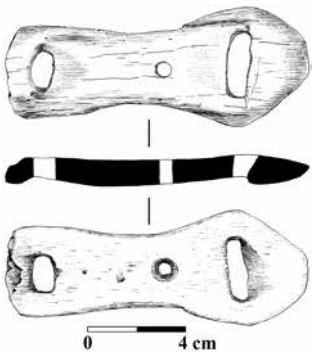


Fig. 40: A bone belt buckle from the Aguit cave burial site

Fig. 41: The road where burial site was destroyed, from the west

Fig. 42: From the southeast

Fig. 43. A human vertebra, from the north

Fig.44: A human left radius, from the southeast

Fig. 45: A human left clavicle, from the north

Fig. 46: A head of a human left femur

New Zealand

Cultural Heritage Conservation in a World Heritage Area - Auckland Islands, Subantarctic, March 2020 Fieldwork

Matthew Schmidt, *Senior Heritage Advisor*
Southern South Island, Department of Conservation Te Papa Atawhai

Introduction

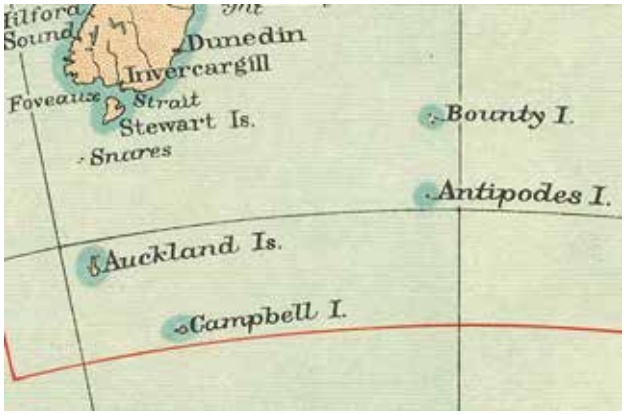


Figure 1. Locations of the UNESCO World Heritage Area Subantarctic islands: the Snares, Bounty Islands, Antipodes Islands, Auckland Islands and Campbell Island

Figure 2. Map showing heritage sites and features recorded during the March 2020 Operation Endurance Expedition to the Auckland Islands as well as proposed infrastructure locations (Image courtesy of DOC Geospatial Services)

The Auckland Islands are one of five island groups located in the Subantarctic World Heritage Area. The islands in this Area consist of the Snares, Bounty Islands, Antipodes Islands, Auckland Islands and Campbell Island and they are known for their significant natural and cultural heritage values (Figure 1). The Subantarctic has a history of human occupation which dates back to the great Polynesian voyages of the 12th to 14th centuries AD. This is illustrated by the late 13th/late 14th centuries AD Polynesian occupation site in Sandy Bay on Enderby Island (Anderson 2009:29). The Pakeha (European) history of the Auckland Islands only begins in 1806 when the islands were first encountered by Europeans on 18 August of that year. Since this time Pakeha have occupied and used the islands for various reasons including sealing and whaling, planned settlement, farming, scientific and astronomical surveys, military outposts, establishing castaway depots, with the islands also being the location of a number of historically significant shipwrecks. Maori also occupied the islands early in its written history with Ngati Mutunga and Morori arriving in 1842 and finally leaving in 1856. Many of these historic events have left a footprint on the islands, particularly on Auckland Island itself.

The *Maukahuka – Pest Free Auckland Island Project* is a ten-year project aimed at removing pest animals from the Auckland Islands so as native species can thrive and recover. Pests on the island were introduced by Pakeha/Europeans during various visits in the 19th century. The release of rabbits and pigs were to provide food for those who became isolated on the islands such as from shipwrecks. Cats and mice followed Pakeha during attempts to settle the islands such as the 1849-1852 Enderby Settlement. This pest eradication project requires infrastructure which has the potential to affect heritage sites and so management of the heritage on the island was incorporated into the project planning. It was already known that the potential locations of the projects' infrastructure in the Enderby Cove/Davis Cove area would be in the vicinity of the extensive archaeological site of the 1849-1852 Enderby Settlement (also known as Hardwicke). Infrastructure may also be required at the historic Erebus Cove Boatshed, Castaway Depot and Monckton's Farmhouse. Hence the primary aim of the March 2020 cultural heritage survey and assessment was to inform on where infrastructure could be placed to avoid heritage features. A second aim was to determine if any heritage features could be adaptively re-used for the project with an outcome being the long-term preservation and management of these features. A third aim was to undertake management work on selected heritage features if time allowed. This report briefly describes the outcomes of the March 2020 heritage fieldwork.

Cultural Heritage Site Survey

The cultural heritage site survey was undertaken by Matthew Schmidt and Andrew Blanshard, Department of Conservation ("DOC") Senior Heritage Advisors for the Southern South Island and Northern North Island, respectively. Support was provided by the pest project team whose skills with chainsaws were particularly valuable in clearing vegetation from heritage sites. The

first task for the survey consisted of ground truthing earlier heritage survey work in Erebus and Davis Coves undertaken in 2003 (Figure 2). Key to this was GPSing features recorded on the original tape and compass maps and as described in the associated NZAA Site Record Forms (NZAA Site No's AU/22 to AU/29). Secondly, the new survey was widened to record in more detail the nature and extent of the Enderby Settlement heritage features. The opportunity was also taken during the project to update the 2003 recordings of the 1874 German Transit of Venus heritage site (NZAA Site No. AU/21). New sites/features discovered during the teams' various field activities were also recorded.

Figure 2 shows the GPS locations of recorded heritage features identified during the survey. Locations marked H1 through H23 are where monitoring markers were placed so as changes to these particularly important features could be documented over time. In total, 50 heritage features were recorded each associated with its own GPS point, photographic record and field notes.

The archaeology of the 1849-1852 Enderby Settlement/ Hardwicke recorded typically consisted of living terraces, house sites, numerous scattering of bricks, ceramics, bottles and roof slates (Figure 3). The cultural remains of the day-to-day activities of the settlement were found to be quite defined in their distribution. Cut rata stumps, the result of 19th century deforesting activities, had a wide distribution and were more extensive than shown on the original 2003 survey map, though they were more common closer to the coast. It was found that not all of the cut Rata necessarily dated to the Enderby Settlement activities as demonstrated by the age of some of the trees with cuts. The survey established a boundary of the known heritage features associated with the Enderby Settlement where proposed infrastructure work for the pest eradication project would avoid these features (see Figure 2). This boundary (marked as a yellow dotted line on Figure 2) was not only GPS'd but marked physically on site through spray paint marking on trees (Figure 4). Outside of this area evidence of cut rata was present but this was easily recognisable and could be avoided if necessary. Heritage features that could be re-used for the project were also identified during the survey and this included the original 1849 boat haul/slipway and a nearby boat cutting/jetty as well as sections of the original Hardwicke Road (Figures 5 & 11).

Figure 3. A montage of the various heritage features and artefacts present in the area of the 1849-1852 Enderby Settlement (Photos: Matthew Schmidt)

Three important heritage features were found during the survey work. The first was a brick, cobble and cement plinth discovered during track clearance work (Figure 6). This plinth matches one located at the 1874 German Transit of Venus site. Further research will determine what this feature is. Jones (2009:93) attempted to date the similar plinth at the Venus site back in 2003 and concluded that it could date from the Ross 1840 expedition era, the 1907 Philosophical Institute Expedition (more likely in Jones mid) or from Eden's 1945, 1947 magnetic measurements. If this new plinth is from the German Venus expedition, then it may be the location of another *Collimatorhaus* used to record light levels as the 1887 Krones map of the Venus site shows this instrument in the location of this type of plinth.

The second find was that of a whole 19th century black beer bottle found in the general location of the possible Ngati Mutunga 'pa' (Figure 7). The bottle was well buried implying deposition in the period of use of the area by Ngati Mutunga and the occupants of Hardwicke. Thirdly, on Enderby Island two Polynesian ovens were recorded eroding out of dune faces on the Sandy Bay beach front as well as a mussel midden layer. Although

occupation has been identified in the bay previously and has been physically investigated on a minor scale (back in 1998 & 2003), these recent recordings confirm that this internationally significant heritage site is continually being lost to coastal erosion and sea lion activity.

Heritage Conservation Management Work Undertaken

The March 2020 fieldwork provided an opportunity to undertake heritage conservation management works on particular sites and this third aim was achieved for four key heritage locations.

The Amherst spar dates from 1868 and was once a tall imposing structure set on a vegetation bereft headland (NZAA Site No. AU/25). It was erected to direct people shipwrecked on the island to a castaway depot. Today this artefact lies in three pieces. The base of the spar protrudes 3 m from the ground on an *ca*. 80-degree angle (Figure 8). A 4 m long piece of the spar has cracked off, fallen vertically and lies hung at a *ca*. 60-degree angle against the 'v' of a tree (Figure 8). A third piece of spar 3 m long lies horizontally on the ground (Figure 8). The vegetation cover does provide some protection from the elements for the pieces of spar but the piece lying on the ground is exposed to moisture from below and insect activity. The piece hung up in the tree will be prone to future damage when the weight of the branches holding it up gives way. Sea lions and pigs are a constant issue for the pieces by rubbing past them and, for the piece on the ground, climbing onto or over this artefact. Recognising these risks, the team moved the piece of spar on the ground next to the two vertical sections and built a temporary fence around these using metal warratahs and wire mesh to protect them (Figure 9). The loose piece of spar was also lifted off the ground onto small timber blocks.

The brickwork of the 1874-1875 German Transit of Venus site plinths and pedestals are sensitive to moisture and vegetation encroachment (NZAA Site No. AU/21). This site required vegetation immediate to these features to be removed but most importantly vegetation and peat build up removed from the plinths and pedestals themselves (Figure 10). One of the plinths was completely hidden by peat and moss build-up and was found through probing. Each brick feature was cleaned down using trowels and brushes and the wooden boxing placed around the structures by past DOC management work exposed and checked for integrity. It was this past boxing which saved three of the plinth bases from deteriorating completely. Interestingly, one of the plinths was not recorded during an archaeological survey in 2003 and must have been found after this visit by DOC Rangers who then conserved it.

The *ca*. 1890 Erebus Cove Boatshed and Castaway Depot (NZAA Site No's AU/22 & 23) had vegetation encroaching on both structures cleared back to allow sunlight and fresh air to flow around the structures and to reduce the risk of overhanging branches damaging them further. A section of a ship's spar stored on the timber boatshed floor was also lifted onto blocks to reduce moisture uptake and increase airflow around the artefact to help keep it dry.

Finally, sections of the original 1849-1852 Hardwicke road alignment were cleared so its path could be delineated more clearly as it travelled through the rata forest. This work would also help preserve any buried cobbling from further damage by vegetation growing through the stonework (Figure 11).

Conclusions & Recommendations

Heritage conservation management as a component of the *Maukahuka – Pest free Auckland Island Project* successfully demonstrated the benefits of combining two projects with the aims of conserving the natural and cultural heritage values in a World Heritage Area. It was found that the infrastructure required to be built for the eradication of pests on Auckland Island could be designed to incorporate heritage features at the Enderby Settlement and in the long term benefit these features particularly in regard to the management of encroaching vegetation and visitor impacts.

The following recommendations were made as a result of the fieldwork regarding the management of cultural heritage sites in the vicinity of the proposed infrastructure works for the Maukahuka – Pest Free Auckland Island Project, at the 1874 German Transit of Venus site and for two sites visited on Enderby Island:

- Vegetation should be cleared from all heritage features relating to the Enderby Settlement/ Hardwicke site and the German Transit of Venus site where possible under supervision of a Senior Heritage Advisor. The aim of this clearance is to preserve and protect the heritage and open the area up for historic heritage visitation.
- Permanent fencing should be built around at risk archaeological features such as the Amherst spar remains, particular Hardwicke house terraces, areas of cobbling, the Hardwicke settlement well, the German Transit of Venus plinths etc. Some features, such as the spar remains, may require simple corrugated iron roofing for environmental protection.
- Boardwalks should be built around the Hardwicke settlement and various heritage features to not only protect these from foot traffic and animal damage but to take visitors on a journey around the story of settlement.
- Interpretation panels should be installed at chosen locations around Terror, Davis and Enderby Coves to tell the story of the human history of these coves such as the arrival of Ngati Mutanga and the Moriori, the Enderby Settlement, the German Transit of Venus story.
- The Stella Castaway Depot on Enderby Island requires vegetation to be cleared from within and overhanging the enclosure.
- The nature and extent of the Polynesian occupation at Sandy Bay on Enderby Island must be investigated urgently. It is unknown whether the eroding ovens are the last remnants of the site or whether the site extends under the extensive grassy terrace behind. This investigation could be undertaken during the proposed infrastructure programme and would initially involve a series of test pits and auguring

over the terrace area behind the eroding dune face and undertaking salvage archaeology on the eroding ovens.

- An interpretation panel developed in consultation with Iwi should be installed at Sandy Bay on Enderby Island to explain the Polynesian discovery of the Auckland Islands in the late 13th/late 14th century AD and a separate panel/s explaining the history of Enderby from Pakeha arrival onwards.

Acknowledgements

My thanks to my heritage colleague Andrew Blanshard whom teamed up with me to embark on heritage recording and management work and to the *Maukahuka – Pest Free Auckland Island Project* team of James Ware, Stephen Horn, Veronika Frank, Rachael Sagar, and Micaela Kirby-Crowe for their support in undertaking the heritage component of the March 2020 fieldwork. Also, thanks to Lindsay Chan and Ann De Shutter who provided the GIS mapping services for the project.

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Figure 4. Tree sprayed with paint to indicate boundary of known heritage remains at the Enderby Settlement (Photo: James Ware)

Figure 5. The 1849 boat haul/slipway (left) and nearby boat cutting/jetty (right) (Photos: Matthew Schmidt)

Figure 6. The newly discovered plinth (left) and the plinth at the 1874 German Transit of Venus site (right). Both have 30mm copper pipes at their centre and use the same bricks (Photos: Matthew Schmidt).

Figure 7. The buried black beer bottle found during mouse trap monitoring work (Photos: Matthew Schmidt)

Figure 8. The three pieces of the Amherst 1868 spar: Left image - the piece hung in the tree (left), the section on the ground (center), and in-situ piece (right); Right image - the 4m length of spar hung up in the tree (Photos: Matthew Schmidt)

Figure 9. Temporary warratah and wire mesh fencing placed around all the pieces of the Amherst spar (Photo: Matthew Schmidt)

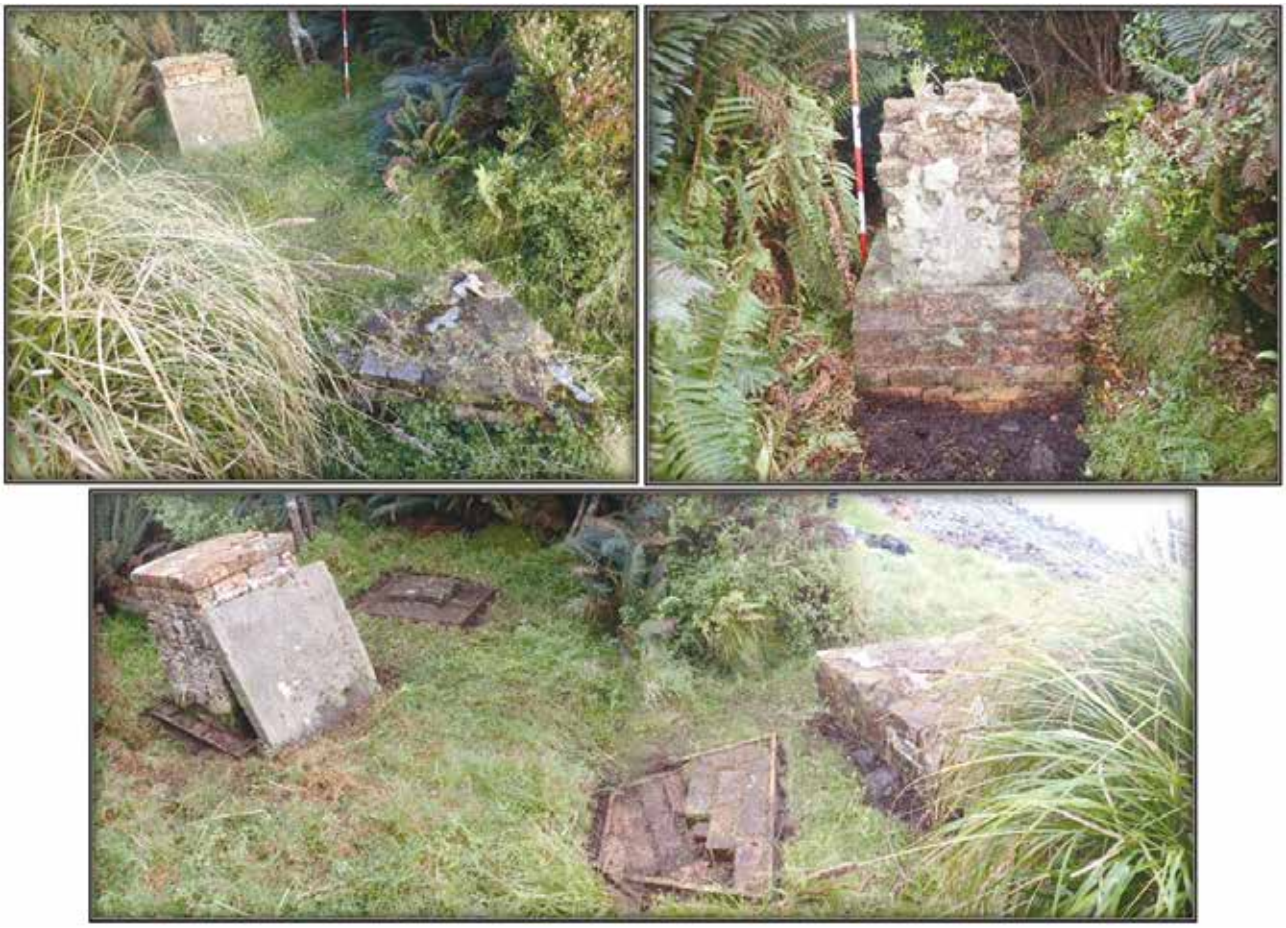

Figure 10. The German Transit of Venus Plinths before (top left) and after vegetation clearance (top right & bottom) (Photos: Matthew Schmidt)

Figure 11. Hardwicke Road cleared of vegetation (left). Close view of exposed road cobbling (right) located below the Rata roots on the left of the left image (Photo: Matthew Schmidt)

Philippines

Report on the Cleaning of the Facade of the Historic Church of San Agustin

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A Reflection During the Lockdown in the Philippines

I am about to report on a topic that happened prior to the worldwide pandemic, but before that let me give a short narrative about what has taken place this year in my country. In the Philippines, Batangas City was under a state of calamity due to the Taal Volcano eruption that started on January 12, 2020. Several areas, including Manila, experienced ash fall for some time. The affected areas were just beginning to recover when the entire island of Luzon, including its associated islands, was placed under an enhanced community quarantine on March 16, imposing a lockdown in Manila due to the rise in corona virus cases. Business establishments and the tourism industry were greatly affected. Even various projects for the conservation and restoration of heritage buildings and art objects were temporarily suspended. There was no way even to regularly monitor museum collections. We all came to realize, by watching the news, that covid-19 had affected the entire world and most countries had instituted social distancing measures. The Catholic faithful in the country during the lockdown relied on live-streamed masses in different parishes on social networks. The Augustinian priests of the Order of St. Augustine in the Intramuros district of Manila made sure that Lenten Week was celebrated online in their parish to lift the hearts of the people. On April 5, 2020, a Palm Sunday, the people were encouraged to gather leaves, twigs, or any part of the plants that a family could get in their gardens as representations of the traditional palaspas, the woven palm fronds used for the blessing. There was a prayer procession at the cloisters of the San Agustin Monastery depicting several key moments in the life of Christ. Since regular processions were not allowed, the Parish priests would go around the Intramuros district in a vehicle with the Holy Cross, Our Lady, Santo Niño, and other Saints so that people could venerate the images and be granted blessings without leaving their houses. The traditional practice of pag-dungaw of Our Lady of Consolation on April 18, and the feast day of Saint Rita on May 22 at the San Agustin Church, were also featured. The Pope led the world's shrines in a rosary prayer online on May 30, 2020, and a subsequent series of healing rosaries were led by the Manila Cathedral and different parishes to unite the people in prayer for healing and to end the pandemic. On July 10, a fire hit the Santo Niño de Pandacan Church in Manila, and a revered 400-year-old image of the Child Jesus was not saved. So much has happened to the world in just a short period of time. It is time to reflect on what has happened and think of what can still be done. We must be respectful and hopeful. Moving forward, we must continue to protect ourselves and our communities, and together overcome this crisis.

Report on the Cleaning of the Facade of the Historic Church of San Agustin

It is of paramount importance to decide cautiously which products and methods to use when faced with maintaining and preserving a historic structure. The repair and maintenance of such a structure requires specialized skills and knowledge. When cleaning a facade and walls like those of the centuries-old San Agustin Church in Intramuros, Manila, one must think of the gentlest possible means and use methods and materials that are not harmful.

It was in 2015 when the Augustinians at San Agustin Church and Monastery, in the Intramuros district of Manila, celebrated the 450th anniversary of the arrival of the Augustinians in the Philippines. In preparation, the San Agustin Church, Convent, and Monastery went through phases of conservation, restoration, and refurbishment. Several years had passed since the previous general cleaning and restoration of the facade of the church and convent. Manila had experienced extreme temperatures, storms, and earthquakes during recent years which may have contributed to the poor condition of the facade.

A German company named Kärcher Inc. offered their voluntary service to the Augustinian priests to clean the San Agustin Church and Convent facade. Kärcher's cleaning technology aims to eliminate the biological growth of algae, mosses, small plants, and emission pollution from the walls. The company chose San Agustin Church because of its stature as the oldest stone church in the Philippines, inscribed on the World Heritage List by UNESCO in 1993, as well as being a designated National Historical Landmark and a National Cultural Treasure. After a series of test cleanings of the walls of the church, and meetings from 2017 to 2019 with stakeholders regarding approval for this cleaning project, a memorandum of agreement was prepared between Kärcher Inc. and San Agustin.

The walls of the San Agustin Church are made of adobe finished with plaster, known as paletada. There were visible parts of the adobe walls which no longer had their protective finish and had become exposed to the elements. Soot and grime were present over almost the entire facade of the convent, the lower parts of the facade of the church, the bases of columns, the edges of walls, and parts of the belfry. The dark appearance of the surface of the walls of the facade was due to the accumulated dirt, grime, soot, and biological growth. Due to its age and the country's tropical climate, San Agustin Church's natural stone exterior had acquired organic vegetation. These biological components produce harmful acids and drill in their roots, which had weakened and partially damaged the surface of the delicate stone structure. There were plants that grew on the lower and upper parts of the church facade. All of these elements threaten further damage to this heritage structure without

immediate intervention. Hence, there was a great need for preventive measures. It is difficult to do manual cleaning of the church wall facade since it requires scaffolding, a hose linked to tap water for cleaning, and the use of a brush on the walls to remove the dirt and grime. This is a difficult process and takes time, not to mention the cost it entails.

The cleaning of the San Agustin Church facade and walls started last November 13, 2019, and continued to November 22. The aim was to clean the surface of the San Agustin Church and Convent of any pollutants by well-trained experts, taking care to maintain the structural integrity of the building.

Kärcher Inc. provided a team of experts for this project headed by Mr. Thorsten Marco Möwes, a specialist in Cleaning and Hygiene Technology for Cultural Sponsorship and Restorative Cleaning Projects, whose task was to perform the actual cleaning while ensuring the safety and protection of the site. Mr. Möwes is a cleaning specialist actively involved in supporting the preservation of historical monuments and buildings worldwide. Cleaning heritage buildings may cause surface damage if the methods lack the proper specifications and controls needed to deal with various types of dirt, surface coatings, and biological growth. Close inspection and tests were necessary prior to cleaning. Mr. Möwes demonstrated their two main cleaning systems, using hot steam and high pressure, before the full-scale cleaning of the facade of the Church. Hot water, high-pressure cleaners remove algae, lichens, and moss without chemicals. They remove oil, soot, and grease from facades just as successfully. Inside the hot water, high-pressure cleaning machine are two main components: the electrically driven pump, and a boiler with 150-degree Celsius heating capacity. To eliminate biological components, they only need 60 degrees Celsius. The temperature, water quantity, and operating pressure can be minutely adjusted. This makes the equipment especially suitable for sensitive materials, since it can clean very thoroughly yet gently using hot water or steam, even at low pressure. The technology using gentle steam is harmless to delicate facades, but can remove biological growth such as algae, moss, and plants.

Hot steam is used for sensitive stone materials such as adobe and limestone, while high pressure is used for strong stone such as granite. Adobe is powdery in nature. Only gentle steam can be introduced to clean the exposed walls. Cleaning equipment such as hard brushes or metal tools are some of the most common harmful practices that damage historic structures. Mr. Möwes emphasized the importance of using hot water for cleaning. Hot water is more efficient than using cold water. The easiest and gentlest way to clean is the steam system. Its reduced pressure setting is suitable for sensitive stone. Depending on the climate, the traditional cleaning of structures is done every 6–7 years, but results using the hot steam system may last up to 10 years or more. Super boom and scissor lifts were used to carry out the cleaning work in elevated areas. The use of steam cleaning was introduced during the cleaning of the church facade and walls to prevent the growth of algae and other plants. The roots can penetrate and greatly affect the condition of the walls. The hot steam system is known to be the most effective technique for preserving and restoring old structures made of mineral materials. Its high temperature delays the reintroduction of organic vegetation. With the use of the steam mode, the wall surfaces of the church were cleaned without any surface damage.

Conclusion

The effects of sunlight, changes in weather and temperature, the presence of moisture and air pollution, and the movement of the building due to vibration and earthquakes contribute to the deterioration of the building facade. There must be a consistent maintenance, repair, and prevention plan in place to protect the property. When cleaning is not carried out properly, it has the potential to cause damage either immediately, while cleaning is in progress, or over a period of time. The abrasive or corrosive actions of many cleaning methods can remove or destroy the protective surfaces. It is imperative that the stone is only cleaned of harmful materials by using the least aggressive methods to achieve the desired result. It is best to determine or measure how much cleaning is necessary. Pre-project trials should be compulsory for work of this type and should be undertaken by skilled conservation contractors. Always seek the advice and guidance on maintenance to best preserve the structure. If the building is to be cleaned, it is important that all parties agree on what is expected of the process.

Facade cleaning can be performed using high-pressure water, low-pressure water, sandblasting, wet aggregate blasting, hot water steam, chemicals, sponges, etc. In the case of cleaning the facades of the San Agustin Church and Convent, cleaning equipment using a gentle steam method was introduced to effectively clean the delicate walls. The cleaning was done methodically. The soot, grime, and biological growth were removed without destroying the wall of the facade. Proper maintenance of a heritage structure increases the life of the property and improves the building's value. The Augustinians are making sure that this heritage structure is well preserved for the generations to come.

Photographic Documentation: November 15–22, 2019, Cleaning of the San Agustin Church and Convent Facade








Acknowledgements
San Agustin Church/Convent and Monastery: Rev. Fr. Roy Gallano, OSA (Prior); Rev. Fr. Ricky Villar, OSA (Museum Director); Rev. Fr. Arnold Santa Maria, OSA (Parish Priest). Kärcher Inc.: Mr. Klaus Puehmmeyer (Regional Manager), Mr. Thorsten Möwes (Cleaning and Hygiene Technology Specialist), Ms. Daina Bartuseviclute (Marketing-International Project), Mr. Mark Palisoc (General Manager), Mr. Ramon Ramirez (Marketing Manager). Photographs courtesy of Kärcher Inc.

Sri Lanka

A Summary of Fire Disaster Management in Sri Lanka

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Department of Archaeology

Introduction

This short paper provides an overview of the background to fire and protection activities used in Sri Lanka. Sri Lankans have experienced the following categories of natural and manmade disasters.

i. Fire
ii. War and Terrorism
iii. Looting
iv. Flood
v. Tsunami

Of these, fire is one of the main types of disasters because it can totally destroy monuments or objects in a matter of seconds. About 50% of ancient monuments in Sri Lanka are wooden heritage, i.e., image houses, dwellings, public buildings, etc. These buildings are often susceptible to fire. Although timber structures are combustible, fire protection equipment has not been installed in many cases.

History of Fire Disasters in Sri Lanka

i. The Lovamahapaya, built by the Great King Dutugemunu, and described as an edifice of nine stories measuring 120 m x 120 m and containing 1,600 stone columns, was destroyed by fire during the reign of King Saddatissa (137-119 BC). It is recorded that a century later, it was renovated by King Bhatikabha (22 AD). Hundreds of Sri Lankan experts in architecture, engineering, interior decoration, and artists, along with thousands of workers, had worked hard generation after generation to rebuild the building. All that hard work and the resources used in the project were wasted in just one day.

ii. Warlord Magha of Kalinga (Kerala) came when Sri Lanka was already under the control of the Pandyan invaders, but unlike many invaders before him, they destroyed the Sinhalese Kingdom. Like a scorching fire sweeping through a dry forest, they ruled and ruined the country for 21 years, setting fire to everything they found.

Wildfires

Wildfires occasionally occur in Sri Lanka, with the warming of the atmosphere paving the way for more wildfires. In the dry season, mountain forests can sometimes catch fire. Although the forest on Pidurutalagala Mountain caught fire in March 2010, destroying a large amount of wood, fortunately it did not affect any cultural heritage. People are responsible for wildfires either due to malicious intent or negligence; forests are often purposely set on fire by hunters so that they can hunt animals in the dry season.

Causes of Wildfires

i. Fire starting inside the forests
ii. Lightning
iii. Careless disposal of heat-generating items
iv. Human activities

In Sri Lankan practice, most fire incidents are generated from human activities, which can be intentional or unintentional.

Causes of Fire in Ancient Monuments

i. Human activities such as rituals and vandalism
ii. Lightning
iii. Faulty electrical installation
iv. Negligence

Intentional

i. Purposely lit fires due to quarrels between owners and other parties
ii. Vandalism
iii. War / Civil Conflict

Purposely lit fires cannot be eradicated because such persons try to fulfill their aims by bypassing fire protection measures.

In this paper, fire damage due to unintentional human activities is discussed.

Unintentional

i. Unsafe / careless handling of oil lamps / incense sticks
ii. Careless disposal of heat-generating items

The lighting of oil lamps and incense for Lord Buddha / gods inside religious places in Sri Lanka and most other South Asian countries has been done since a long time in the past as a ritual which increases the risk of fire, with the curtains hanging around the statues acting as a fire carrier.

The best example of such a disaster is a recent fire at Bihalpola Tampita Image House. The wooden structure of this image house caught fire due to oil lamps which were lit by devotees in the evening. The fire spread to curtains from the oil lamps and finally found its way into the roof, where it was seen by neighbors who had taken steps to extinguish it.

Careless disposal of cigarette butts and used matches will cause the same damage. But this situation has been somewhat alleviated by the law against smoking in public places in Sri Lanka, and it depends on personal patterns of behavior.

Anyway, it is unfortunate that no fire protection measures are fixed for most wooden monuments, even at World Heritage Sites. The reason for this is that not many fire

incidents have not been recorded, and these fires have been controlled without spreading. The cost of such fire protection systems is high as well.

Most disasters like fire, explosions, lightning, etc. cannot be forecasted or avoided. But by using preventive measures they can be controlled to some extent to lessen the damage. The following preventive measures have been taken to control fire damage.

i. Awareness
   Using signage, mentioning the significance of such monuments, precautions, etc.
ii. Preparing a place outside the building for lighting oil lamps and candles
iii. Keeping the outside of the monument free from combustible materials
iv. To prevent grass fires spreading around the building, removing all vegetation in a 1-meter wide zone around the monument
v. Proper electrical installation including lightning arresters

Most of the cultural monuments are located in places where there is no vehicular access. Some of the monuments are situated on top of rocks, etc. On the other hand, the local authorities have no firefighting facilities, and in these situations people use their own simple methods to put out fires, i.e., using water, sand and earth, etc. Water can douse the flames with the use of buckets and sand can be thrown onto the fire to separate the object and the fire.

Although such simple efforts are a fantastic improvement, some disadvantages will occur when water is used.

Water

i. dissolves some materials (e.g. glue, wall paintings, etc.)
ii. corrodes metals (e.g. roof materials)
iii. delaminates some materials (e.g. planks)
iv. leaves tide marks in porous materials (e.g. ceilings, walls)
v. swells organic materials

On the above occasions and when the fire is out of control, modern techniques should be applied. Therefore, studying these methods and techniques will be more advantageous for planning a disaster management system for cultural heritage.

Proposed strategies for better fire protection systems

i. Introducing suitable fire prevention methods to suit the condition of the site.
   It is important to select proper fire extinguishing media after consideration of the characteristics of the monuments or sites.
ii. Fixing fire alarm systems
   As some of the sites are situated in remote areas, there are no services available. In such cases, a fire alarm system would be more useful than fire extinguishers.
iii. Training of fire and rescue teams
iv. Extending fire regulations to heritage sites
   In practice, fire regulations are presently applied only in urban areas.

Case Study - Fire Destruction of Bihalpola Tampita Vihara (Image House)

Location: Located on the Kuliyapitiya – Narammala high road in the Kurunegala District, North Western Province of Sri Lanka (Latitude / Longitude (7.454433, 80.153754)

Implementation Body: Regional Archaeological Office (North Western Province) Department of Archaeology of Sri Lanka

Funding Body: Annual Budget Allocation, Sri Lankan Government.

Figure 1. Bihalpola Tampita Image House

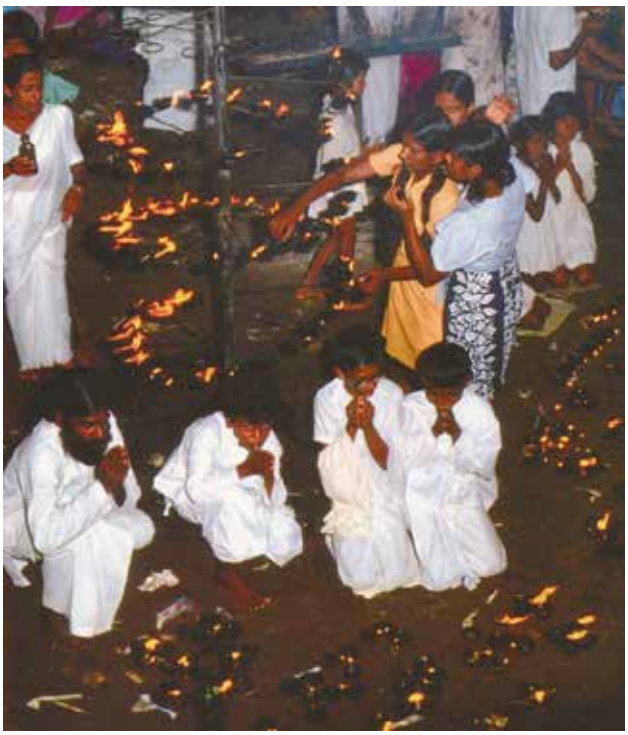

Figure 2. Lighting oil lamps

Introduction and Background

Built on stone pillars, the Tampita architecture of Sri Lanka makes a unique contribution to the architectural tradition of the country. This tradition has been extensively used to build the Buddhist image houses of the 17th to 19th centuries. This temple is situated on rock and has a carved stairway in rock. The Bihalpola Tampita Vihara is built on rough stone boulders, with a number of heavy wooden beams horizontally laid on it. On these, wooden planks were laid to form a stage for a shrine room, and a series of wooden pillars were positioned on each stone pillar to hold a traditional hipped tiled roof structure. The shrine room is of wattle and daub construction, with two doorways in the northern and western facades. A special feature is the outer high wall, instead of a railing or short wall. Images of Buddha and various gods are enshrined in the sanctum, and the walls and ceilings are decorated with paintings dating back to the 19th century.

Bihalpola Ancient Tampita Image House and Temple of the Sacred Tooth Relic (Dalada Maligawa) were inscribed as a protected monument by law in Gazette No. 14737 on 23 Feb., 1967. Therefore, the Department of Archaeology has responsibility for the conservation and maintenance of these monuments following accepted archaeological methods. This monument was conserved from time to time since 1967 by the Department of Archaeology.

Values

Although this building provides clues of the culture of that period in Sri Lanka, it has much value in representing their living and administration system in the 19th century. This is a good example of their culture of constructing Tampita Image House and the Temple of the Sacred Tooth Relic (Dalada Maligawa). The heritage values connected with this building can be summarized as follows.

Historic value

It is said that this place has been in existence since the era of King Devanam Piyatissa and was developed by King Valagamba and Keerthi Sri Rajasinghe. Therefore, it provides a historical testimony for the future.

Architectural value

This building represents Sri Lanka's most important building tradition, called Tampita Vihara. Carved wooden components, thick walls, decorative murals, timber roof frames, and statues are its characteristics. This building represents the Kandyan architecture of the 19th century.

Material value

All the walls of this building have been made out of mud/clay and wattle and daub, which are in their original state. In Sri Lanka, the wattle and daub technique was used widely in the ancient periods.

Artistic value

The artistic impression is high as the architectural composition is excellent. The inner area of the shrine room has a decorative doorway, statues of Buddha and various gods give a deep artistic impression, with the inner and outer walls and ceiling containing decorative and colorful murals.

Religious and Symbolic value

It has religious and symbolic value, as for a certain period of time, the sacred tooth relic of Lord Buddha is housed here. This monument is still worshiped by devotees.

Fire Damage

The wooden structure of this Image House caught fire on 19th May, 1997 due to an oil lamp which was lit by devotees in the evening. The fire spread to curtains from the oil lamp and finally to the roof. It was seen by neighbors, who took steps to extinguish it.

Conservation Project

The conservation was started and is being carried out with the Architectural Conservation team of the Department, according to the conservation proposal drawn by them. The Department of Archaeology has appointed conservation staff for the task, who are directly instructed and guided by the Director General of Archaeology and Director (Architectural Conservation).

As a national monument is legally protected, it is necessary to preserve the physical remains according to accepted archaeological conservation principles. Apart from that, this is a living monument and also a sacred place for worship. Therefore, the monument has to be conserved and the paintings and images must be cleaned and preserved for ritual purposes. Structural strengthening of the roof frame and load bearing structures had to be identified.

The Project Comprises the Following Main Activities

i. Conservation of the building
ii. Conservation of paintings and images
iii. Introducing a fire or risk protection system
iv. Public awareness program

Figure 3. Before fire destruction

Figure 4. After fire destruction

Figure 5. Damage

Figure 6. Floor totally burnt

Figure 7. Damage to murals and paintings

Figure 8. Damage to the decorated ceiling

Figure 9. Damage to a statue

Figure 10. Damage to murals, paintings and statues

Procedure Followed for Conservation

i. Documentation and recording (complete condition assessment / drawings / photographs)
ii. Studied the historical data and reports of the previous conservation
iii. Prepared conservation proposals (decisions / drawings / structural details if any)
iv. Prepared estimates
v. Allocated funds
vi. Prepared work programmes

Short Term and Long Term Benefits to be Achieved From the Project

i. Protecting an important historical monument with rare architectural features and giving people a good knowledge of vernacular timber architectural heritage
ii. Keeping the necessary environment for rituals for villagers
iii. Attracting more tourists to the northwestern part of Sri Lanka
iv. Upgrading the lifestyles of the local community in terms of both economic and social aspects.

Problems Encountered

i. Introducing a fire or risk protection system
The main problem in introducing a fire protection system was financial difficulties as a developing country for the installation of fire hydrant and alarm systems.
ii. Lack of knowledge of the latest techniques
A lack of knowledge of new fire protection methods, techniques and use of the latest equipment are also problems. Simple methods, i.e. using water / sand, are currently being used for most fire incidents. Though it is cheap to use water, some places need the latest techniques to obtain more protection. A lack of knowledge of new methods, techniques and use of the latest equipment are also problems.

As a developing country, the latest technology for fire or risk protection is not accessible by the conservation field.

Uzbekistan

Lacuna, *Rigatino*, and *Tinta Neutra* (Italian Experience in Conservation)

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Italy is famous not only for its beautiful and picturesque nature, but also for its architectural, historical and cultural monuments dating back thousands of years. Monuments such as the Colosseum amphitheater in Rome, the Leaning Tower of Pisa and the ancient city of Pompeii, preserved under the volcano, have become the hallmark and symbols of the country. It is no coincidence that this place is visited by millions of tourists every year.

The ancient Roman Empire, considered one of the oldest civilizations in Europe, left not only a rich written history, but also hundreds of architectural and archaeological monuments, as well as several thousand works of art. Conservation, exploration, transformation into tourist attractions and their transfer to future generations is one of the most pressing issues today. The country has sufficient experience in this area, because international institutes in the field of restoration, universities that train professional restorers, and repair laboratories have been established here[1].

Terms such as lacuna, *rigatino*, and *tinta neutra* are widely used in the world of restoration, including in the Italian scientific literature. Originally Italian, these terms were introduced to the field of restoration long ago, became deeply rooted and have now become international terms. These terms refer to the theoretical and practical rules of restoration.

Lacuna (*lacuna or lacunae*[2]) is a word of Latin origin, meaning a gap or a missing part. A lacuna is a historical and cultural object or part of a work of art that has not survived for a known or unknown reason. The term was originally used to refer to books or manuscripts, but later it came to be widely applied to other historical and cultural sites. The term "lacuna" is defined as follows in EwaGlos glossary of restoration terms. That is, "a missing part of an architectural surface or wall painting which affects their integrity." [3] The glossary explains that such deformation leads to a violation of the integrity of the surface and can be produced by accidents or by loss of adhesion. It differs depending on the size of the lacuna, which in turn determines whether it is possible to restore the integrity of the image using a restoration technique (Fig. 1).

Among the main ethical principles of C. Brandi's theory, there are aspects directly related to filling a lacuna. That is, in his words, "a restorer should never take the place of an artist, imitate his style and indirectly interpret the artist's work." At this stage, Brandi intended to strictly prohibit the reconstruction of the restored object or restore it in the form in which it appeared[4].

Until the middle of the 19th century, a lacuna was considered a violation of aesthetic rules, and therefore restoring a work of art to its original state (mimetic integration) was an integral part of restoration work. But the development of a scientific approach in the second half of the last century changed the attitudes towards restoration. Now the authenticity and historicity of the work determined its value and created the conditions for organizing the concept of modern restoration. These conditions made it necessary to preserve or restore it based on the exact meanings present in each piece.

The analysis of lacuna moves from its definition, focuses on the different meanings in relation to scale and context, deals with the causes that generated it and the alteration of the work's expressive value. A methodological approach to tackle lacuna and to define the resulting operative choices is proposed in relation to its treatment, also to demonstrate how the same critical-methodological approach is valid for architectural, historical-artistic and archaeological works of restoration[5].

Rigatino translated from Italian means "hatching," a method to fill in the missing part of the image, that is, the gaps, by placing very thin parallel lines of pure colors close to each other in a vertical position. This makes it difficult to separate the *rigatino* from the stored image at a certain distance. Only a specialist can detect this at close range.

This method was developed at the Central Institute of Restoration (Ital. *Instituto Superiore per la Conservazioneed il Restauro*) in 1945-1950 and became more widespread thanks to the modern theory of restoration by Cesare Brandi. A method that gives *rigatino* or similar filling values restores the image and allows it to be understood or recognized. To achieve the desired color, draw thin vertical colored lines sequentially and dashed. Brandi emphasizes that in any case; new paint on any restored object can be removed, leaving the restored area easily visible and understandable to the naked eye.

[1] The article was prepared during a working visit to Germany and Italy by a delegation of the Research Center for the Restoration of Cultural Heritage and Art Objects at the Foundation for the Development of Culture and Art under the Ministry of Culture of the Republic of Uzbekistan to study international experience in the field of restoration.

[2] The word lacūna itself comes from the Latin word *lacus* - "lake," which Latin Americans replaced with lacūna and used this word to mean "deep," "crack" or "pool." English speakers adopted this phrase in the seventeenth century.

[3] *EwaGlos: European Illustrated Glossary of Conservation Terms for Wall Paintings and Architectural Surfaces*. Russian/German translation of the English Terms. Hildesheim: Michael Imhof Verlag, 2018, p. 180.

[4] Brandi C. "Theory of Restoration, I." In N. S Price, M. K. Talley Jr, & A. M. Vaccaro (Eds.), *Historical and Philosophical Issues in the Conservation of Cultural Heritage* (pp. 230-235). Los Angeles, CA: Getty Conservation Institute.

[5] Alvisi, A., Santopuoli, N., Sodano, C. "Lacuna's Treatment Restoration and Technological Innovation" // *6th International Congress on "Science and Technology for the Safeguard of Cultural Heritage in the Mediterranean Basin"* Proceedings. Vol. II. – Athens, 2013. – pp. 115-122.

Essentially, *rigatino* is a branch of the *tratteggio* method in the language of scientific conservation. According to Brandi's theory of restoration, *tratteggio* also means "hatching and is the restoration of the shape or color of a missing piece by drawing short vertical lines." Pure colors (mostly watercolor) are used in painting, as in the method of pointillism. In this way, work can be better understood by recovering lost parts that are small, easily recoverable, and can be discerned at close range. In many countries, the word "tratteggio" is mistakenly used as a term for any type of "line drawing" (hatching), even a monochromatic method made with lines. It is necessary to distinguish *tratteggio* from *rigatino* (Fig. 2).

Pointillism (or "dotting")

Another *tratteggio* method is pointillism or dotting. Pointillism is a method of restoring a damaged or missing part of a work (lacuna) by drawing colored dots next to each other in accordance with the principles of pointillism. Small dots drawn in this way do not make it possible to distinguish the distance from the place to be repaired in the work. This recovery method is only used to recover recently lost parts. Pointillism restoration can be used in some traction principles. However, in this case, the original mold can be used to restore severely damaged or lost parts to a degree beyond repair (Fig. 3).

In this direction, there is another method, which in the literature is called "chromatic or color selection" (*Selezione Chromatica*). In fact, this method is the Florentine version of the strategy developed by O. Casazza and U. Baldini. Lines drawn with this method do not need to be vertical; they need to be oriented according to the composition of the image. Chromatic selection means finding the characteristics of the desired color and its repetitive composition, as well as reintegrating the image (Fig. 4).

EwaGlos defines this method as follows: "Color picking is the restoration of a missing piece of a piece by drawing short parallel colored lines on a light background. It repeats the original shapes and lines." The *tratteggio* method is not used in the conservation method developed by U. Baldini. The length of the lines depends on the size of the artwork and the distance from the viewer. Due to the arrangement of the lines, the color selection method is also suitable for polychrome three-dimensional objects.

These phrases were also pioneered by Brandi in the field of restoration. Cesari Brandi (1906-1988) himself wasn't only an art critic and historian, but also an expert on the theory of conservation and restoration. In 1963 he wrote the fundamental work *The Theory of Restoration*. It was later translated into English by him and soon became popular as a methodological guide for restorers. His theory, opposing the technique of redrawing a missing or damaged piece of art, amazed everyone. Brandi's proposal had a great impact not only on the Italian restoration industry, but also on modern restoration practice in many countries around the world.

Another method of restoration is "mimetic reintegration" – in which the damage (a lacuna) is reconstructed as accurately as possible – technically and stylistically – so that it cannot by distinguished from the original with the naked eye[6]. Previously, this method was used based on the principle that the work should be kept in its original state. Today, this method is used only in cases of restoration of parts of a work, the origin of which is known, and where the place of damage in the work is not very large, in order to prevent historical and artistic copying of the work. Restoration by the method of historical imitation, as a rule, is acceptable as long as this does not negatively affect the preservation of the original work (Fig. 5).

***Tinta Neutra* – Neutral Reintegration**

Tinta neutra (Ital. *tinta* – color, shade; and *neutra* – neutral) is a combination of several colors (red, yellow, blue), which means a neutral color. *Tinta neutra* is also a lacuna at work, that is, a neutral color with the same shade, formed from several mixed colors to paint a filled space. It is also a neutral color composed of different shades of white, black and gray.

EwaGlos defines neutral restoration as follows: "When damage cannot be repaired due to the size of the room or space, the lack of reliable sources or the artistic value of the work of art, it can be reduced." This method is aimed at preserving the original fragments of works and is widely used in archeology. However, this has recently been criticized for its theory of perception. This is because, according to Gestalt psychology, or color theory, there are no "neutral" colors or "neutral" additions to a work of art.

Restoring neutral space in works of art has not always been welcomed. Some restorers and experts interpret *tinta neutra* differently. For example, the architect G. Sacconi wrote that it would be wrong to choose one neutral color for a painting. In his opinion, in different parts of the work it can seem dark, like a background, or vice versa, stand out. According to another expert, E. Bouyer, *tinta neutra* cannot be systematically applied to all visible voids. In his opinion, this would play an important role in the history of conservation; otherwise it would be disregarding the aesthetic value of the work of art.

In short, today we require a deeper study of the terms used in restoration, such as lacuna, *rigatino*, *tinta neutra*, and their introduction into local schools of restoration. With these expressions, it is advisable to strengthen and apply in practice clear theoretical rules in restoration.

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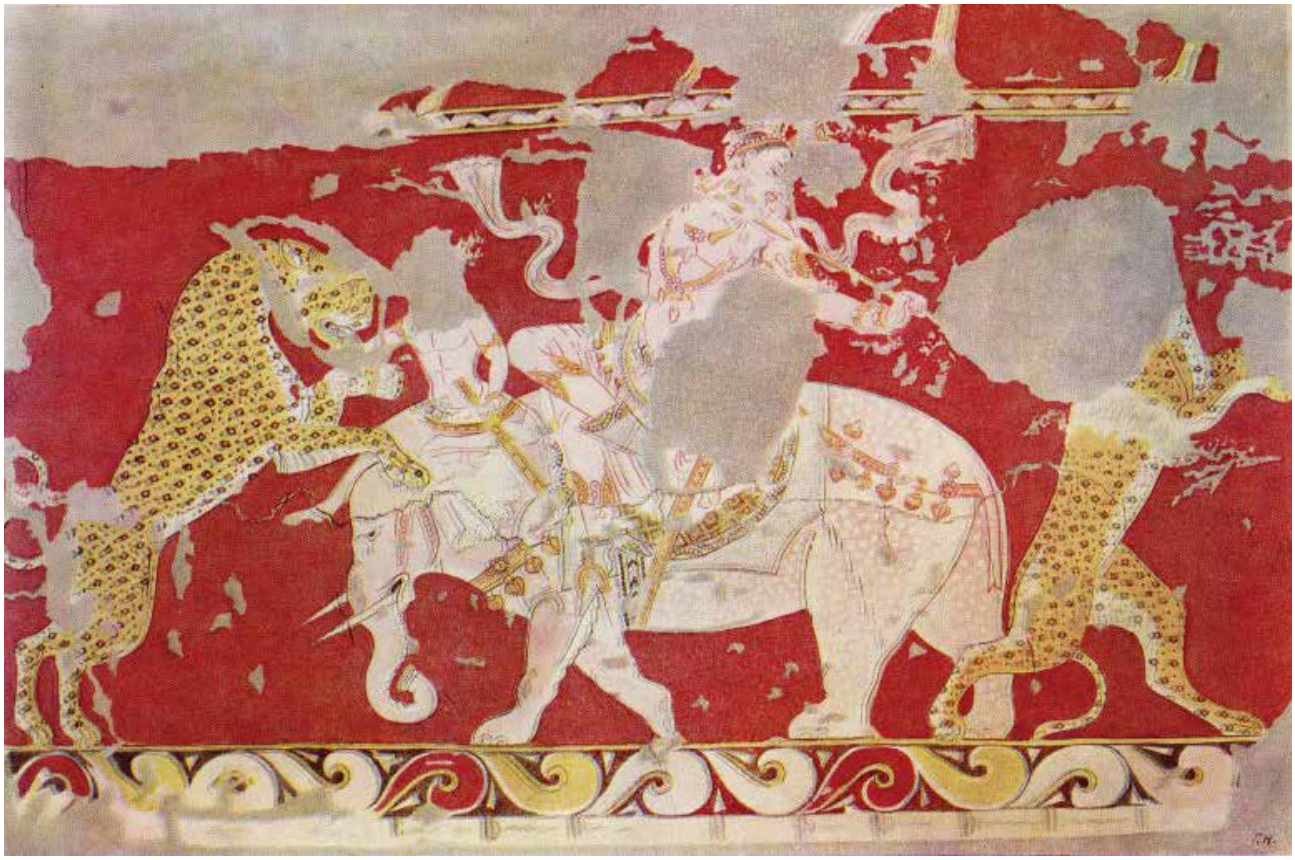

Fig. 1. Lacunas on the surface of a wall painting. Varakhsha (Bukhara), VII c. A.D. (Photo appears in the book Shishkin V.A. Varakhsha, published by the Academy of Sciences SSSR. Moscow, 1963. Fig. IV.)

Fig. 2. One of the types of *tratteggio*. Short vertical colored lines for reintegration of an infill, wall painting by Dionis Vidal, Church of San Nicolas Obispo San Pedro Martir, Valencia (Spain) 1694-1700; Photo: 2014, UPV (EwaGlos. European Illustrated. p. 332)

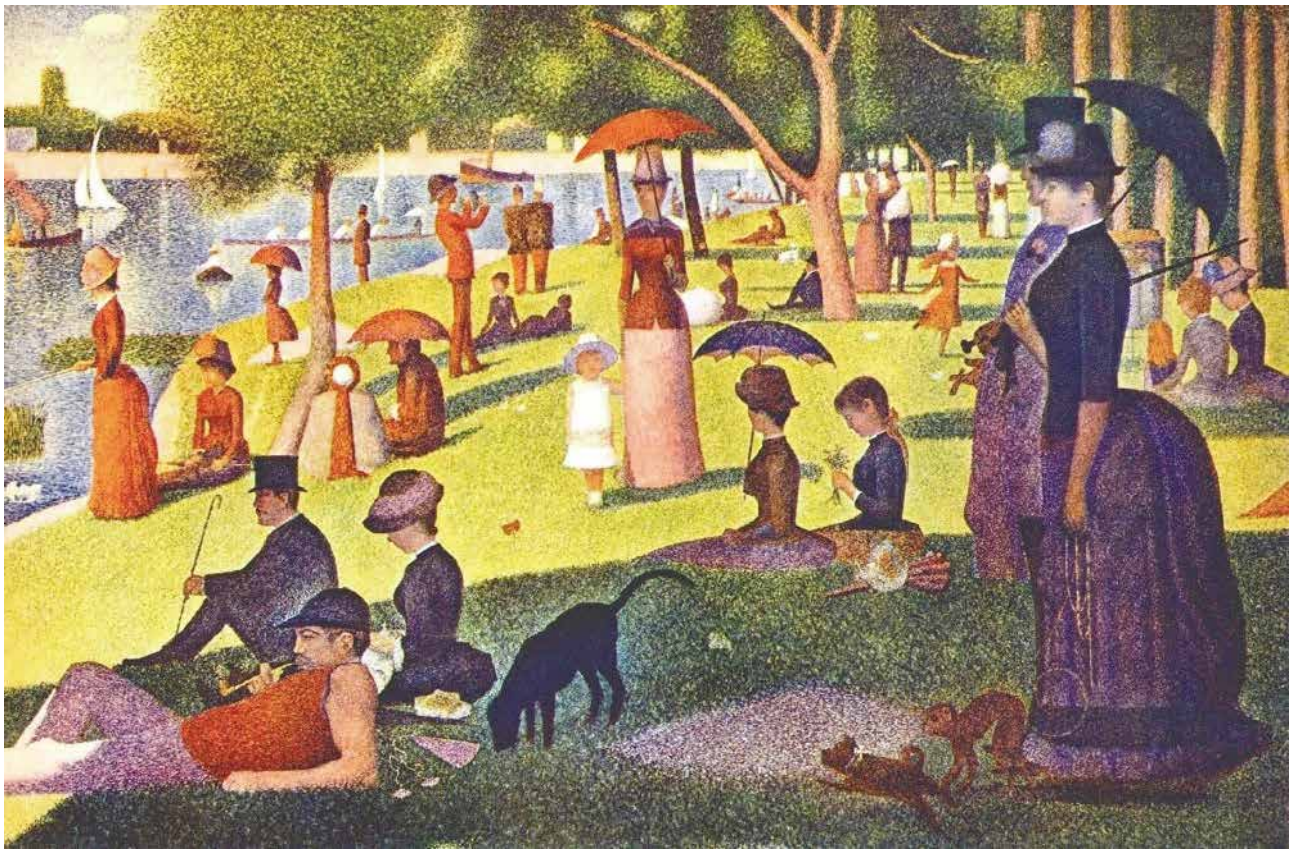

Fig. 3. An example of pointillism. *Sunday Afternoon on the Island of La-Grande Jatte*, by Georges Seurat (https://www.amazon.com/Sunday-Afternoon-Island-Georges-Art/dp/B01FVC478M)

Fig. 4. Chromatic selection of lacuna. Wall painting of Agnalo Gaddi. *Cappella Maggiore di Santa Croce*. Florence (Italy), 1380 y. Photo by OPD (Maria Loza Lafranchi, 2010. EwaGlos. European Illustrated.p. 342)

Fig. 5. Before and after mimetic reintegration filling. Church of St. Lawrence, Pozega (Croatia), XI c. Photo HRZ (Ivan Srsha, 2012. EwaGlos. European Illustrated. p. 338)

Fig. 6. *Tinta neutra* – neutral reintegration of large lacunas. Griffin-shaped vinegar shock. Egypt, XI c. (© The Metropolitan Museum of Art)

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