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18 November 2024

PROF. LYRE ANNI E. MURAO, PhD
Chancellor



THROUGH: CHANNELS

SUBJECT: Application for UP Office of International Linkages (OIL) Travel Grant to Participate and Present Two Accepted Papers at the 57th International Conference of the Architectural Science Association (ASA), 26-29 November 2024, Griffith University, Gold Coast, Australia

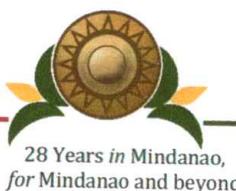
Dear Chancellor Murao:

Greetings!

I am respectfully writing this letter to request your recommendation of this application for UP Office of International Linkages (OIL) Travel Grant to support my international travel to participate and present two accepted papers at the 57th International Conference of the Architectural Science Association (ASA), 26-29 November 2024, Griffith University, Gold Coast, Australia.

Firstly, I will present our accepted paper entitled “Floating and stilt houses in Agusan Marsh, Philippines: Vernacular architecture and water urbanism in the 21st century”, with Rachel Mae P. Sitcharon as second author. The paper is an output of my personally initiated and funded research when I was on sabbatical last Academic Year 2023-2024. While I personally shouldered my transportation, meals and accommodation during the conduct of our research in the river communities of Agusan Marsh, the success of the research was mainly due to my collaboration with the provincial local government unit (LGU) of Agusan del Sur, municipal LGU of Talacogon, and barangay LGUs and river communities of Sabang Gibong and La Flora. Secondly, I will also present another accepted paper entitled “Multicriteria framework for land use planning in watershed areas: Case of Matina river watershed, Davao City, Philippines”, as the second author with Marlon Suelto as first author and Dennis Alonzo as third author. I am taking this opportunity to present two accepted papers as the maximum number of paper presentations covered in the full registration fee of AUD 890. These accepted papers went through refereeing process and will be published in Scopus-indexed conference proceedings.

My participation at the conference also includes as Chair of Session 12 with the theme on “Cities and Outdoor Environment”. Furthermore, as an active member of the Architectural Science Association (ASA) and a member of the international scientific committee, I am invited to join the private dinner meeting on 27 November 2024 where I will have an opportunity for international linkage with my colleagues in the architectural science, mostly academics from leading universities in Australia, as my community of practice since I was a PhD student in the University of Adelaide (2012-2016) until now as Professor in our University.





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While this application for OIL Travel Grant is still in process, I will personally shoulder all costs for my international travel from 25 November to 01 December 2024 covering return international flights from Davao (via Manila and Sydney) to Gold Coast, Australia; meals and hotel accommodation; conference registration fee; and, other related expenses. If in case this requested travel grant will be approved, the allowed actual expenses will be processed for reimbursements later.

Attached herewith are the necessary documents to support this application for OIL Travel Grant.

I hope for your kind consideration and favorable response to this request, and thank you.

Sincerely,

PROF. ISIDORO R. MALAQUE III, PhD
Faculty

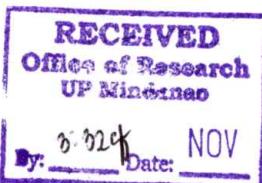
Endorsed:

ASST. PROF. RYAN C. SONGCAYAUON
Chair, DA

PROF. JHOANNA LYNN B. CRUZ, PhD
Dean, CHSS

PROF. MAY ANNE E. MATA, PhD
Director, Office of Research

fr: PROF. ANNABELLE U. NOVERO, PhD
Vice Chancellor for Academic Affairs 11/21/2024





OFFICE OF THE VICE CHANCELLOR FOR ACADEMIC AFFAIRS
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8 November 2024

OVCAA-MEM-AUN
2024-071-V001

TO : ASST. PROF. JON HENLY O. SANTILLAN
Director, Interactive Learning Center-Learning Resource Center

FROM : *An Novero*
PROF. ANNABELLE U. NOVERO, Ph.D.
Vice Chancellor

SUBJECT : OFFICER-IN-CHARGE OF OVCAA

You are hereby designated as Officer-in-Charge of the Office of the Vice Chancellor for Academic Affairs on November 19-22, 2024 while I am on official business in UP Visayas.

Thank you.

NOTED:

lyre annie e. murao
PROF. LYRE ANNIE E. MURAO, Ph.D.
CHANCELLOR



Floating and stilt houses in Agusan Marsh, Philippines: Vernacular architecture and water urbanism in the 21st century

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Abstract: To further study vernacular and indigenous architecture as man-made environment complementing the dynamism of marsh ecosystem in the context of 21st century influences, this case study investigated the houses in La Flora, Talacogon, Agusan del Sur, Philippines. Other than the typologies of floating houses, stilt houses and houses combining stilt and floating technologies were also found in La Flora. In this area, floating houses are situated along the main Agusan river and in the tributary Mayat river. These houses can float all throughout the year, but during dry season, some are sitting on land near river banks. Stilt houses that is the most common type were constructed with stilt heights in accordance to the various water levels during annual flood recurrences. The third type are houses that will function as stilt houses during dry season but will float with the bamboo floaters inserted below the main floor during flooding. Shown in the use of building materials and design variations, the 21st century influences are reflected. Finally, with this century's issues and concerns on climate change adaptation and disaster risk reduction management, this study is hoped to inspire new insights towards sustainable development strategies for cities and other regions.

Keywords: Agusan Marsh; vernacular architecture; water urbanism.

1. Introduction

The 21st century is marked by urbanisation of the global population. Coupled with climate change phenomenon, cities and the urban population are now more subjected to disasters such as flooding. Human settlements as source of solution, instead of being the problem, insights towards sustainable development strategies could be inspired on the interaction of man and nature evident in the creation of vernacular environments. One example is how the indigenous knowledge system and practices is demonstrated by the architecture of floating houses and its management regimes in the case of Sabang Gibong community in Agusan Marsh (Sitcharon and Malaque III, 2023a; 2023b). To further study vernacular and indigenous architecture as man-made environment complementing the dynamism of

marsh ecosystem in the context of 21st century influences, this case study investigated the houses in La Flora that is another river community located in the same municipality of Talacogon, Agusan Marsh.

2. Vernacular architecture and water urbanism in the 21st century

3.1. Architecture of floating houses in Agusan Marsh

The architecture of floating houses in Agusan Marsh as demonstration of socio-ecological approach to design and planning, in the context of indigenous and vernacular environments, was carefully studied in Sabang Gibong community (Sitcharon and Malaque III, 2023a; 2023b). The previous study was theoretically inspired from the works of Rudofsky (1964) that highlighted human and nature-relations in shaping the built environment; and, of Bronfenbrenner's (1979) socio-ecological model which theorised that human development is influenced by the ecological environment of nested structures where humans may or not be directly in. Thus, the study on the architecture of floating houses (Sitcharon and Malaque III, 2023a) and their management regimes (Sitcharon and Malaque III, 2023b) were previously conducted.

In the case of Sabang Gibong where all houses are floating, four typologies of floating houses in the area were found, classified, and referred in local dialect as *hapa*, *hanger*, *hapa-hanger*, and *dos andanas* (Sitcharon and Malaque III, 2023a). To keep afloat, bundles of bamboo poles are used as floaters with each bundle having 40 to 50 poles. In each house, the number of bundles used may range from five to 10 depending on the size of the house structure. Considering financial capacity, the typological choice also depended on the household's preference and benefits from the structure. *Hapa*, for example, is deemed the safest floating house typology tested safe against strong winds and typhoon. *Hanger*, on the other hand, provides better ventilation and easier access for cleaning and maintenance of the floaters and other parts under the floor of the main house. To enjoy the benefits from these two types, *hapa-hanger* could also be a choice. For the affluent few households, the *dos andanas* with larger living spaces could be their choice, but transferring to safe locations against strong winds becomes a challenge (Sitcharon and Malaque III, 2023a). Moreover, the sustainability of floating houses was investigated by exploring the presence of management regimes and sustainable dimensions (Sitcharon and Malaque III, 2023b). In the context of environmental, economic, and social sustainability, the management is heavily reliant on cooperative endeavour that is locally known as *lugoy-lugoyan*. In terms of resource sustainability, it is evident of the six management regimes: clearly defined boundaries; congruence between appropriation and provision rules and local conditions; monitoring; graduated sanctions; conflict-resolution mechanisms; and, nested enterprise (Sitcharon and Malaque III, 2023b). Therefore, the architecture of floating houses in Agusan Marsh and its management regime is seen as result of healthy and sustained human-environment relations which continually shape the built environment of the community, and in return shapes the living conditions and behaviour of the people.

3.2. Vernacular architecture of the 21st century

Pioneering works on vernacular architecture include that of Rudofsky (1964) where it was explained that vernacular architecture as communal architecture is produced not by specialists but by spontaneous and sustaining activity of a group of people with common heritage, acting within a community of experience. Among other theories, in terms of culture, vernacular architecture works well within which it is built, and its aesthetics is based in terms of the aspects of its own environmental quality (Rapoport 1988). In this 21st century, theorists of vernacular architecture moved away from viewing only the artefacts, and

paid more attention to the people who shaped, use, alter, and whose behaviour or way of living is shaped by the form of the vernacular environment. Following this ideology, from Rapoport (2006) for example, by moving from a natural history stage to a problem-oriented stage, it is possible to regard vernacular environments as a laboratory to interpret the wide range of human responses to various factors affecting their way of living. From Rudofsky's (1964) definition of vernacular architecture and Bronfenbrenner's (1979) socio-ecological approach to design and planning, to this 21st century's study of vernacular environments, it is also important to note from Asquith (2006, p. 129) that 'once the vernacular is seen not as static building form, but as constantly evolving, reacting to changes in the communities that shaped its form, it will become higher on the agenda in architectural education'. Thus, the study of the floating houses in Sabang Gibong, with their architecture and management regimes, was conducted (Sitcharon and Malaque III, 2023a; 2023b), which is being continued in this case of La Flora that is another river community with unique features evident by the presence of stilt houses and another hybrid type, other than the typical floating houses commonly found in other Agusan Marsh communities such as in Sabang Gibong.

3.3. Water urbanism and climate change resiliency

The management regimes and sustainable social dimensions of floating houses in the case of Sabang Gibong community (Sitcharon and Malaque III, 2023b) of the previously conducted study was presented in the 1st Southeast Asian Urbanisms Seminar on the theme of water urbanism in May 2023 at the University of Architecture Ho Chi Minh City, Vietnam. Among other papers also presented in the said conference, examples of related studies include water oriented development and placemaking strategies for Bangkok (Udomcharoenchaikit, 2023); how slum dwellers survived with local indigenous measures in order to reduce risks of flood hazards in the coastal slum of Dharavi, Mumbai (Goyal and Silva, 2023); socio-ecological impacts of industrialisation and urbanisation of craft villages in the Red River Delta, Vietnam (Montresor, 2023); and, placemaking practices in riverine settlements after river modification projects in the case of Citarum river, Indonesia (Stassi, 2023). Similar to the paper of Trang *et al.* (2023) which proposes the integration of water in infrastructure development in Ho Chi Minh, these water urbanism papers mainly considered the vulnerability of urbanized environment brought by climate change inherent in the raising of overall flood water levels. Hence, these are to explore on feasible design and planning interventions in order to reduce the risk of disaster due to flooding, and to make cities and the people resilient to climate change.

3. Aim and objectives

Increasing urban population and climate change remain the most pressing issues in this 21st century. Recognizing the role of indigenous knowledge and vernacular architecture demonstrated in the findings of the previously conducted research on the floating houses in Sabang Gibong community (Sitcharon and Malaque III, 2023a; 2023b), this paper aimed to explore on the vernacular houses in La Flora which is another river community in Agusan Marsh evident with floating houses, stilt houses, and the combination of both types. Specifically, this sought to investigate the indigenous knowledge system and practices evident in the vernacular architecture of houses, including but not limited to architecture, methods of construction, and factors that shaped the variety of houses and settlement in La Flora community.

4. Case study area and research methodology

4.1. Agusan Marsh and La Flora

One of biodiversity and culturally significant sites in the Philippines, Agusan Marsh is situated in the province of Agusan del Sur, Caraga region in the mainland of Mindanao. It is one of the largest wetlands in the country which serves as a catch basin of adjacent regions estimated to cover a total land area of 110,000 hectares. However, only 19,196.558 hectares was declared as protected area through Presidential Proclamation No. 913 Series of 1996 but was expanded to 40,954.745 hectares through Republic Act No. 11038 in 2018, covering 38 barangays within six municipalities of Agusan del Sur province.

La Flora is one of the river communities in Agusan Marsh, within the political jurisdiction of the municipality of Talacogon. It has a total land area of 1,383.85 hectares wherein 1,276.12 hectares or 92% of its coverage is inside the protected area, including the settlement area. It is considered a river barangay along the main Agusan river with floating and stilt houses. Based on the latest statistics, it has a total population of 1,518 individuals within 338 households. Moreover, 98% of the total population are identified as indigenous peoples, locally referring to themselves as Talacognon but statistically recorded as Manobo Ethnolinguistic Group (Provincial Government of Agusan del Sur, 2018).

4.2. Fieldwork and data collection

Preliminary ocular site seeing on the La Flora community was also done during the conduct of the research on floating houses in Sabang Gibong community (Sitcharon and Malaque III, 2023a; 2023b), being both are neighboring river *barangays* along Agusan river in the municipality of Talacogon, Agusan Marsh. In the second week of January 2024, an ocular site seeing in La Flora was conducted, which happened to be the peak of the flood season. Fieldwork and data collection specific for this paper was conducted in the last week of April 2024 for the physical documentation of the houses, and followed by focus group discussion and key informant interviews in the first week of May 2024. The research was conducted in collaboration with the Provincial Environment and Natural Resources Office of the provincial government of Agusan del Sur, thus, legal access to the municipality of Talacogon and down to the *barangay* community of La Flora as the case study area was properly secured.

5. Results and discussion

5.1. The architecture and typologies of houses in La Flora

There are three key house typologies in La Flora, which are described in the following paragraphs. These are all referred by the locals as *ba'y*, which may be related to the *balai* of the Malay; or, the *balay* of the Visayan and *bahay* of the Tagalog in the Philippines. These houses are built in response to the regular and abrupt changes in the water current and levels of the area in the marsh landscape conditions.

The first type is the floating houses that are situated along the main Agusan river and the tributary Mayat river which is a small river that empties to the greater Agusan river. These houses can float all throughout the year. During dry season, while some houses remained afloat and moored by ropes to adjacent trees along the riverbanks, some are sitting on land near or at the riverbanks. Shown in Figure 1, the same typologies and architectural details were found in Sabang Gibong, as illustrated and presented in the previous paper (Sitcharon and Malaque III, 2023a).

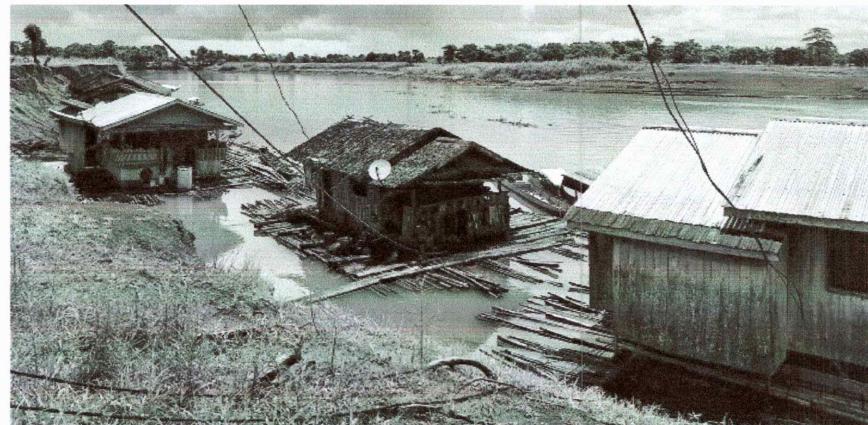


Figure 1: Floating houses in La Flora along Agusan river.

The second type is the stilt houses located in the inland part of La Flora. Stilt houses that is the most common were constructed with stilt height of 12 feet (3.60 meters) or higher since water level during annual flood recurrence may reach as high as 10 feet (3.00 meters). However, since very high flood level is not always experienced, households utilize the open area between the stilts by constructing a social space that also serves as the living room, kitchen, and comfort room of the households. These spaces are considered useful but impermanent because it is considered that this area may be damaged during high level flooding. This open space at the upper part of the stilts, typically elevated from the ground at approximately four feet (1.20 meters), referred as *permirong andana* or first floor functions as social space and service area during dry season or when floodwater level during wet season is lower. The main floor referred as *ikaduhang andana* or second floor serves as sleeping quarters and storage for household items when floodwater level is higher reaching the first floor (Figure 2a).

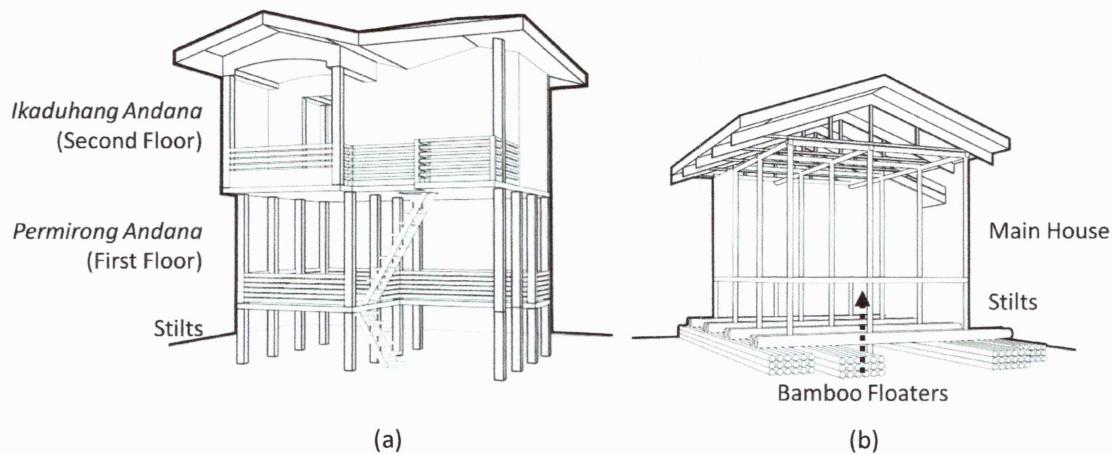


Figure 2: (a) Typical stilt house situated in inland part of La Flora; and, (b) Combination of floating and stilt house technologies in La Flora.

The third type is the combination of floating and stilt house technologies. These houses are typically located along the riverfront during dry season or at the banks of Agusan river, although some can also be located inland. These are houses with stilts approximately four to six feet (1.20-1.80 meters) in height that serve as stilt houses during the dry season but will float with the bamboo floaters inserted below the main floor during flooding, which will be moored to an adjacent tree to secure. Households with this type of house have bamboo floaters ready all the time even on dry season, either by storing them below the house or by putting them on the rivers for preservation and to avoid faster deterioration (Figure 2b).

5.2. Housing materials

Bundles of bamboos are used as floaters of the floating houses (Figures 1 and 2b). Limited native bamboo species which only thrive in the marshland environment commonly used are locally referred to as *Kayawan* or spiny bamboo (*Bambusa blumeana*), and *Damoan* or sweet bamboo (*Dendrocalamus latiflorus - Munro*). Being available in the vicinity, these can easily be gathered around by the community. However, being few within the vicinity, households buy more bamboo materials from the town centre in Talacogon or from other communities as far as Malinao of the municipality of La Paz, and from other communities in the municipality of Loreto. Each pole cost PHP 30.00 (USD 0.51) to PHP 35.00 (USD 0.60) which also covers cutting and delivery costs. Locals in La Flora do not buy from communities directly adjacent to them, particularly from other river *barangays* of Maharlika and Sabang Gibong since these said communities also need bamboo materials for their own floating houses.

Timbers are used as the main building material for all types of houses. Like bamboos, timbers are freely gathered from the vicinity of the community, especially from the forested part of the marshland. Timbers are easier to gather during flood season as the water conditions in the marsh provide better accessibility to forested parts of the community and easier transportation of the cut logs by floating. The tree species locally referred to as *Sanganan* and *Amayan*, both producing redwood quality timber, are commonly used as the main materials for stilts as they are expected to last at least 20 years, which the locals are even claiming that these could last beyond the original house owners' lives. Other key tree species that provides timber for house are *Laku-waku* (unknown common and scientific names), *Mambog* (*Mitragyna speciosa*), *Bangkal/Kabak* (*Nauclea orientalis*), *Bungyas* or also known as Banyan tree (*Ficus benghalensis*), *Tagkan* (*Palaquium pinnatinervium*), and *Palomaria* (*Calophyllum inophyllum*).

Moreover, other synthetic modern building materials such as corrugated galvanized iron roof sheets, coloured steel sheets/panels, nails, ropes, jalousie windows, glass doors and windows, paints, cement, and steel bars are used and integrated in the design and construction of the houses. These building materials are bought from the town centre, also known as the *poblacion*, of the municipality of Talacogon which is approximately nine kilometers away from La Flora; which takes approximately 20 to 30 minutes via land vehicle through the road, or 40 minutes to one hour via pump boat through the Agusan river. For the roofing, coloured corrugated sheets are mostly used by the households. However, few households are still using the leaves of Sago palm tree (*Metroxylon sago*). As observed, majority of the households use timber as stilts, but there are a few which use concrete. Other households use concrete as footing of their wooden stilts which are strapped in place and connected to the concrete with anchored steel bars.

5.3. Factors influencing house typologies and building materials

Households would prefer floating houses if bamboos were available. However, since there is limited source and supply of bamboo materials, while timber is abundant, that is why most households in La

Flora are preferring to build and live on stilt houses. Furthermore, the choice of stilts is the community's experience and assumption that the floodwater level recedes after the regular flood season noted from December to March. However, much to the dismay of the households in January 2024, the floodwater reached as high as 16 feet thereby flooding the *ikaduhang andana* or the main second floor. Moreover, stilt houses require little to no maintenance compared to floating houses. On the contrary, floating houses require regular replacement of bamboo floaters. Usually, replacements were done once a year if most of the bamboo used is the spiny variety, but may also take more than once a year when most are sweet bamboo as this variety has weaker quality.

Despite on the use of stilts as an attempt to be safe from flooding, it is noted that the community understands that the water level evidently may reach up to their sleeping quarters. However, the community deem it necessary to use stilt houses where they can monitor floodwater levels and will have enough time to prepare for, and to avoid, impending damage brought by flooding as natural hazard in the marsh environment.

Most of the households only rely on farming and fishing, and with their limited financial capacity, houses are mostly constructed on incremental phases. Nevertheless, if one must build a house, the highest cost is around PHP 150,000.00 (USD 2,560.00) inclusive of buying timbers from other community members, labour, and other synthetic modern materials needed. But if one is to collect their own timber, the only financial requirement is labour for the cutting of logs into timber and labour for the construction, thereby significantly reducing the construction cost of a house. Wooden stilts are predominantly used since most of the households cannot afford to buy cement, sand, gravel, and steel bars for reinforced concrete construction. Timber is readily available and technically for free to take around the community's vicinity, especially *Sanganan* and *Amayan* hard wood varieties.

5.4. Other related social practices

The actual house construction requires the expertise of local carpenters. However, the annual replacement of floaters or the erection of wood stilts require the strength and assistance of numerous individuals. Although floaters can be replaced by four or more people, wooden stilt installation requires 15 to 20 people. As such, the community has a traditional practice called *lugoy* or mutual assistance wherein people help each other with no expected monetary return. One may ask for help by saying "*lugoyi sa ko*" which means asking for help depending on one's availability, and the kindness shall be returned when the helper requires the same or another kind of assistance in the near future. As a free service, those who help are given snacks or meals, and even including alcoholic drinks, especially the local rum brand *Tanduay*, since the day is also to be celebrated for the success of the communal undertaking.

6. Conclusion

Other than floating houses, stilt houses and combination of both types are also situated in La Flora relative to its landscape features. La Flora site has an inland area, which is also flooded during wet season, with access road directly connected to the town centre. Other than the house structures being resilient to flooding in response to dynamic marsh system and conditions, the use of building materials and current design variations also reflect 21st century influences. Finally, with this century's issues and concerns on climate change adaptation and disaster risk reduction management, this study is hoped to inspire new insights towards sustainable development strategies for cities and other regions.

Acknowledgements

We would like to express our deepest gratitude to the *barangay* local government unit and community members of La Flora, Talacogon, Agusan del Sur for allowing the conduct of the study and sharing their invaluable indigenous knowledge system and practices. Acknowledgement is also extended to Renzo Isidore R. Malaque for the assistance in the production of architectural drawings.

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