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REVITALISING HISTORICAL EDUTOURISM THROUGH OUTDOOR LEARNING EXPERIENCE IN NIBONG TEBAL, PULAU PINANG

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ABSTRACT

There has been an increased awareness of the benefits of nature for educational purposes. With regards to learning about history and culture, outdoor learning experience (OLE) can be a promising method to augment learning experiences. However, implementing the outdoor learning concepts becomes challenging for most historical sites due to the need for conservation and preservation. At the same time, unpredictable natural phenomenon such as flooding can further deteriorate the historical assets. In the case of Nibong Tebal, historical buildings and cultural practices are currently underappreciated as heritage assets. Without heritage preservation efforts or tourism initiatives, these assets are susceptible to neglect and decay, hence leading to a potential loss of traditions. This research aims to explore historical outdoor learning concepts to promote the heritage of Nibong Tebal for edutourism. The objectives are: (i) to study how the concept of OLE experience can be adopted using natural and built assets, (ii) to highlight the historical value of Nibong Tebal, and (iii) to propose strategies to restore the ecological value of the town. The methods include collecting data from online and face-to-face survey questionnaires, online interviews and site observation. The finding revealed that there is a potential to establish an outdoor learning space with some improvements on the natural and built assets of the town. In conclusion, the outdoor learning experiences at historical places can contribute to the planning and design guidelines to make nature part of the teaching tools to enhance one's learning experiences.

Keyword: Edutourism, heritage, landscape architecture, outdoor learning

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INTRODUCTION

This study is conducted in Nibong Tebal, Pulau Pinang (Figure 1). Apart from experiencing the fading culture and heritage value, the town faces flood issues and rapid urbanisation. The scenarios may implicate the historical and cultural assets of the place. Those values are vital for the town's identity and outdoor learning experience (OLE). Therefore, this research aims to study the elements of the outdoor learning concept and later propose the educational theme using landscape solutions for the community of Nibong Tebal with the following objectives: (1) To adopt the outdoor learning experience criteria using natural and built assets, (2) To highlight the historical value of Nibong Tebal for edutourism, and (3) To restore the ecological value of the town.

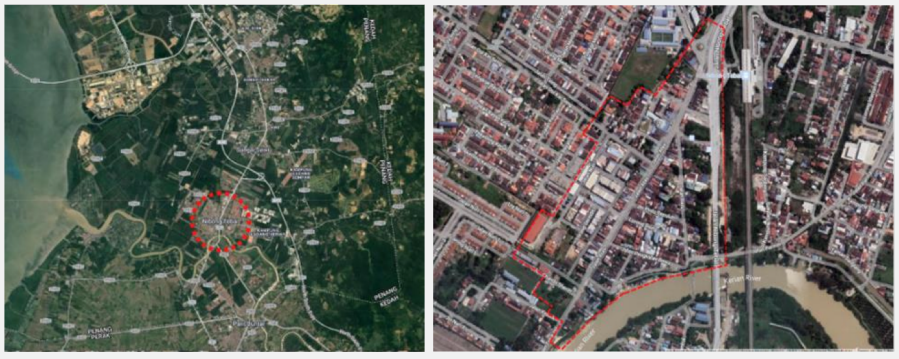


Figure 1: Location plan of Nibong Tebal, Pulau Pinang

METHODODOLOGY

In this study, the data collected was employed using both online and face-to-face survey questionnaires, e-mail interviews and site observation (Figure 2). The data was further detailed to the OLE aspects and the historical value of Nibong Tebal. For the physical and online survey questionnaires, the respondents from groups of teachers, students and the local community had participated. Some of the contents of the instrument include an open-ended questions that encouraged the public's opinions. A total of 62 respondents participated, where 50 responses were collected from the public, and 12 responses were collected from professionals of educational institutions. The interviews with experts helped to broaden the knowledge of OLE concepts and the historical values of Nibong Tebal. Next, a site observation was conducted to analyse the existing conditions of the site. The data was then analysed using site inventory, analysis and synthesis that led to the strategies to enhance the outdoor learning experience for edutourism of Nibong Tebal.

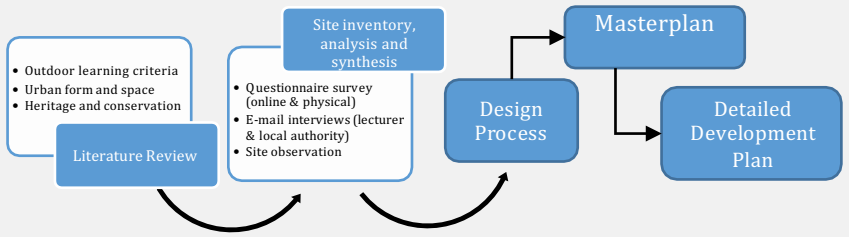


Figure 2: Research process

LITERATURE REVIEW

To understand the basis of OLE, this study analyses the components of outdoor learning concepts. Temple (2007) highlights that the outdoor learning space with well-equipped facilities, outdoor furniture and landscaped features are significant elements to encourage for an effective learning process. The implementation of OLE brings the need to understand the elements of an urban morphology and historic city since the establishment. The anatomy for the effective outdoor learning generates the understanding about criteria, benefits, challenges of OLE in relation to edutourism. Outdoor learning experiences, particularly in historical edutourism, enhance students' cognitive development, emotional well-being, and environmental awareness while fostering relevance, depth, and holistic appreciation of history and culture (Lopez, 2021). However, effective implementation in historical contexts requires targeted teacher training and professional development to ensure meaningful, accurate, and engaging educational experiences. Table 1 delineates the key features of design space for active learning, which include reinforcing the sense of belonging, providing flexible and multi-use spaces, and adapting the uses of non-classroom spaces for learning (Knapp, 1996; Temple, 2007; Barrie & Neda, 2020). To identify potential spaces for OLE, it is necessary to first understand the urban morphology of the study area. Some common patterns of urban form in different settings have been illustrated by Scheer (2017) as displayed in Figure 3. In the context of Malaysia, Figure 4 shows the heritage shops in Penang, which becomes a reference to examine the buildings in Nibong Tebal (George Town World Heritage Incorporated, 2020).

Table 1: Key design features of active learning space

Key features of design spaces for active learning
1. **Sense of belonging**
-The space that accommodates diverse students and public
-Maximize the use of day lighting to reduce energy use
-Multipurpose spaces for varying learning activities
-Comfortable spaces build a feeling of connection towards the environment
2. **Flexibility and multi-use spaces**
-Movable furniture to incorporate multifunction activities
-Highly flexible, self-contained and free distraction spaces
-Increasing flexibility spaces for specific functions / multifunction activ ities
-Design features that maximize user control
3. **The uses of non-classroom spaces for learning**
-Design spaces to overcome functions and services
-Space availability merges social interaction
-Usable transaction space between indoor and outdoor

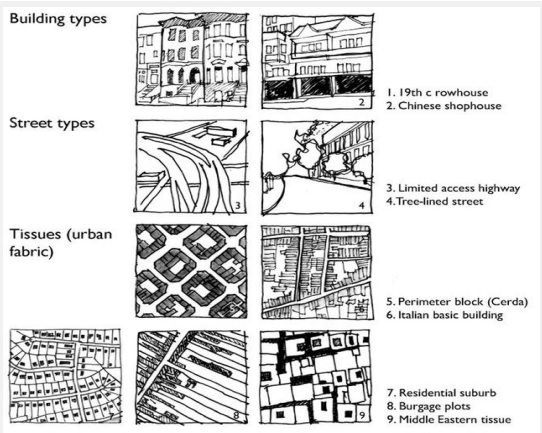


Figure 3: Urban forms and patterns (Scheer, 2017)

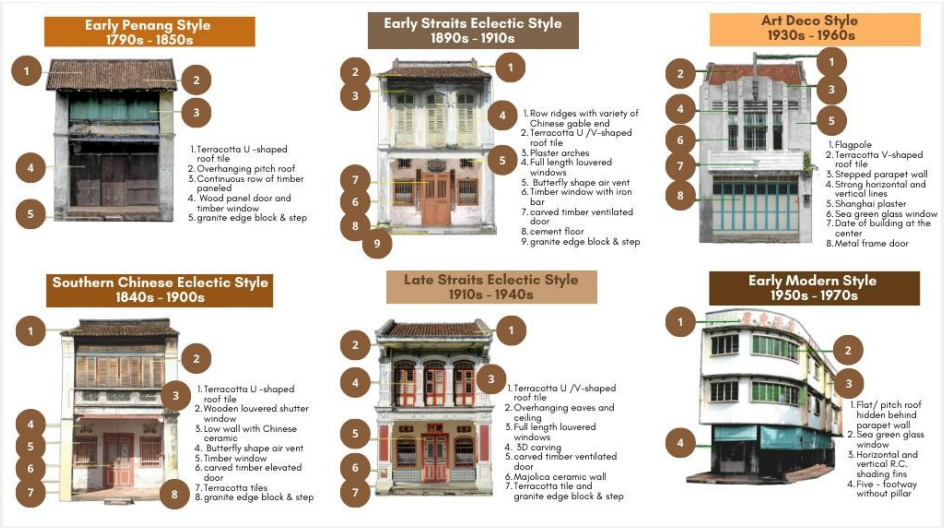


Figure 4: Classification of heritage shop house in Penang

PRECEDENT STUDIES FOR OLE

Catur Village, Kintamani, Indonesia

Catur Village is situated 1,250 metres above sea level in Bali's Kintamani District. There are many tourist attractions in the village. The village consists of a sizable plantation and farming area where the villagers grow Arabica coffee, Balinese oranges, and marigold flowers among other things. The residents of Catur Village cultivate a variety of herbs for use in various products, primarily medicines. The goods manufactured from these herbs are offered for sale in the village market, a unique marketplace that solely deals in agricultural goods. OLE is implemented in the village through herbal educational programme from the government, educational tourism programme about specialty coffee, and preservation of cultural value and heritage assets.

Taiping Heritage Trail, Taiping, Perak, Malaysia

Taiping was one of the first towns in Malaysia to be developed by the British and this is reflected in the grandeur of some of its architecture. It was the tin capital of Perak until it was superseded by Ipoh. It is town of 'firsts'. Among others, it boasts the first hill station in Malaysia, Maxwell Hill (Bukit Larut), the first museum, the first prison, the first railway line (from Taiping to Port Weld) and the first English language schools. Taiping's beautiful Lake Gardens is the oldest public park in Malaysia. Some of the edutourism strategies implemented are providing heritage trail connecting prominent old façades in the town, installation of wall plate and information board about the history of elements in Taiping and promoting scenic view with instagrammable spots.

Interactive maps can offer a captivating learning experience for visitors, particularly the younger generation. THE:DAWN website serves as a reference to the potentials of OLE in Nibong Tebal where visitors can interact with the iconic maps and learn about the history of the buildings, parks and elements in the town: https://taiping-heritage-exploration.webflow.io/the-firsts. Platforms like this has the potential to be integrated in to the informative signage displayed around the town, and by providing QR codes for people to access from their mobile phones. The concept of OLE emphasises on the use of non-classroom spaces for learning, where the learning can also be experienced virtually (Knapp, 1996; Temple, 2007; Barrie & Neda, 2020).

RESEARCH FINDINGS

The findings from the data collection are divided into natural and built asset analysis, as follows:

NATURAL & BUILT ASSET ANALYSIS

Throughout the analysis process, the attributes of microclimate, hydrology, geomorphology (topography, soil and geology), vegetation and wildlife were categorised under the natural assets of the town. In terms of microclimate, the result shows that the temperature of the site is above moderate (e.g.32^{o}) with high humidity level (81%) and precipitation (87.1mm). The data concludes that the hot-humid environment would require several preparations when anticipating any outdoor learning activity. Secondly, the method of conserving and preserving of natural assets needs to consider the implications caused by nature's phenomena like flood, heavy rain, landslide and other nature mishaps.

In term of geomorphology, the town has been developed on a flat land with rich geological structures consisted of clay, silt, sand, peat and minor gravel. The vast combination of soil formation can result in healthy vegetation. This data indicates the potential to develop an outdoor learning space with a wide range of plant selections, particularly native species and species that have historical significance, since the ground is stable and fertile. Throughout the site observation, the finding indicates that the drain along the Jalan Atas is shallower than the drain along the Jalan Baru. The physical condition of the former drain has potential to implicate the facades of some historic buildings located along Jalan Atas when there is a flash flood. Thus, in order to prevent this from happening, a proper drainage system and flood management control can be considered. Figure 5 presents the hydrology and geomorphology data of Nibong Tebal.

Figure 5: Hydrology and geomorphology map

Vegetation and wildlife have vital roles to the town's ecological and historical values. Plants such as *Areca catechu* (Areca Palm), *Leucaena leucocephala* (River Tamarind), *Saccharum officinarum* (Sugarcane) and *Elaeis guineensis* (Oil Palm) hold significant historical value to the formation of the town, where they signified the evolution of Nibong Tebal from an agricultural village to an industrial town.

Next, species of fireflies also provide good ecological indicator to the mangrove ecosystem along the Sungai Kerian. Based on the site observation, the habitat is still in good condition, due to the mangrove replanting programme that takes place along the riverbank. Therefore, vegetation and wildlife can add significant values to the town's natural asset.

Throughout the analysis process, attributes such as land use, facilities and utilities, circulation, solid and void, social and culture, and architectural image were categorised under the built assets of the town. Site observation indicates both commercial and industrial sectors provide good economics value. They are concentrated in the town centre. On the other hand, recreational land use (0.39ha) is the smallest of all land uses. Perhaps, the abandoned lands (7.17ha) would be the good location for the development of the ecological outdoor learning spaces. Although the town centre has public facilities, the quantity of the street furniture is still lacking. Many people prefer to park their vehicles by the roadside. Allocation for an infrastructural development is still limited. Here, there is an issue of setback. The narrowed corridor can implicate users' safety when crossing the road. The town also has distinct features of building facades. The building layout found scattered and compacted. The old construction that took place between 1790s and 1970s has potential to be recognised as the heritage zone. Perhaps, the congestion of infrastructural development may be eased by having pocket spaces. Pocket parks can serve as the outdoor learning space. Figure 6 illustrates the architectural image of buildings constructed between the era 1790s and 1970s.

Figure 6: Prominent architecture style and attractions map.

In summary, Nibong Tebal has rich natural and built resources. The variation in architectural image and the presence of prominent attractions like (in Figure 6), such as Hock Teik Soo Temple (1855), Culture Street and 99 Door Mansion, Sri Kaala Bairavar Temple (1816), St. Anthony Church (1891), and Sri Sithi Vinayagar Temple (1924) create potential outdoor learning elements for edutourism of Nibong Tebal. The idea of promoting Nibong Tebal as a historical edutourism site is further proven based on the questionnaire results. Importantly, 86 percent (43 respondents) agreed to list Nibong Tebal as a historic town. Meanwhile, a high number of respondents 77 percent (38 respondents) agreed that built and natural resources are the best attractions to the town. In the aspect of outdoor learning, majority of the respondents agreed that by providing adequate facilities, improving accessibility and introducing universal design would help to promote the edutourism industry there. From here, the site synthesis and design strategies were formulated based on the findings.

Nibong Tebal's natural assets are deeply intertwined with its built heritage. The town's built assets often reflect adaptations to its natural environment, such as river-oriented settlements and industries reliant on natural resources like charcoal-making. This connection creates opportunities for integrated heritage narratives, blending ecological and cultural elements to enhance Nibong Tebal's potential as an edutourism destination.

SITE SYNTHESIS

The study found that there is a high potential to revitalise the outdoor learning experience at Nibong Tebal through historical edutourism. Based on the findings from inventory and analysis, there are a lot of opportunities for the development of outdoor learning space. However, major issues such as flood occurrence needs urgent attention to ensure the sustainability of the town's assets and surrounding ecosystems. In addition, the historical and cultural assets are vital in highlighting the identity of a place. Thus, the continuity of these elements can be sustained using outdoor learning through edutourism. The objectives of the study for adopting outdoor learning concepts, highlighting, and restoring the historical and ecological value of the town are achieved followings the list of potential strategies to enhance OLE for historical edutourism of Nibong Tebal (refer to Figure 7 for details):

1. Improvement of facilities, utilities and universal design at potential nodes and pathways.
2. Continuing initiatives of beautification, preservation, and conservation on historical assets.
3. Improvement of stormwater drainage system and introduction of sponge city concept.
4. Enhancement of softscape and hardscape elements at entrance, exit and connecting area.
5. Introduction of native vegetation for streetscape and outdoor learning spaces.
6. Enhancing safety, accessibility, and local identity elements throughout the town.

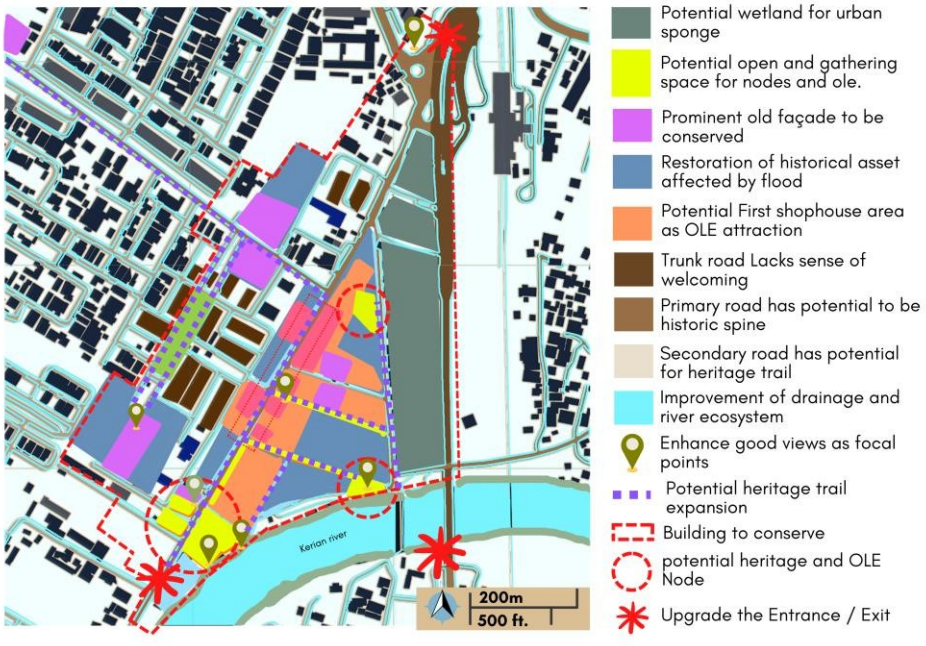


Figure 7: Strategy Map

MASTERPLAN DEVELOPMENT PHASE

DESIGN AIM AND OBJECTIVES

The project targets to propose a sustainable outdoor learning network for historical edutourism in Nibong Tebal which can be achieved by following the objectives, which are:

1. To create a historical outdoor learning area emphasising the local history.
2. To integrate the space and elements with the sense of place to be promoted for tourist and local.
3. To restore the ecological value of the town.

DESIGN AND PLANTING CONCEPT

The design concept for the masterplan is "The Sparks of Memory". The concept is targeted to spark the memory of the past for locals and creating new memory for outsiders. The concept is portrayed through the physical form of trail that connect spaces which represents the "memories". The linkages become the process of learning through five senses where memories was created or retrieved (refer Figure 8). Meanwhile, the planting concept is "nostalgia". Nostalgia is a sentimental longing or wistful affection for a period in the past. The design rationale behind "The Sparks of Memory" and "Nostalgia" for Nibong Tebal is to evoke a sense of connection and appreciation for the town's rich cultural and natural heritage by rekindling personal and collective memories through immersive and meaningful experiences. This planting concept uses native species such as *Oncosperma tigillarium* (Nibong Palm), *Saccharum officinale* (Sugarcane) and *Leucaena leucocephala* (River Tamarind) which are significant to the town's revolution from agricultural village to industrial town (refer Figure 9).

Figure 8: Creating the sparks through connecting the spaces

Figure 9: Native species of Nibong Tebal

SPACE PROGRAMMING

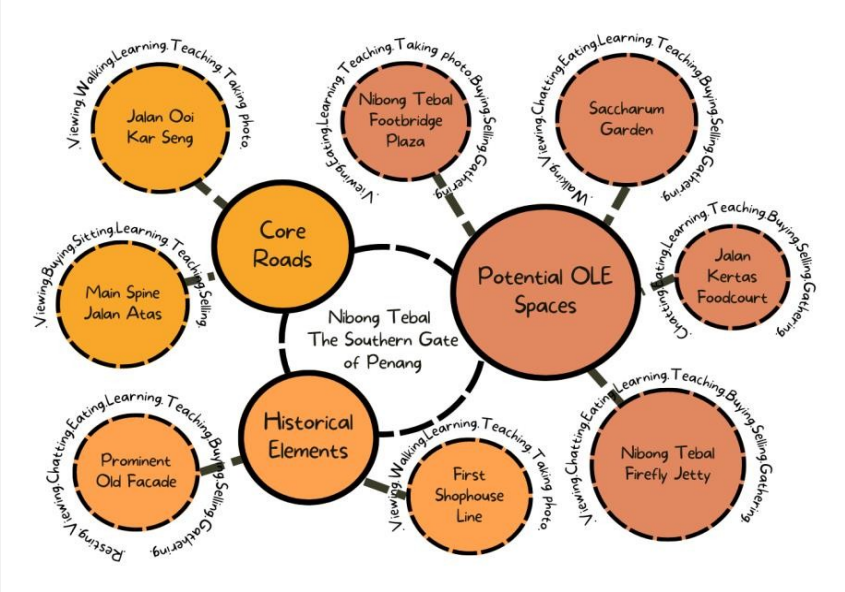


Figure 10: Design programming diagram

Based on Figure 10, the design programme focuses on three main spaces, which are the core roads: (a) Jalan Atas and Jalan Ooi Kar Seng, (b) potential OLE spaces consisting of Jalan Kertas Food Court, Saccharum Garden, Nibong Tebal Firefly Jetty and Nibong Tebal Footbridge Plaza, and (c) historical elements consisting prominent old façade and first shop house line. Consideration on connectivity and unity of space design is vital to ensure that the identity of the town and its originality in term of material palette and planting design (refer Figures 11-13).

Figure 11: Functional diagram

Figure 12: Preliminary masterplan

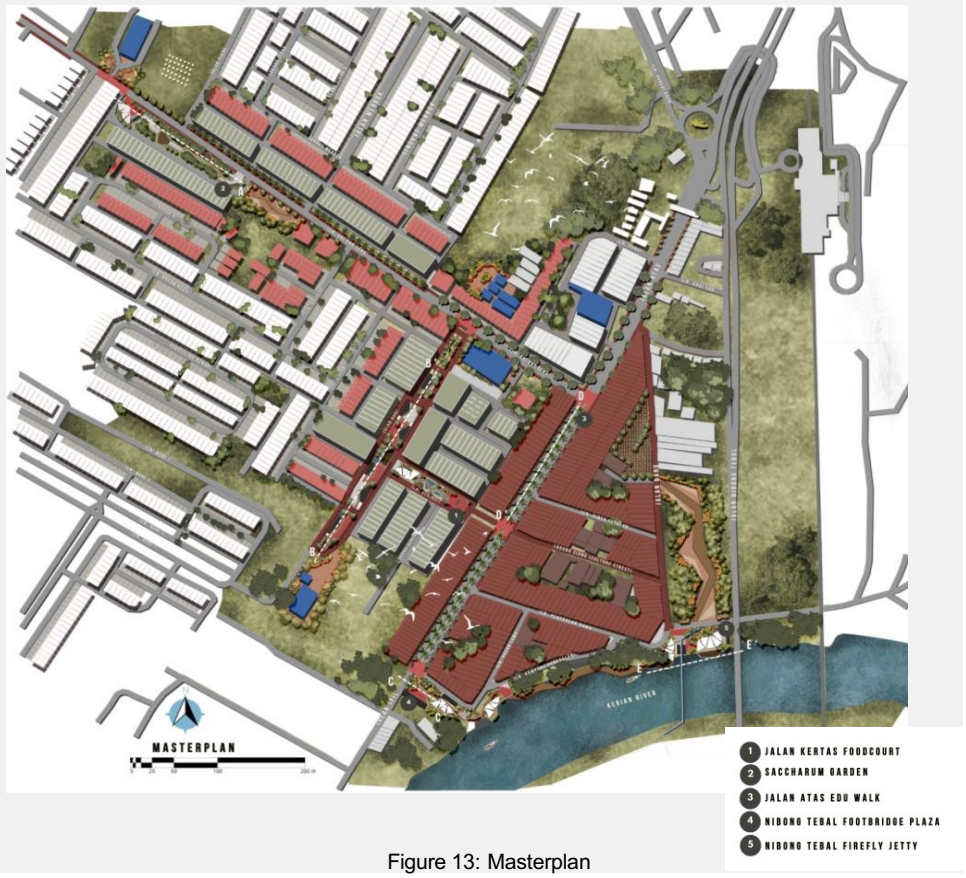


Figure 13: Masterplan

SPACE DESIGN

Building Character's OLE along Jalan Atas

Based on Figure 14, the enhancement of OLE is focused on providing essential facilities and views to maximise learning experiences. In order to create an active outdoor learning experiences along Jalan Atas, some steps are taken such as modifying the existing road by proposing a suitable pedestrian walkway which is accommodated with proper signage and seatings design. The existing shophouse will be restored and documented with the installation of wall plaque containing the building history. The usage of native vegetation is important in order to unify the scenery, create a sense of direction and to keep the town's identity. Concurrently, the aspect of safety and privacy is also considered to ensure the shop owner's security.

Figure 14: Section and image of proposed design at Jalan Atas

Cultural OLE at Jalan Kertas Food Court

Based on Figure 15, Jalan Kertas Food court serves as a nodes for local and outsiders to enjoy local delicacies and learn about their town's cultural identity. Installation of informative boards create an ongoing learning experience for all users that arrived there. The construction of the food court also highlight the form of Nibong palms that is important to shows the town's identity. Upon reaching the area, visitors can take photos at the Nibong Plaza before walking through a linear Nibong Garden to the Cultural Gallery. After that, visitors will enter the food court area that is divided into three parts following the cultures in Nibong Tebal. There will be an area where visitors can enjoy different local delicacies and learn about their unique culture and custom.

Figure 15: Section and image of proposed design at Jalan Kertas Food Court

Ethnobotanical OLE at Saccharum Garden

Based on Figure 16, Saccharum Garden provides the users information on the economic revolution of Nibong Tebal from agricultural village to and industrial town. Along the trail, users can learn about sugarcane species which is the main first agricultural species that developed the town's economy. Ecologically, *Saccharum officinarum* act as a phytoremediation plants that can filter contaminated water into the soil.

Figure 16: Section and image of proposed design at Saccharum Garden

Ecological OLE at Nibong Tebal Firefly Jetty

At the entrance, the visitors will see the mural of local history of the town. The mural provides learning element for visitors apart from being an instagramable spot. Besides, Nibong Tebal Firefly jetty is accommodated with container shops and shade to attract users for learning activities while boosting the town's economy. The area is connected to a boardwalk where the visitors can learn about the ecological value of mangrove and river ecosystem (refer Figure 17).

Figure 17: Section and image of proposed design at Nibong Tebal Firefly Jetty

Figure 18: Section and image of proposed design at Nibong Footbridge

Transportation History OLE at Nibong Footbridge

Figure 18 shows the Footbridge Plaza. The boardwalk connects the boathouse to the jetty and the footbridge area. In general, the boardwalk provides a parking space for fishermen's boat and resting spot for them. Meanwhile at the footbridge plaza, the utilisation of area under bridges can maximise the potential development of social spaces that helps to beautify the existing infrastructure. The plaza is also accommodated with a simple tensile design which not only provides shade to users but also requires less maintenance. The streetscape design shall also enhance the existing roads to connect visitors to experience the old façade of buildings and visit the various cultural attractions in the town (refer Figures 19-20). \

Road Enhancement and Old Façade Beautification

Figure 19: Permeable pavements

Figure 20: Beautification of prominent facade with ethnobotanical planting

DETAILED DEVELOPMENT PLAN PHASE

DESIGN AIM AND OBJECTIVES

The project targets to propose a sustainable outdoor learning area for boosting ecological edutourism at Nibong Waterfront which can be achieved by following the objectives which are:

1. To establish outdoor learning space by promoting the ecological and historical value of Nibong Waterfront.
2. To introduce smart facilities and infrastructures for enhancing the economy of local sellers.
3. To improve the environmental quality using green technology and riparian enhancement.

DESIGN, HARDSCAPE AND PLANTING CONCEPT

The design concept for the detailed development plan (DDP) is “Reviving the Sparks”. In relating to the masterplan's concept which is "The Spark of Memory", the detailed development plan targeted to be the area where the site is rejuvenated by Reviving the Sparks. In terms of design, the concept is implemented through establishment and enhancement of existing area for outdoor learning purposes, boosting the local's economy and sustaining the surrounding environment.

Next, the planting concept is “Ethno Treasures”. The planting concept for this DDP aimed to bring the sentimental value of vegetation palette at Nibong Waterfront by introducing ethnobotanical species through its composition in rain garden and overall planting design (refer Figure 21).

Figure 21:Triangle hierarchy planting to give a sense of balance for planting design

Lastly, the hardscape concept is “The Nibong Rhythm”. The concept symbolises the essence of nature and genius loci of Nibong Tebal town. In design terms, the material palette highlighted the texture of stones, sand and wood that are used holistically throughout the building's construction within the town. In parallel, the color scheme of hardscape elements will also match the earthy tone of buildings' color and material palette (refer Figure 22).

Figure 22:Elevation of historical shophouse building along Jalan Atas

SPACE PROGRAMMING

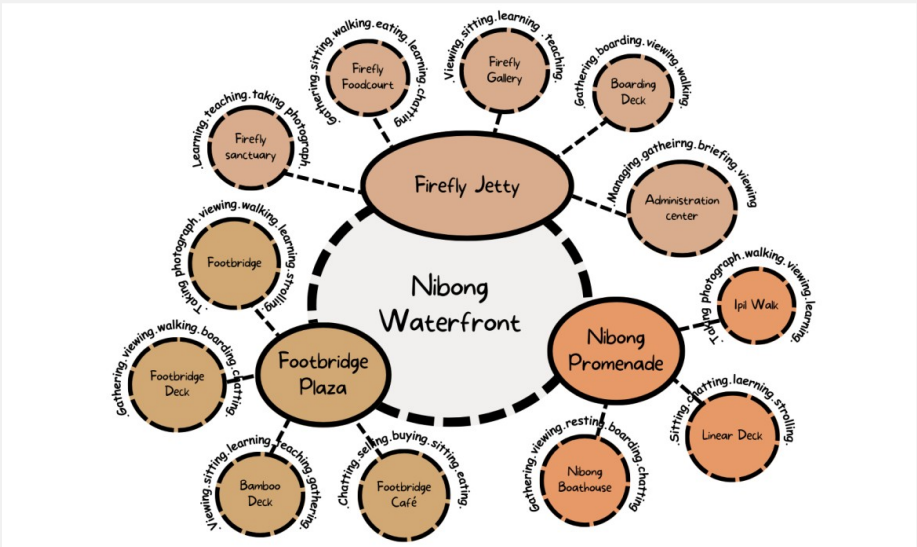


Figure 23: Design programming for Nibong Waterfront

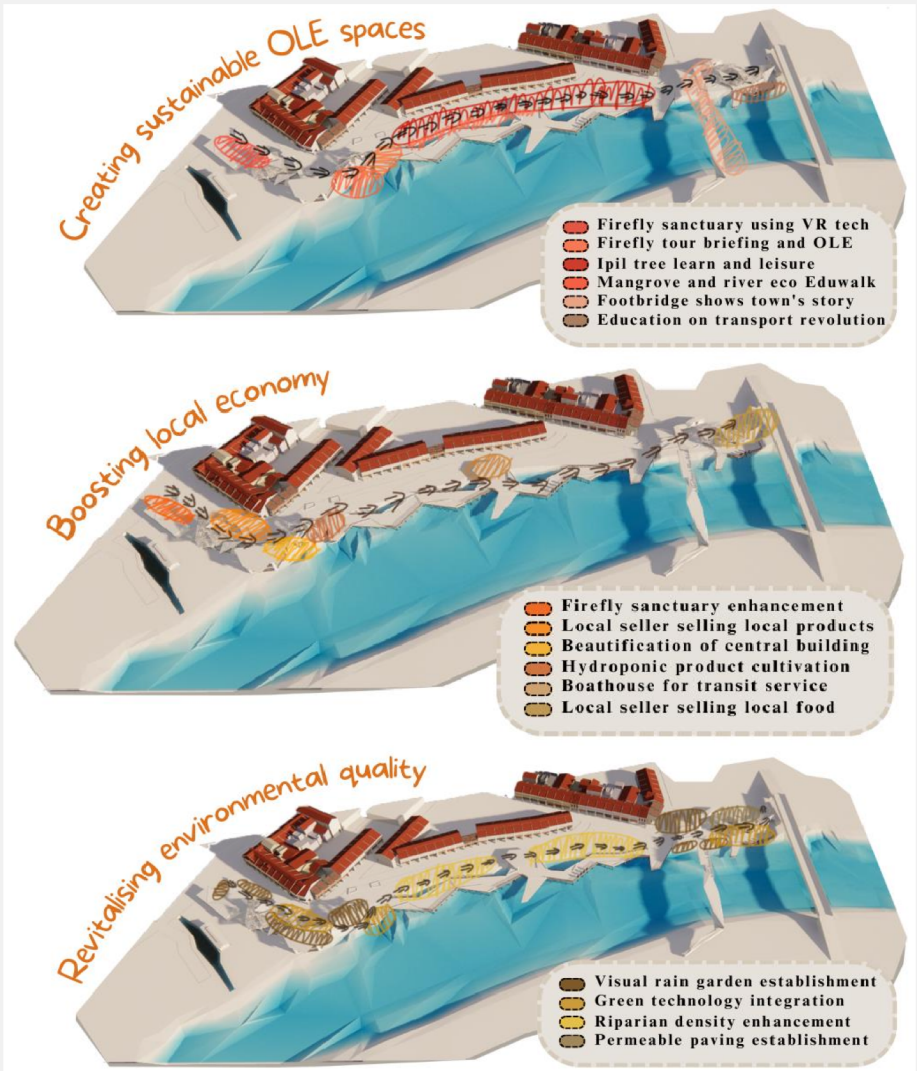


Figure 24: Design strategies for Nibong Waterfront

Figure 25: Functional and conceptual diagram

Figure 26: Schematic plan

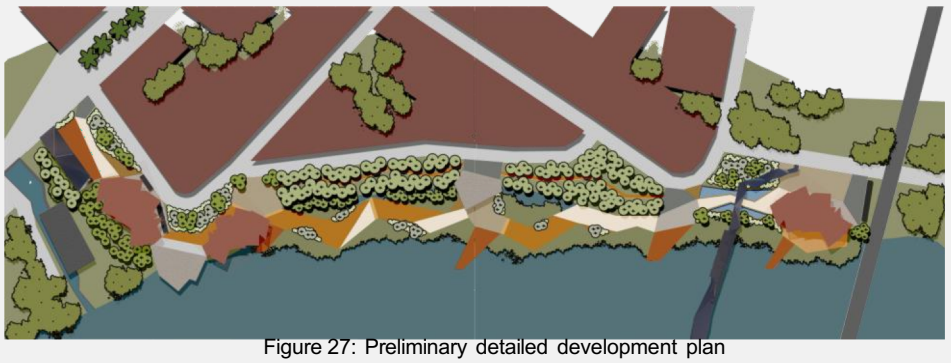


Figure 27: Preliminary detailed development plan

Figure 28: Detailed development plan

The main attraction is Nibong Waterfront, where visitors can visit Nibong Tebal Firefly Sanctuary, Eco Food Court, the various gardens, Kerian River Edu Walk and access to the footbridge (refer Figures 23-28).

SPACE DESIGN

Figure 29: Section and image of proposed design at Nibong Tebal Frefly Jetty

Establishing OLE Area at Nibong Tebal Firefly Jetty

The entrance of Nibong Tebal Firefly Jetty gives a sense of welcoming to all visitors that reach the area. Ivory beige sandstones that are used as the permeable paving reflect light from the sun creating a highlight on the pathway to the adjacent spaces. Tall vegetation such as palms frame the view giving a sense of direction towards the next space. The wall of Firefly Sanctuary is painted with mural that represents the local story consisting the memories of sugar harvesting, transportation revolutionary era and richness of culture and diversity of race in Nibong Tebal and next to it is the eco shelter where visitors can enjoy their evening with unique local delicacies. The area is also connected to the central administration building where users can register for a tour package to hear a briefing about firefly tour before continuing their journey by joining various active learning activities at the Firefly Open Gallery next to it (refer Figures 29-30).

Figure 30: Section and image of proposed design at Nibong Boardwalk and Ipil Garden.

Enriching Mangrove and River Education at Nibong Boardwalk

Throughout the 150 meters Nibong Boardwalk, users will learn about mangrove and river ecosystem that give a huge impact to urban river system that lies across the town. The majestic view of birds and mangrove line can surely create a memorable moment for all visitors. The area targeted to give awareness about the importance of maintaining a good river and mangrove ecosystem that are beneficial to the adjacent development area. Meanwhile, the boardwalk is also connected to the Ipil Garden. The Ipil Garden trail highlights the riparian lines that keeps the town's cool and humid (refer Figure 31). It serves as a natural flood barrier which also acts as a soil stabilisation elements to the riverbank. Moreover, ethnobotanical plants is used to shows the identity of the town to be promoted for edutourism.

Figure 31: Section and image of proposed design at Nibong Footbridge Plaza.

Transportation History's OLE at Nibong Footbridge

Upon reaching the end of the boardwalk, users will be greeted by the Nibong Waterfront Footbridge that lies across the Kerian river. The 5 metres high structure can be seen clearly from Nibong Memorial Deck that surely catch the gaze of everyone who passed by. A precious spot for shutterbug and photo hunters. At the Nibong Footbridge plaza, users can learn about Nibong Tebal's transportation revolution and given the opportunity to enjoy a short boat ride along Kerian river. This plaza also provides boat service and river tour (refer to Figure 32). At night, the plaza will be enlivened with various activities and lighting from the eco shelter that will brighten up the area with dim lights to reduce light pollution.

Figure 32: Aerial view of the proposed landscape design at Nibong Waterfront.

SOFTSCAPE AND HARDSCAPE PALETTE

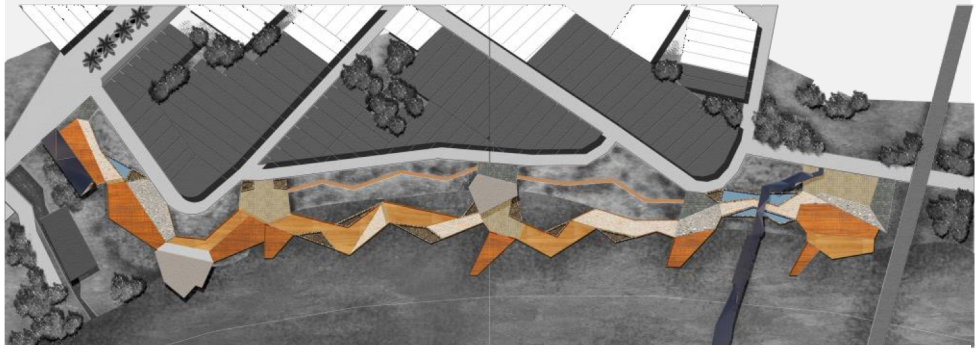
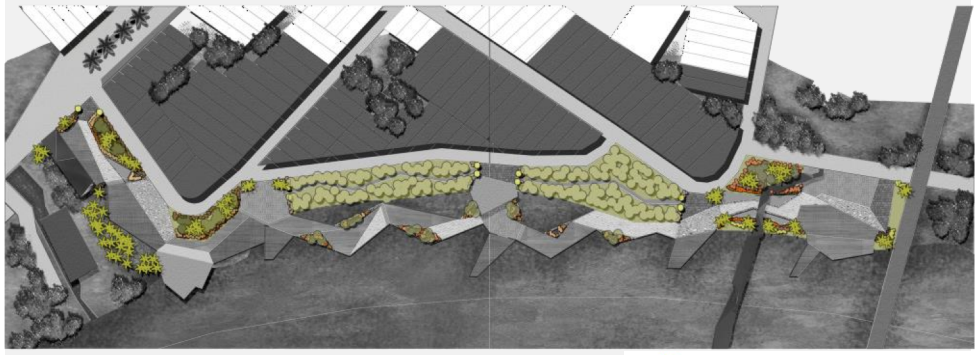


Figure 32: Proposed hardscape palette for Nibong Waterfront



Trees
1. Dillenia suffruticosa (Simpoh Air)
2. Plumeria Rubra (Kemboja Merah)
3. Moringa Oliefera (Kelor)
4. Gardenia tubifera kula (Tenggek Burung)
5. Luecena Leucocephala (River Tamarind)
6. Saccharum officinale (Sugarcane)

Shrubs
1. Persicaria odorata (Kesum)
2. Pluchea indica (Beluntas)
3. Piper sarmentosum Roxb. (Kaduk)
4. Kaempferia galanga (Cekur)
5. Lasia spinosa (Geli- geli)
6. Gynura sarmentosa (Sabung Nyawa)
7. Oenanthe javanica (Selom)
8. Neptunia prostrata (Setangki)
9. Cosmos caudatus (Ulam raja)
10. Zingiber zerumbet (Lempoyang)

Palms/bamboo/groundcover
1. Areca cathecu (Areca Palm)
2. Licuala grandis (Licuala Palm)
3. Bambusa glaucophylla (Malay Dwarf)
4. Bambusa ventricosa (Buddha's Belly)
5. Centella asiatica (pegaga)
6. Axonopus compressus (Cowgrass)

Figure 33: Proposed softscape palette for Nibong Waterfront

The usage of nature-themed materials (refer Figure 32) and traditional herbs as the main planting palette (refer Figure 33) can create awareness to the visitors on the cultural landscape design of Nibong Tebal.

INNOVATIVE DESIGN ELEMENT: ECO SHELTER

Figure 34: Innovative Design Elements (IDE) for Nibong Waterfront.

The eco-shelter is an innovative design element that harmoniously integrates sustainable architecture with Nibong Tebal's natural and cultural heritage (Figure 34). It is a pavilion that is facilitated with thermoelectric technology and hydroponic system. The design utilises bamboo as the main structural material and Nibong palm as the form's inspiration. A thermoelectric generator (TEG) is an electric device that converts heat energy produced from a heat source directly into electrical energy. This phenomenon is called the Seebeck Effect, named after Thomas Johan Seebeck. The process occurs are as follows: (1) Sun rays hit the solar glass and heat up the TGE creating electricity. Electric supply activates the pump for the irrigation system; (2) Water flows through irrigation net and wet the bamboo layer which released humidity that cools down one side of the TEG and indoor temperature of the Eco shelter; (3) Water is purified through hydroponic system before flowing back to the river.

CONCLUSION

The study concludes that Nibong Tebal has high potential to be develop as an edutourism site as it contains a lot of heritage and ecological value that can provide the locals and visitors a holistic view on both topics. For future planning, the town can be developed as a heritage town. This study has provided a framework of ideas on historical edutourism planning through promoting the outdoor learning experience.

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