

Eco-resort in Rural India

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A Research Project submitted in partial fulfillment of the requirements for the degree of Master of Architecture Professional

Unitec Institute of Technology, 2011

ACKNOWLEDGEMENT

First and foremost I offer my gratitude to my supervisors and all the other staff members at Unitec who have helped guide me through this project. I would especially like to acknowledge and thank Krystina Kaza for her continued support and encouragement with this project.

I would also like to thank my uncle Titto Kainady, for his guidance in understanding the site and its importance to the area and architect, Tony Joseph, for helping me understand the different elements of Kerala architecture.

Finally, I would specially like to thank my parents, Rajan and Tancy, for their continued support and encouragement through my architectural studies. To all my friends, thank you for standing by me in this incredible journey.

I dedicate this project to my granddad who passed away last year. This project was his dream.

ABSTRACT

This research project aims to develop a design for an eco-resort in rural Kerala, India. The research is based upon the theoretical influence of Hitesh Mehta and his exploration of the principles of eco-tourism. An important element of this project is gaining a theoretical understanding of the forms of local architecture and their methods of construction. The project aims to deal with the site, climate and the culture in a detailed way.

The site chosen for the project is located on an iconic island in the heart of the Vembanad Lake in Kerala. The site is currently a working plantation and the project is proposed as a way to promote conservation of the island.

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1.0 Introduction

1.1 Aim

The project explores the role of architecture in educating according to the principles of eco-tourism in rural India. The project proposes to use architecture as a way of economically supporting a struggling island located in the heart of the Vembanad Lake in Kerala. The project aims to promote conservation and eco-tourism in the region.

1.2 Purpose

The main purpose of this project is to revitalize an industry which has been largely ignoring the social and cultural values of the surrounding region by limiting the interaction between the tourists and the locals. I aim to successfully incorporate an eco-resort along with a working plantation, thereby introducing the guests to the traditional methods and ways of living and farming in this region.

In the past, hotel groups like the Radisson have acquired large blocks of land to create their five star resorts. These resorts are completely self-contained with minimal interaction with the local environment. This type of development detracts from providing its guests the true essence of rural India.

I would like to design a resort which gives the guests a real sense of what rural Kerala is really like. The guests will have a real interaction with the day to day running of a working plantation and with the locals employed on the farm. They will have the ability to interact and even take part in the operations at the plantation. This

may include activities like helping with the harvesting of cocoa or vanilla plants. Their experience of this area will be different to anything the average tourist to India might encounter.

1.3 Methodology

Research problem: How can eco-tourism revitalize rural areas of India? I propose doing this by looking into the two important points of my scheme in detail:

Architecture: Investigating the local architecture. This is an important element of the design as the type of buildings, or villas, designed need to reflect the local culture and heritage of the area so that tourists can experience it firsthand.

- What is the local vernacular architecture?
- What are the materials used in constructing the local buildings?
- How are all of the above (materials, construction) related to the local climate, culture and society? Are meaning attached to materials/ways of building?
- Are there any precedents for this type of scheme being undertaken in other parts of India?

Eco-tourism: Understanding the principles of ecotourism is important

- What is eco-tourism?
- What are the main principles of eco-tourism?
- How do the architecture and the eco-tourism principles reinforce each other?

The second important factor to consider is the existing plantation into which the scheme is being incorporated. The eco-resort is to sit within this working plantation without hindering its daily operations.

- Which areas of the plantation need to be kept private and which areas are to be opened up to the guests?
- What is the maximum allowable number of guests?
- What are the essential design and functionality components that need to be addressed for this scheme to work?
- What is the right architectural and programmatic response to facilitate integration between tourism and agriculture?

Design Methodology is an iterative process explored through a variety of design schemes. This analyzes each design schemes on its strengths and weakness.

2.0 Define Project

2.1 What is Eco-tourism?

Eco-tourism is an environmentally responsible way of travelling to a natural location. Eco-tourism promotes conservation of the environment and helps improve the lives of the local people.¹ This type of tourism is valuable in the conservation and protection of local sites. It helps struggling communities, create a source of income through tourism while maintaining their way of life.

According to the United Nations², the principles of eco-tourism are:

- Minimizing the impact of tourism on nature and culture
- Educating tourists to the importance of conservation
- Promoting responsible business practices
- Providing financial benefits for the conservation of the natural areas
- Educating the traveller on the local community and its culture

What is an Eco-resort?

An eco-resort is the destination where the traveler experiences the local culture and landscape. Hitesh Mehta is regarded as an expert

¹ What is Ecotourism? – TIES - http://www.ecotourism.org/site/c.orLQKXPCLmF/b.4835303/k.BEB9/What_is_Ecotourism_The_International_Ecotourism_Society.htm (accessed on March 2011)

² Wood, Megan Epler, "Ecotourism: Principles, Practices & Policies for Sustainability" *United Nations Environment Programme* 1, (2002) 14.

in the field of eco-lodges. In his book, *Authentic Ecolodges*³, the three main principles of eco-tourism that an eco-resort should embody are:

1. The conservation and protection of the site
2. Local community must benefit through educational programmes.
3. Educating the guests and locals on the surrounding environment and its cultural heritage.

The project aims to follow these three principles of eco-tourism and look into other related issues such as using sustainable materials, using local vernacular architecture and minimizing impact to the site.

³ Hitesh Mehta, *Authentic Ecolodges*. (New York, NY: Harper Collins, 2010). 10.

2.0 Site

2.21 Location



Figure 1: Map of Kerala

The site is located in state of Kerala, India



Figure 2: Vembanad Lake – R-block



Figure 3: R-block – Kainady Plantation

2.22 Site History

In 1834, Kerala was facing a severe famine and the government at the time decided that it would allow people to reclaim parts of the Vembanad Lake for cultivation purposes. Large outer bunds (retaining walls) were created in the lake and paddy cultivation began. The cultivation is done at 2.5 meters below sea level.⁴ This is one of the characteristics of the site which makes it truly unique.

Thirteen very influential families of central Travancore one of which is the Kainady Family were the leading forces behind the reclamation of these islands. My Great Grandfather, P.J Joseph Kainady was the founder of R Block, H Block and E Block, divisions of reclaimed land.

R block is built according to a scheme locally known as the 'Holland Scheme'. It is a direct reference to the dykes of Holland. Dikes, or levees, as they are more commonly known, were used to create new habitable areas. Currently more than 27% of the Netherlands is below sea-level and this area is home to more than 15.8 million people.⁵

The importance of what was achieved in the Vembanad Lake is not just a significant to Kerala but also to the whole world. This is the only place in the India were cultivation is carried out below sea-level. The project's success is shown through the very important and

influential visitors it has had over the years. These include dignitaries like former Prime Minister Rajiv Gandhi and Sonia Gandhi and family, V.P Singh (ex Prime Minister) and India's current Prime Minister Dr. Manmohan Singh.



Figure 4: Sketch of the R-block

⁴ Titto A.Kainady, *Showcasing the Rustic Life of Kuttanadu* (Kainady Heritage – Pamphlet, 2004), 1.

⁵ Dikes of Netherlands – Netherland's Dikes - <http://geography.about.com/od/specificplacesofinterest/a/dykes.htm> (accessed June 2011).

2.23 The Site

R-block at 620 hectares is easily one of the biggest manmade islands on the Vembanad Lake. The Kainady family has a 200 acre farm in R Block where coconuts, vanilla, arecanuts, bananas, mangoes, tamarind, plantain and cocoa are grown. Cultivation is done all year round. There are 112 families who reside on R Block Island.⁶ Some have been living on the island since the 1960's.

The unique concept of creating the R Block with bunds is replicated in the layout of the farm. The farm is entirely connected through interlinking waterways/canals, which circulate the water around the entire island. Boats are used to move supplies around the island to where it is needed. Harvests are also transported the same way from all over the island.

The site is primarily planted with coconut trees: this creates a canopy above the entire plantation keeping it shaded and cool. The plantation employs over 200 local workers seasonally.⁷ The plantation's annual harvest has drastically reduced over the past two decades. In 1985, 1.2 million coconuts were harvested. In 2010 only 100,000 coconuts were harvested.⁸ This decline is due to a lack of maintenance and the economic downturn, which greatly reduced new investment into the island.

⁶ Kainady, Titto. E-mail to Pawan Benzar, September 05, 2010.

⁷ Kainady, Titto. Interview by author. Note taking. Kainady, Kerala., February 16, 2011.

⁸ Ibid.,

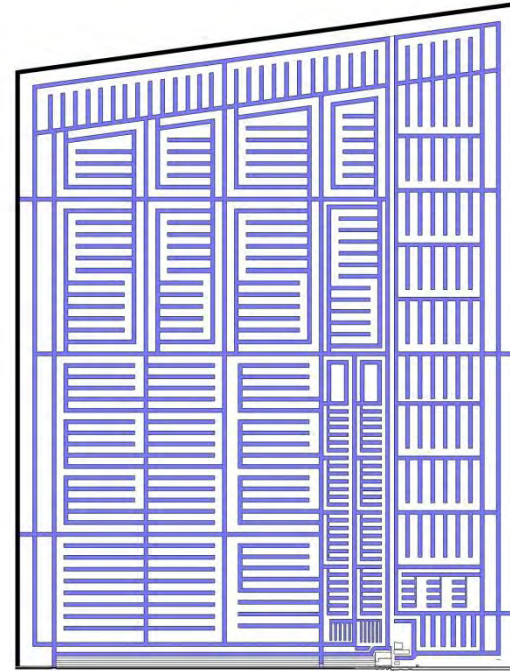


Figure 5: Plantation Map (Blue – waterways)



Figure 6: Kainady Family Farm House

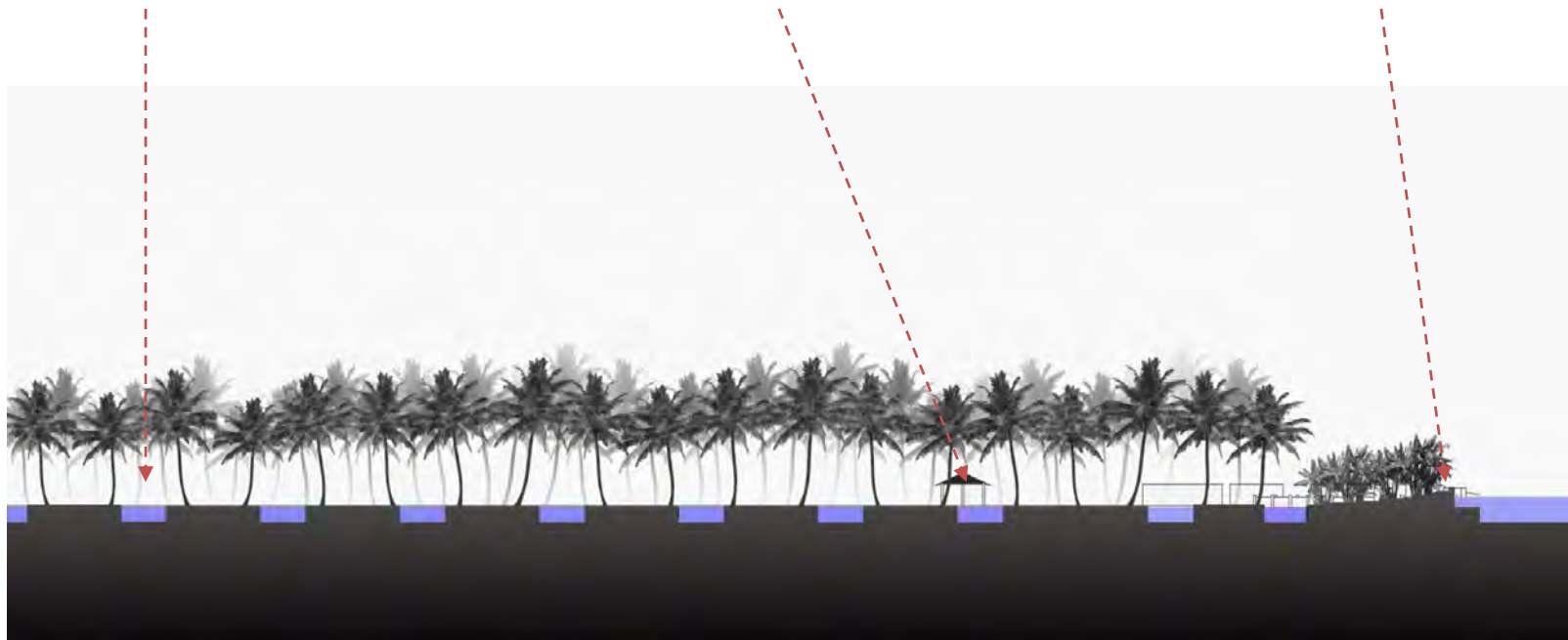


Figure 7: Site Section

2.23 Climate⁹

Sun Angles (Degrees °)

| | | | | | | |
|-------------|----|-------------|-----------|----|---|---------|
| • January | | 57 | | 63 | } | |
| • Feb | 63 | | 72 | 63 | | |
| • March | | 72 | | 84 | } | Summer |
| • April | 84 | 89.9 | | 85 | | |
| • May | | 85 | 78 | 85 | | |
| • June | | 78 | | 76 | } | Monsoon |
| • July | | 76 | 81 | 76 | | |
| • August | | 81 | 89 | 76 | | |
| • September | | 89 | | 77 | } | |
| • October | | 77 | | 66 | | |
| • November | | 66 | | 59 | } | Winter |
| • December | | 59 | 57 | 59 | | |

Summer (March – May)

Temperature Min 22o C Max 38o C

Winter (November – February)

Temperature Min 18o C Max 35o C

Monsoon (June – August) Annual Rainfall – 3600mm

⁹ Sunrise and sunset in Kottayam - <http://www.timeanddate.com/worldclock/astronomy.html?n=1905&month=1&year=2011&obj=sun&af=-11&day=1> (accessed April 2011)

2.3 Programme of Architecture

The site programme went through a few phases before it was finalised and implemented. The programme was shaped in accordance with my research into precedents, interviews with plantation owners and tour operators and also the comments of my supervisors.

2.31 Initial Programme

The initial programme of the project was based around creating a master plan for the whole island. The master plan was based around the existing facilities on the plantation. The plantation currently has a large two level farm house, a separate office and staff building, a large boat repair shed, a post office and a large storage shed. The initial concept encouraged the idea of mixing the programmes of the resort and plantation together. The spaces created would help the guests experience all the different aspects of a working plantation, alongside all the facilities of the resort. The concept wanted to add, a resort accommodation block, a large restaurant, craft & cultural centre, a performance hall and a medical centre to the site. These facilities were essential, as they would not with the running of the resort and provide facilities which were previously many kilometres away from the island's residents.

- The resort should be able to accommodate 16 guests in eight - one bedroom villas or rooms.
- The restaurant and kitchen are to be designed in an open plan arrangement to help connect resort guests with the kitchen chefs. Food is an important part of the Indian culture and the restaurant and kitchen conveying the tradition and culture of the area through the dishes that are created. Guests will be

encouraged to take up classes with the resort's chefs, serving only locally sourced produce.

- The craft centre is a building which will house local craftsmen who repair/make bamboo furnishings. Local employment will be encouraged in order to revive a dying craft. Visitors will be able to see and learn how to carve these pieces. These furnishings will be used throughout the resort.
- The cultural centre will hold language classes and teach the guests about the site and the local culture through guided tours of the island in which guests will have the opportunity to interact with local residents.
- The medical centre is an important addition to the Island as the inhabitants of the island currently have to travel more than 40 minutes via the backwaters for medical care. This is also beneficial to the tourism industry since the waterways in front of the site are extensively used by tour operators.
- The performance hall will be used to showcase the traditional dance forms of Kerala. These include the *Mohiniyattam*, *Koodiyattam*, *Thullal* and *Nangiarkoothu*.¹⁰ These dances are both culturally and socially significant as the performances depict ancient tales and some of them are associated with annual festivals.

The master plan also looked at expanding its influence to the rest of the island by adding key facilities to the island, such as:

- An Ayurvedic centre – practicing traditional Indian medicine

¹⁰ Kerala Tourism, *Kerala Kalamandalam*
<http://www.keralatourism.org/destination/destination.php?id=180> (accessed July 2011)

- A veterinary clinic – The plantation owners have expressed interest in bringing farm animals onto the site and also to take care of the animals already farmed on R block
- Seed production farm – Currently there are 62,000 hectares being cultivated in Kuttanad. All the seeds needed for this are currently being brought in from other states. A new industry could be created with the allocation and proper planning of this space
- Solar and wind power units – The project should look at the possibilities of renewable energy onsite. This idea should be explored to make the project more eco-friendly and the island become self sufficient.

2.32 Programme – Catering to a specialty

The research into eco-resorts and tour operators around the world provided me with valuable information on how the industry was set up and run. This was important as it allowed me to fine tune the facilities that were needed. The precedent studies showed that most eco-resorts have a specialty market which they cater to. These specialties were activities and elements located on, or near, the resort. Chumbe Island Ecolodge is an eco-resort located in Tanzania which highlights the importance of conservation of natural habitats and involves the local community in its running. The resort has eight guest villas and a very large main building. Their main attractions are the underwater coral reefs and the forest trails. It is regarded as one of the world's most authentic eco-lodges.¹¹

¹¹ Mehta, *Authentic Ecolodges* 53.

Another example of a specialized eco-resort is the Moseitlha Bush Camp in the Madikwe game reserve in South Africa. The resort accommodates 16 people in nine wooden cabins located around a central camp fire.¹² The resort specializes in 4x4 tours of the surrounding game reserves and provides wilderness walks in the nearby hills. Both of these examples identified attractions near their resort sites and have focused the resort programmes toward them.

My site is located in the heart of the Vembanad Lake surrounded by islands cultivated in paddy crops, coconuts, cocoa and many other cash crops. The majority of tourists know Kumarakom for its hundreds of kilometers of backwater canals which can be explored using houseboats. But there are many other unique attractions to this area, such as the nearby Kumarakom Bird Sanctuary. This fourteen acre bird sanctuary is a favourite among the tourists visiting Kumarakom. There are over two hundred different varieties of local and migratory birds which can be seen and heard here.¹³ Another important local attraction is the *Vallam Kali*, a traditional Kerala boat race. Outside of Kerala, it is more commonly known as the Snake Boat Race. The name comes from the type of boats used for the race, a *Chundan Vallam* (snake boat). This race is conducted during the monsoon season of August and September. Annually, it attracts over 100,000 spectators.¹⁴

¹² Ibid., 181.

¹³ Kerala Tourism, *Kumarakom*.
<http://www.keralatourism.org/destination/destination.php?id=41>

¹⁴ Kainady, Titto. Interview by author. Note taking. Kainady, Kerala., August 26, 2011.

2.33 Interviews with Tour Operators

I conducted interviews with two Australasian tour operators (via email and telephone) who specialise in bird watching tours, Kiwi Wildlife tours and Peregrine Bird tours. I asked them a number of questions regarding the ways in which they operate the tours. The main points from these interviews are listed below.

Kiwi Wildlife Tours

- Average tour group is around seven to eight people with a maximum of ten clients taken.
- Most of their clients are retired or professional in their 50s - 60s
- The operators look for quality accommodation with attached facilities, quality food and must have good birding sites nearby.
- The resort must provide accommodation for the groups local guides.
- The group stays at a birding site for a maximum of three days before moving to the next location.
- Popular activities include those that promote local culture and preservation of the local landscape.

Peregrine Bird Tours

- Average tour group is between five to seven people and has an average age of 40 or older
- Proximity to birding sites is extremely important as the groups tend to have a very tight schedule and want to experience the maximum number of activities during their stay at the resort.
- The groups tend to stay between three to four days at the resorts before moving to the next birding site.

- The resort must have all the basic amenities and should be comfortable. The villas do not have to be vernacular copies of the traditional buildings but should showcase aspects of them.
- Tourists pay from \$8,000 - \$18,000AUD for trips lasting up to 20 days

This information helped focus the resorts programme to one that is based around groups of travelers rather than individual clients. The resort should offer multiple bedroom villas rather than the standard single bedroom options. Another important point raised was the average age of the clients. They are in the 40+ age group. These individuals are passionate about wildlife and are interested in learning about different cultures. This was important as it showed the resort clientele as people who were active, loved the outdoors and enjoyed the company of others.

Outcome

The research showed the project would need to have a direct focus on the eco-resort and its programme. The master planning of the island would not be beneficial to the overall scheme. The project would concentrate on the key programmes associated with an eco-resort to achieve the project's aim. The medical centre, veterinary clinic, and the seed production farm would need to be set aside from the design scheme. These programmes do not have a direct relation to the eco-resort's viability.

2.34 Typical Guest Profile

Age

- 40-60+

Income

- \$80,000-100,000+ (NZD)

Ethnicity

- Europeans, and Americans

Lifestyle

- Retired or semi-retired professionals

What do they want from their visit?

- Activities which show/engage them in how the local residents live and work.
- Other local activities such as: the Vallam Kali (local boat race), and other various festivals that run around the year like Onam (harvest festival) and Diwali (festival of lights).

Most visitors to the area come to Kumarakom as part of a larger tour of India and only stay two to three days. Currently, no local resorts exist that cater for the bird watching tourists or offer a cultural experience of the region.

The following outlines a typical itinerary for a bird-watching group visiting the resort:

Day one: Bird watching tours at the local bird sanctuary.

Day two: House boating and then relaxing at the resort.

Day three: Visit to R block and the Kainady Heritage Home.

Typical couple

John and Mary are a retired couple from Switzerland, both in their mid 50's. They have booked a 15 day package tour of Kerala and it is their first visit to India. One of their friends recommended a visit to the Kumarakom Bird Sanctuary and the surrounding areas. Both of them are keen bird watching enthusiasts who are active and enjoy the outdoors.

The resort should offer them:

- Villas which are private yet feel open to the outdoors
- A room with an attached ensuite and a large open lounge area.
- Activities that showcase the local culture and traditional events.
- The opportunity to interact with other guests and staff.

2.35 The Design Brief

Research into the precedents, tour operators and critical comments from critiques have helped me fine tune the programme to the list below. I have used the *New Metric Handbook* edited by David Adler to calculate some of the spaces required.

Programme: Eco-resort / Bird Watching Resort

Main Buildings

Administration and Staff Block

- Manager’s Office 6m²
- Staff Room 1.0m² per staff member¹⁵ (14m²)
Resort manager, two resort staff, three maids, maintenance man, two chefs, three waiters and two local guides (all locally employed workers)
- Staff and tour guides sleeping quarters 21m²
Some staff are required to stay overnight on the property and the resort is obliged to provide accommodation for the guides travelling with the group.
- Housekeeping and general storage 1.4m² per number of rooms¹⁶ (11.2 m²)

¹⁵David Adler, (ed.) 2nd ed. *New Metric Handbook* (London: Architectural Press, 1999), section 42.13 table XI

¹⁶Ibid section 36.5 table I

- Restaurant (72m²)
Seating for 40 people
Space was calculated using a table’s chart.
5 x four person tables (2.3m x 2.5m) these tables can be separated to make two person tables.
2 x ten person tables (2.35m x 3.65m)¹⁷
- Lounge area 1.4 m² per seat¹⁸ - 30 seats (42m²)
The resort guests will use this space to mingle with the other guests and relax after their busy day.

Kitchen

- Main Kitchen, Prep Area and Store room - 0.9m² per seat¹⁹ x 40 (36m²)

Activity Orientated Spaces

Interpretation centre 50m²

- This space will be used to teach the guests about the site, the culture and elements of local language before the guests are lead on their tours of the area.

Small library and gallery 24m²

The Performance Hall 120m²

¹⁷Ibid section 18.3

¹⁸Ibid section 36.10 - 4.04

¹⁹Ibid section 36.10 table II

- Local children will be taught classical Indian dances and traditional performances can be conducted in this space.

Boat Building/Craft Centre

120m²

- The space is used by local craftsmen repairing and making bamboo furnishings and architectural elements. Local employment is key in developing this industry.

Accommodation – 8 Villas for 32 guests

- 3 x 3 bedroom = 18 people (3 bedrooms, three ensuite and a lounge)
Research has shown that tour operators have around 5 to 10 people per their travel group. These villas are aimed at the tour groups.
- 2 x 2 bedroom = 8 people (2bedroom, 2 ensuite and a lounge)
- 3 x 1 bedroom = 6 people (1 bedroom, ensuite and a lounge)

3.0 Precedents Study & Analysis

3.1 Housing Types of Kerala

Introduction

Keralan architecture has evolved over many centuries to its present state. It has been influenced by religion, culture, materials and by foreign colonisers of Kerala, such as the British, Dutch and the Portuguese. Each state in India has its own traditional architectural style and Kerala is no different. The tropical climate dictates the choice of materials and spatial arrangement of each house.

Religion played a leading role in shaping the architecture seen in Kerala. Hinduism is the most dominant religion in Kerala, followed by Christianity which arrived in 52AD with St. Thomas. The seventh-century saw Islam entering Kerala.²⁰ Each religion had an impact on the traditional architectural style due to the special needs and particular attitude towards life of that religion. Each religion specified, how a house should be erected, how a site should be selected, what measurements were appropriate for particular spaces, rules regarding the fixing of auspicious dates for the commencement of the work and the orientation and the layout of the structure. The resulting vernacular architecture was highly ordered and rich in structure. From this environment rose the traditional house styles referred to as a Nalukettu (nalū – four; kettu – wings), an Ettukettu (ettu – eight; kettu – wings) and the Pathinarukettu (pathinnaru – sixteen; kettu – wings).²¹

²⁰ Ilay Cooper and Barry Dawson, *Traditional Buildings of India* (London: Thames & Hudson, 1998), 146.

²¹ *Ibid.*, 147.

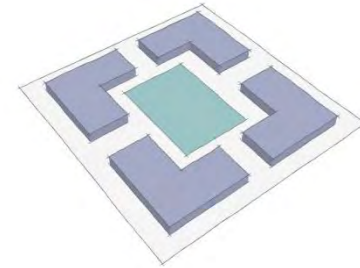


Figure 8: Nalukettu



Figure 9: Ettukettu

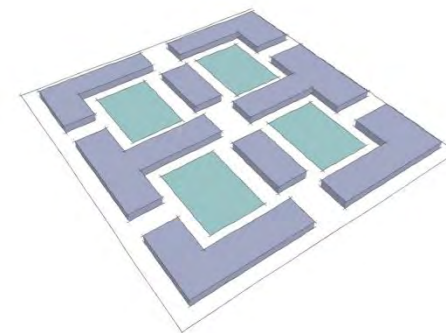


Figure 10: Pathinarukettu

Nalukettu

This is the term used to describe the most common plan of a traditional house found in Kerala. It is typically a rectangular structure where four walls are joined together with a central courtyard open to the sky. The four halls on the sides are called *Vadakkini* (northern block), *Padinjattini* (western block), *Kizhakini* (eastern block) and *Thekkini* (southern block).²²

The Blocks

Each of the blocks has its own designated function. The eastern block (Kizhakini) is the area allocated for the prayer room. The southern block (Thekkini) is for the keeping of wealth and for human dwelling. The western block (Padinjattini) is used as the area to store crops and grain in olden times. Finally the northern block (Vadakkini) is where the kitchen is to be placed. The outer verandahs in a *Nalukettu* are each enclosed differently. The eastern and western verandahs are left open for prevailing winds to sweep through the property. The northern and southern verandahs are enclosed or semi-enclosed. The central courtyard in a *Nalukettu* is called a *Nadumutto*. This space is important to the entire building as it keeps direct sunlight from reaching any of the rooms and keeps the house cool. This type of design element is very effective in this part of the world as the normal daily temperature hovers around 30 degrees Celsius. Houses need to keep their occupants cool and provide adequate protection from the elements. The courtyard

provides natural ventilation as well as an abundance of indirect light into the house.

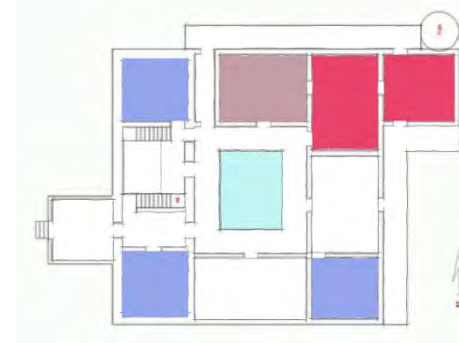


Figure 11: Nalukettu Plan Analyzed - bedrooms (blue), dining (purple) and Kitchen (red)

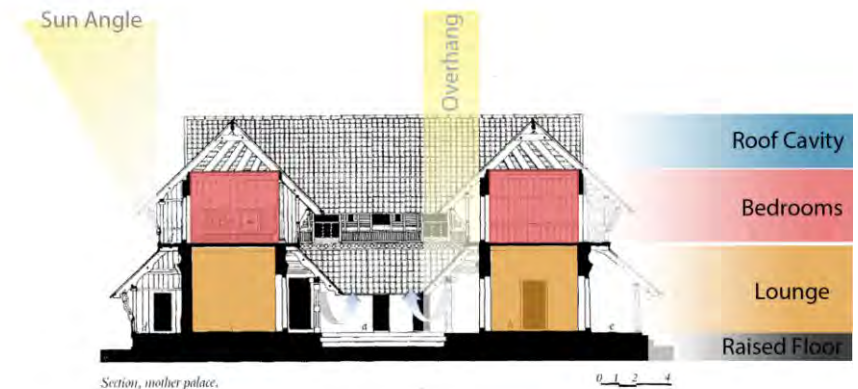


Figure 12: Nalukettu Section

²² Design of a Kerala Nalukettu. Kerala Architect.com. <http://keralaarchitect.blogspot.com/2009/12/design-of-kerala-nalukettu.html> (accessed 3 May 2011)

The Roof

The roof is one of the most important architectural elements in traditional Kerala architecture and the Nalukettu design. It is a double hipped roof pitched at 45° with pierced gables on either ends. These gables are called 'nasikas'. They are highly ornate wooden gables that are used to show a family's stature in society and were also a statement of style.²³ They are placed at an angle of 33° horizontally to the roof.²⁴ These hip gables act as ventilators. They promote the stack effect of the air inside the structure: warm air rises up and escapes through the gable ends.

Traditionally all of the roof structures in Kerala had thatched roofs made of palm leaves except for the royal palaces and temples. This changed in 1759 with the establishment by the East Indian Trading Company of a tile factory in Kerala. During the 1840s the Maharaja of Travancore finally proclaimed that from then on, all castes could replace their thatched roofs with tiled roofs.²⁵ Soon after, tiles became a normal part of Kerala architecture. Clay tiles have low thermal capacity and the breathing space allowed between them helps reduce the internal temperature.

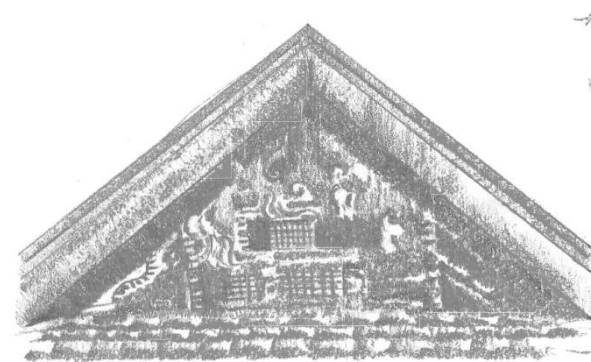


Figure 13: Nasikas Sketch



Figure 14: Typical Roof Design

²³ Sherline Pimenta, *Decorative Gables of Kerala*, <http://www.dsource.in/gallery/gallery-0119/index.html> (accessed July 27)

²⁴ *Kerala Roof Design*. Kerala Architect.com <http://keralaarchitect.blogspot.com/2008/04/kerala-gabled-roof-design.html> (accessed July 27)

²⁵ Cooper & Dawson, *Traditional Buildings of India*, 146.

Climatic Planning

Kerala has a warm and humid climate with heavy rainfall during the monsoon season. The need to ensure ventilation dictates to a great extent the form and layout of a building with regards to the characteristic style of terraces and sloping roofs. Rooms generally a open to the courtyard, have steeply pitched roofs, have open gables for ventilation, and verandahs have deep overhangs to create textures of light and shade.

The houses are always set inside a compound. It is a productive environment, planted with palms, fruit trees and spices. Larger compound, may construct a place for worship, a cow shed, a guest house, a granary, and a water tank. In some cases Hindu compounds contain their own cremation ground.

Traditional Site Planning

The site is separated into two sections in the planning stage. There is the outer realm, where the properties' cultivation/agriculture area is located and the inner realm, the space where the buildings are situated. The larger site context is fenced off from the outside. The area between the gate and the inner realm is where the cultivation/agriculture area is. The inner realm is the location for the main house and the other buildings. This area of the site is levelled and beautifully landscaped around the various buildings. There is an informal boundary wall between these two spaces, usually a line of vegetation or via a level change.

Overall

The traditional architecture is highly ordered and more appropriate to the design of the eco-resorts formal spaces. The project therefore should use the principles of the traditional Keralan architecture to plan and arrange the formal parts of the resort.

The project should explore the idea between the inner and outer realm of traditional site planning for the design. The scheme should pay careful attention to the inner realm and how the resort may be differentiated, from the plantation, without having a physical boundary.

3.2 Temporary Styled Structures

This style of architecture was typically used by the lower classes in Kerala. It was quick and cheap to build. It is typically made up of a structural bamboo frame and then covered with woven palm leaves. This type of house is seen as a more temporary building which needs to be re-covered with new woven palm leaves every few years. It is rarely seen today as most people can now afford the materials for a more permanent structure.

Spatially, the houses consist essentially of a long rectangular room with bamboo partition walls to separate the different areas. The plan is kept very simple. It usually consists of a large bedroom, a kitchen and a dining/living area.

This style of architecture and method of construction is starting to reappear in a few of the coastal areas as forms of accommodation for tourists to the region. Tourists to Kerala who generally come to unwind and relax have welcomed this informal style of architecture. This is evident in the new resort schemes which have been proposed in the surrounding regions.



Figure 15: Weaving Palm Leaves



Figure 16: Beach Villa

3.3 Other Local Forms of Architecture

Houseboats

'Houseboats' or 'Kettuvallam', as they are more commonly known in Kerala, are entrenched in the history of the Kuttanad region. They were originally used to ship rice and spices cultivated in the Kuttanad region to Kochi's ports for distribution. As more road links and other forms of transportation arrived, the use of the old kettuvallams was no longer needed. The transformation of the traditional 'kettuvallam' from goods carrier to a luxury cruise boat only occurred in the past decade.

The term 'Kettuvallam' in Malayalam is "kettu" which means "to tie" and "vallam" which means boat.²⁶ The term also defines the way these boats are constructed. The hull is made up of a series of carefully measured and crafted wooden planks which are tied together using coir with coconut fibres stuffed in between.²⁷ A unique point of this boat structure is that there is not a single nail used during assembly. The main materials used are Jack wood or 'aanjili wood', as it is known in Malayalam and coir. The top part of the 'kettuvallam' is constructed of a bamboo framework, and woven coconut mats are laid over the top. It is then held together with splits of bamboo which are tied to the frame work.

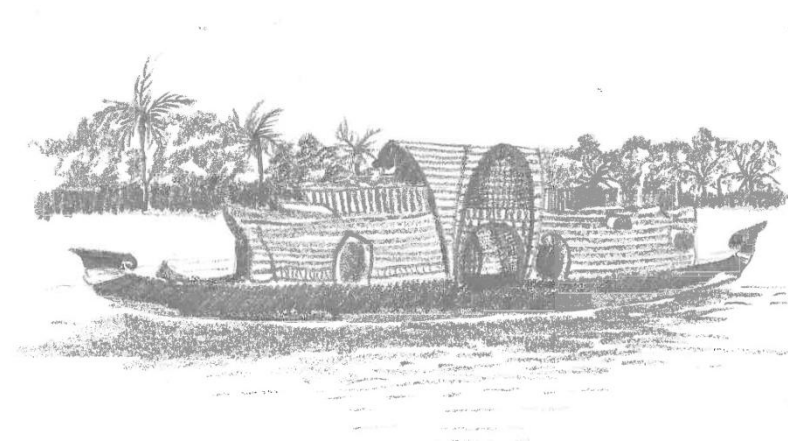


Figure 17: Kettuvallam Sketch



Figure 18: Kettuvallam - Interior Space

²⁶ Coco Houseboats Kerala – History of House Boats
http://www.cocohouseboatskerala.com/history_houseboats.html (Accessed on July 20,2011)

²⁷ Kerala House Boat, Kerala Kettuvallam, Kerala Everything.com.
<http://www.keralaeverything.com/kett.htm> (Accessed July 20,2011)



Figure 19: Kettuvallam Interior Space²⁸

²⁸ Coco Houseboats Kerala – History of House Boats
http://www.cocohouseboatskerala.com/history_houseboats.html (Accessed on July 20,2011)

Overview

The temporary styled houses and the kettuvallams are seen as an informal type of local architecture. They are more appropriate to the relaxed nature of living spaces than the formal Nalukettu type. The spaces created are more intimate than the formal types of vernacular architecture. This makes them an ideal design concept for the resorts accommodation.



Figure 20: Bamboo Framing²⁹

²⁹ The Marine Installer's Rant - The "Yogattorney" and the Kerala houseboats of India <http://themarineinstallersrant.blogspot.com/2011/09/yogattorney-and-kerala-houseboats-of.html> (accessed on September 25, 2011)

3.4 Analysis of Resorts in the Area

3.41 Kumarakom Lake Resort

Site

Kumarakom Lakes Resort is situated on an 8.2 acre, west-facing waterfront property. It sits on the banks of the Vembanad Lake in Kottayam District. There are internal waterways which run through the site, creating small artificial islands. The site is covered with buffalo grass and is extensively landscaped.

Access

The entrance to the hotel is on the east side of the site. As you approach the resort from the main road, you immediately see two five-metre high wooden gates. Security guards at the gates point you in the direction of the main lobby. This entrance is therefore a controlled point of entry. Adjacent to the main gate, there is a small driveway leading up to the services buildings. This houses the kitchen, staff quarters and preparation areas for functions.

The resort is open to Vembanad Lake on the west face of the property. Access to the waterfront is open to tourists staying at the resort via walkways which run along the property.



Figure 21: Kettuvallam Dock at Kumarakom Lake Resort



Figure 22: Site Analysis

Architecture

Kumarakom Lakes Resort was designed by Calicut based architect Tony Joseph to showcase Kerala heritage and culture within a picturesque setting. The concept of this resort was unique with respect to the others surrounding it. It was the first resort in the area to use an already existing 'tarawad'³⁰ for the design of the resort.

The restaurant is situated in a 200 year old *ettukettu* styled mansion. This building used to be the ancestral home of Edamana Kalamthat Gurukul (Master of Martial Arts) in Thiruvalla. The building is beautifully detailed with many ornate architectural pieces. The restaurant seats 115 people and is multi-cuisine. The Ayurvedic centre is housed in a 200 year old *nalukettu* that had a history of being used as an Ayurvedic treatment centre.

Accommodation

The resort has a series of 22 cottages set along the canals, interconnected by pathways and small bridges. The cottages are assembled from portions of nearly forty historical houses from different parts of Kerala. Therefore, each of the cottages has its own ancestral story from its part of Kerala.

³⁰ Tarawad : "A traditional Nair matrifocal family is called a Tarawad or Marumakkathayam family. A traditional Nair Tarawad consists of a mother and her children living together with their mother's surviving eldest brother or eldest surviving maternal uncle who is called *Karanavan*. The *Karanavan* exercises full powers over the affairs of the family."
http://www.wunrn.com/news/2007/03_07/03_26_07/040107_matriarchy.htm
(accessed on 3 May 2011)

Resort Features

The resort features an Ayurvedic treatment centre which houses a yoga centre, beauty salon, consultation and massage rooms, an infinity swimming pool, a conference centre, a business centre, a fitness centre and a concierge service.

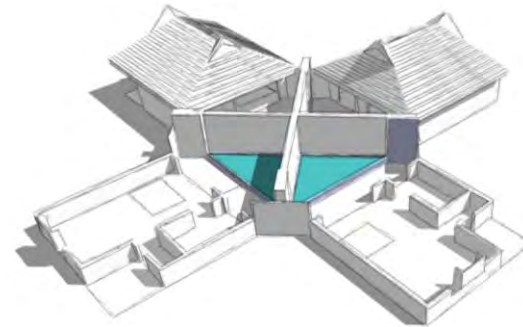


Figure 23: Layout of four individual cottages

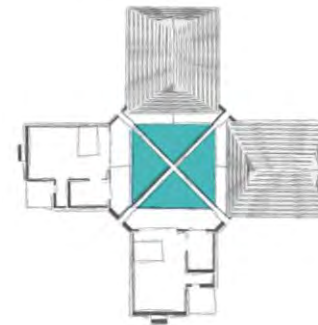


Figure 24: Top view

Overall

This resort scheme has reconstructed a mini village of traditional architecture and adapted it to the resort's programme. The architect has been true to the principles of the traditional architecture and with their use of materials.

The site is completely gated off from the outside world in order to create a private internal space for the resort's guests. This is not ideal for my scheme as the project attempts to connect the guests to the local community.



Figure 25: Internal Waterways



Figure 26: Open Corridors – Ornate Exposed Structure

3.42 The Zuri Kumarakom (Radisson Group)

The Zuri Kumarakom is five Star resort Situated on an 18 acre flat site on the shores of the Vembanad Lake. It has 72 rooms in total (4 types), a business centre, meeting/banquet hall, 2 restaurant, maya spa and a meditation centre.

Access

The resort has a single access road into the site but the road splits for service lane and resort entrance. The resort is surrounded by a four meter high boundary wall. There is minimal interaction with the outside environment.

Services inside the resort are easily accessible to guests and are at a minimal distance from all villas.

Site Planning

The natural landscape has been completely altered to fit the resort, rather than being a part of the design. The resort is entirely landscaped and paved. This takes the natural feel from this resort.

There is an artificial lagoon in the centre of the resort. This creates a huge void in the site rather than becoming the focal point of the villas. The villas are placed facing the artificial lagoon with the ten presidential villas taking up most of the lake frontage.

There are no real site features. Therefore, guests of the resort can only use the limited facilities at the resort and then have to book tours from here.



Figure 27: Overlooking the Artificial Lagoon



Figure 28: Site Analysis

Architecture

There is a mixture of architectural styles seen in the resorts buildings. The buildings replicate the traditional house with all the modern features and functions. There is a lot of false architectural detailing used in the design. All of the villas are fully air-conditioned, yet they all have the traditional nasikas at the top of the roof that is meant used for air circulation.

The design is brought down by the use of incorrect materials and roof angles which do not work with the traditional architecture or the sites climatic conditions. The roof angle is not ideal with the sun angles or the monsoon weather of this region. Therefore the some buildings have had to be installed with blinds and louvers to deal with this problem.

Overall

The resort has a number of issues with respect to how the scheme is planned and designed. By attempting to replicate a traditional architectural form rather than simply taking elements from it, the scheme failed to understand the guiding principles behind the traditional precedents. The site is not planned around the community or the surrounding landscape. It is based on the idea that their guests want to be shut out from the rest of the world, rather than be connected to it.

The project should be look at this precedent as an example of how not to employ traditional architecture and planning principles into the resort's scheme incorrectly.



Figure 29: Main Building



Figure 30: Outdoor Courtyard

3.5 Bird Watching Resorts - Programme Analysis

3.51 Posada de la Laguna Lodge

Posada de la Laguna Lodge is a nature resort located inside the nature reserve of Ibera, in the province of Corrientes, Argentina. The resort has two main buildings, the accommodation block and the main building, that houses the restaurant, bar and lounge space.

Access

The resort is accessible via the nature reserve trail and only with a 4x4 vehicle.

Site Planning & Architecture

The resort is located on a four acre site on the edge of a lagoon. The two buildings on the site around overlook the lagoon. There is no boundary or fence around the resort. It is kept entirely open to the site and its surroundings.

The buildings are two pitched roof structures made of timber and stone. The internal space is lime rendered and showcases the exposed ceiling structure.

Resort Programme

The resort's scheme is based around a nature reserve and the attractions associated with it. The resort offers its guests, bird watching tours, canoeing trips, horseback riding and nature trails. All of these activities highlight the importance of conservation of the natural habitat to the guests.

Outcome

This resort has a simple plan and programmes to satisfy its guests. The resort is oriented toward the activities rather than the type of accommodation or facilities the resort offers.

Eco-resorts are always designed with a focus on teaching its guests on the importance of conservation and connection to the local community. Posada de la Laguna Lodge is not a good example of a resort that promotes community interaction. The proposed eco-resort should look at this example on how to align itself to its surrounding environment and local attractions.



Figure 31: Site Map of Posada de la Laguna (red-main building, blue – accommodation)

3.6 Eco- Resorts - Eco Analysis

3.61 Chumbe Island Coral Park

This eco-resort is located on the fragile Chumbe Island, off the coast of Tanzania. The resort has seven eco-bungalows on the island which houses 14 guests. The resort's main principles are conservation of the island, involvement of the local community and the interpretation of the local culture to the resort's guests.³¹

Access

The resort can only be accessed via boat or sea plane.

Site Planning

The eco-resort has separated out the formal and informal spaces to create its overall plan. It has arranged the programme into groups of buildings. The main building, which houses the reception, lounge, dining and education center is located on the Western side of the site. The 'back of house' resort facilities are all located towards the Northern side of the site, away from the beach front. The villas are spread across the Eastern side of the site overlooking the ocean.

Architecture & Materials

The resort is constructed using traditional building methods and materials. The villas have an open-air plan to maximize air flow through them by using the sea breeze as a natural air conditioner.³²

The building's structure consists of a latticed frame, made from mangrove and casuarinas poles covered with thatched palm leaves.³³ It is a simple structure and design, ideal for this site.

The main building is the architectural feature of the resort. It is a large open plan structure that houses the formal facilities of the resort. Its method of construction and the materials used are identical to the villas' design.



Figure 32: Main Building

³¹ Mehta, *Authentic Ecolodges* 53.

³² *Ibid.*, 54.

³³ Julia Faiers, *Exotic retreats: eco resort design from barefoot sophistication to luxury pad*. (Mies, Switzerland: Rotovision, 2005). 88.

Eco Features

Each villa is fitted with a rain water collection system and filtration system for its water supply. It has the capacity to store up to 15,000 litres of water underneath the floor in large cisterns.³⁴ The villa is also attached to photovoltaic panels for electricity. The bathrooms have self composting toilets.

A centralized water collection system was not installed for the resort due to the amount of excavation required. An individual system ensured minimal impact to the fragile ecology of the island.

Overall

This project embodies many aspects which would be beneficial for a rural eco-resort. The site is planned effectively. The architecture is simple but elegantly placed within the landscape. The eco features have a huge impact on the overall scheme of a resort. The main point this project displays is, how a resort can be designed to work as individual entities and still function as one cohesive unit.



Figure 33: Rainwater Collection and Filter

³⁴ Ibid., 89.

4.0 Site Analysis

4.1 Site Modes of Access



Figure 34: Site to Modes of Access

- 80kms from Kochi Airport
- 50kms from Kochi City
- 16kms from Kottayam Rail Station
- 3 – 4hrs via houseboat from Kochi

4.2 Ownership Chart

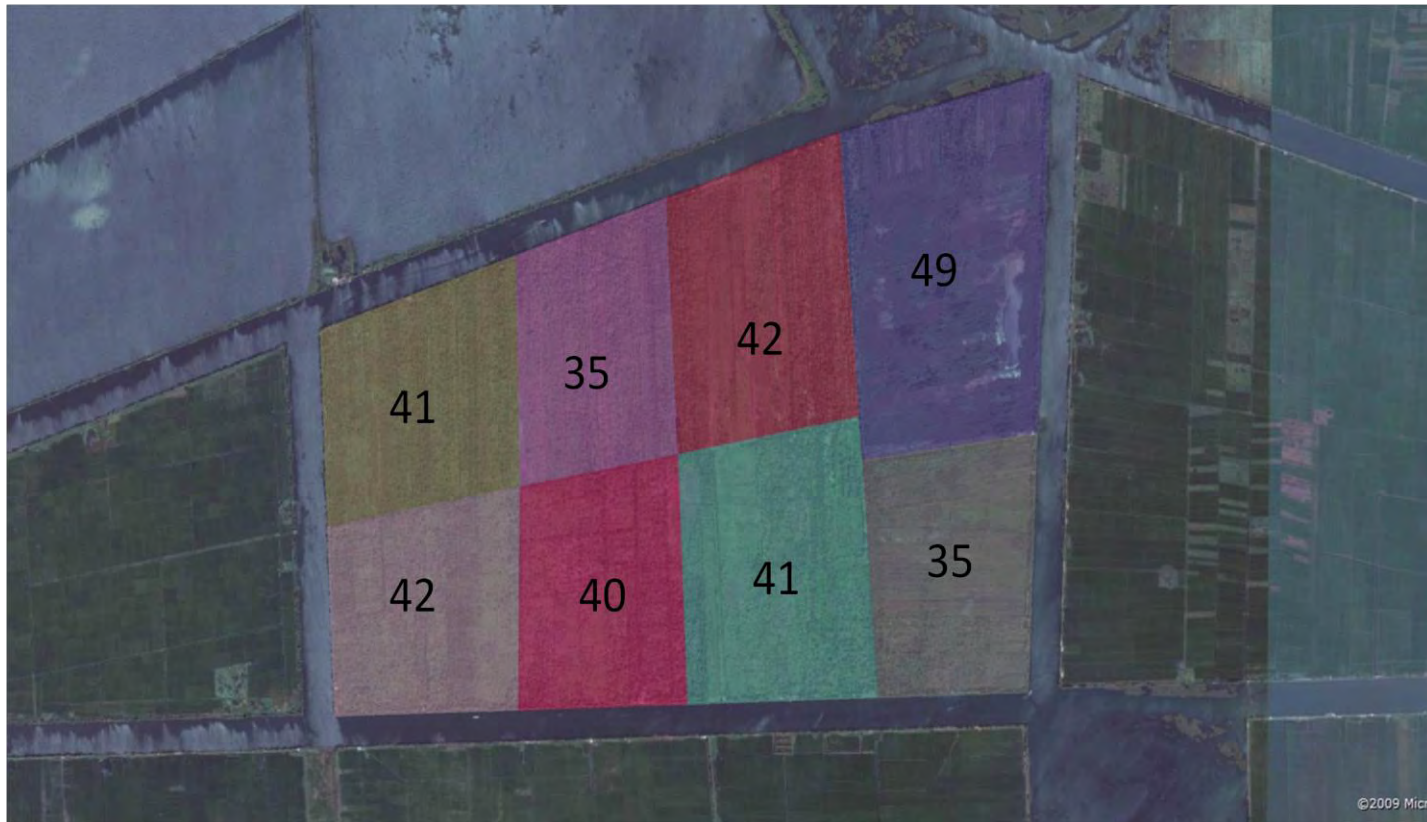


Figure 35: Ownership

4.3 Site Parameters



Figure 36: R-block – 1450 acres / Plantation – 200 acres

4.4 Architecture currently onsite

There is a large two level farm house currently on the island, along with several other small buildings used in the day to day running of the farm. The main house is an 'indian art-deco' styled building constructed in the mid 1960's.

Next door to the main house is the office building, which houses the office, farm workers' canteen and two large storage rooms. It was constructed in the 1920's. The architectural style of this building is completely different to the main house. The building is designed in the traditional Kerala architecture style, with a simple clay tiled, pitched roof. The boat repairing shed is next to the office building. The shed is a simple building, composed of eight concrete columns holding up a pitched tiled roof. The final building on the farm before we enter the long pathway is the large shed, used to store large farming equipment.

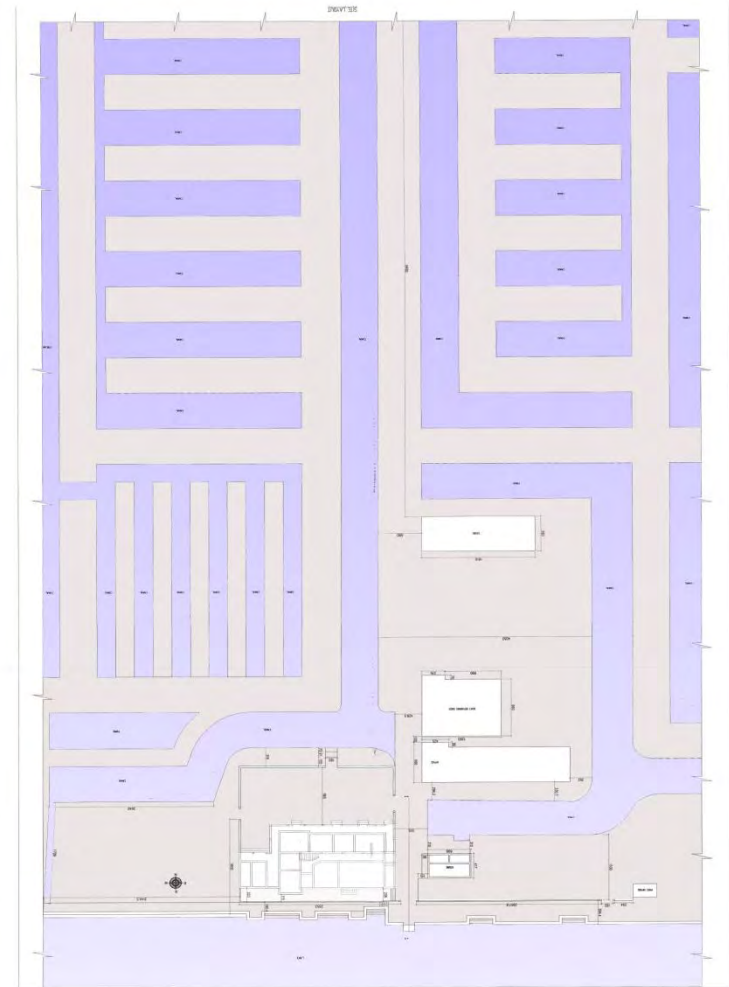


Figure 37: Architecture Onsite

4.5 Issues - Flooding

One of the most important issues to face this site is the flooding that occurs annually during the monsoon season. In 2010, the monsoon rains lasted almost five-six months rather than the usual three months. This problem was amplified onsite because other areas of the island, the bunds, were being breached and no attention was given to this problem. Owners of some of these areas had taken out the pumps that keep the areas from flooding and not replaced them. This meant that in some areas of the island, farmers were pumping water constantly to keep the land above water. Once the rains intensified many portions of the island were submerged.

The cause of this is a two stage problem. Firstly, farming has become very expensive in India and farmers have been affected by the global economic downturn. Some farmers see it as a waste of money to keep investing in their farms in the current financial climate. They have chosen to completely wash their hands off the properties until the economy picks up again. For this reason many of the pumps and levees around the island have been left in disrepair. Of the 21 pumps that were first installed on the island when it was originally constructed, only five still work. The rest have been removed and sold, or are in need of major repair.

The Solution

There is a proposal being presented to local government which proposes that R Block be split into eight individual pieces of land. This is to be done by creating large inner bunds like the exterior bunds that currently exist. They will run through the center of the

island, splitting the various farms and giving more control to the individual farm owners. The plan proposes to install 25 new large water pumps on the island to help keep the water level down.

This proposal ensures that there will be no repeat of the devastating floods of 2010.



Figure 38: Floodwaters 2010

5.0 Design Process

The design process for this project was led through the notion of research by design. Each design explored was not done in isolation but was part of a series of developed schemes. Each exploration has evolved through research into the precedents, interviews with plantation owners and from the feedback. The explorations shown in this section are key concepts which helped shape the final design.

Established Design Principles

The project deals with a variety of different issues, such as flooding on site, climatic condition and the adaption of the resort programme to a working plantation. The flooding issue will be addressed by the government but the resort's design will still incorporate design strategies to prevent its spaces from going under water. This will be approached by raising some of the resort spaces off the ground and others will be placed on raised platforms. The hot and humid climate will be addressed by using traditional roofing techniques.

The adaptation of the resort's programme into the working plantation can only be achieved through careful site selection and planning. This process requires an understanding of the site and how it functions on a daily basis. Interviews with the plantation owners and a site analysis will facilitate the site selection and the layout of the resort.

Proposed Programme

Main building

- The Interpretation centre
- Library/ Gallery
- The restaurant
- Kitchen – Storage
- Resort lobby and services

Performance Hall

Villas

- 3 x one bedroom villas
- 2 x two bedroom villas
- 3 x three bedroom villas

5.1 Site Selection

The selection of the resort's site was made based on an understanding of the programme and study of other precedents. The location of the resort on the working plantation is hugely important, if tourists are to gain an understanding of how the plantation functions and experience its unique ecology. The precedents have shown that the placement of a resort in relation to the local attractions, such as Kumarakom Bird Sanctuary and the backwaters is essential. Access and privacy are the two main points to consider when choosing a location for the resort on the 200 acre plantation.

A key point raised from research was the notion of running the plantation and resort separately. Collusion of these two different industries was seen to create problems in their day to day running. If resort spaces were in constant interaction with the plantation and its workers, then the guest may not have enough privacy, lowering the quality of the stay. The guests need to be engaged with the workings of the plantation, but not constantly. The resort should be in a location which is close to the main plantation and its entrance but still give the guests, the feeling of seclusion.

Based on this research, the site chosen is located towards the front of the plantation on the southern end. This area was largely planted with palms and coconut trees which offer an excellent canopy over the site.

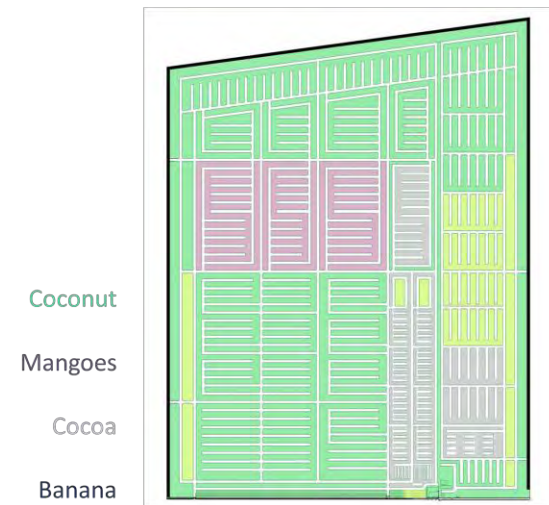


Figure 39: Cultivation Diagram

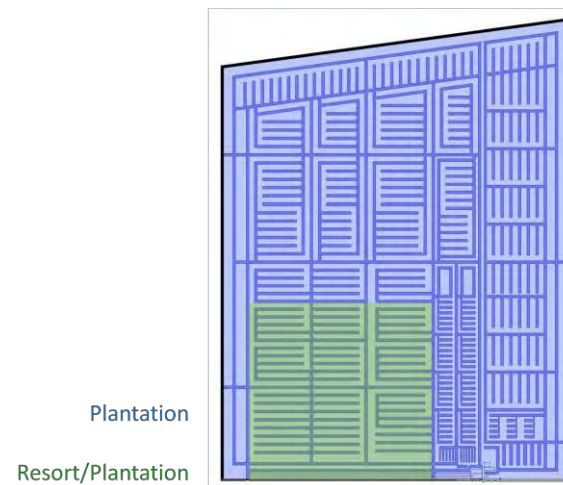


Figure 40: Chosen Site Parameters

5.2 Site Layout

5.2.1 Nalukettu Grid Layout

The layout explored the concept of the Nalukettu and its gridded spatial arrangement. The site is overlaid with a five metre by five metre grid on which the resort spaces are designed. The main building is arranged as the central focal point of the scheme with the accommodation branching from the corners. The main building houses the lobby, the interpretation centre, the restaurant, kitchen and the library. The villas consisted of one bedroom units with a large open balcony on one side. The entire resort is raised off the site by 2.5 metres to create a spatial hierarchy on the site.

The layout was explored to see how traditional site planning methods could inform the resort's layout/planning.

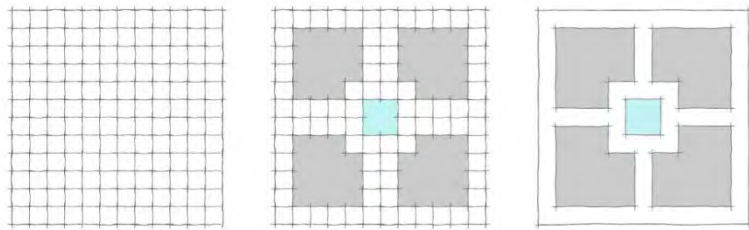


Figure 41: Nalukettu Grid

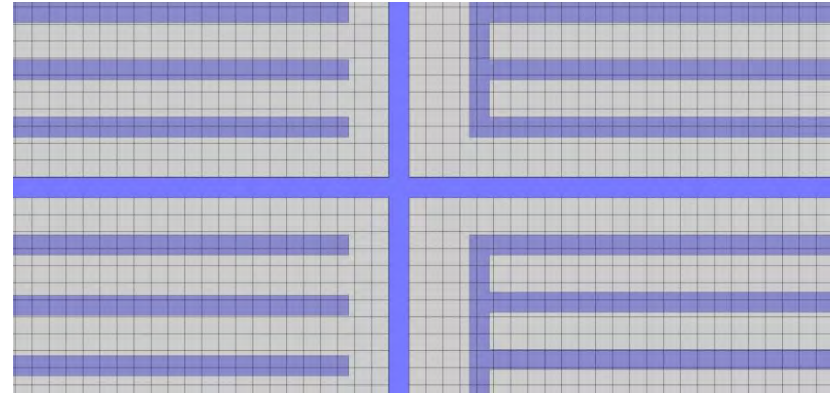


Figure 42: Gridded Site Plan



Figure 43: Design Layout

Outcome of Nalukettu Grid Layout

Access

This location does raise a number of issues with regards to accessing the resort. There are four waterways which converge through the centre of the main building. These waterways are constantly used by the plantation workers.

Main Building

The arrangement of the main building functioned well in the way it housed all the resorts facilities. The layout connected all the guests at the heart of the resort. This was achieved without separating key facilities.

The main building had a number of problems regarding the day to day running of the resort. There are areas of a resort which have to be off limits to its guests. This design did not address this issue and created areas with odd access points such as, a walkway which connected the villas via the side of the kitchen and restaurant. The walkways connecting the guests to the villas have to go through different facilities in order to access other areas of the resort. These walkways were taken from the gridded pattern on the site and this restricted the resort's layout.

Villas

The layout uncovered issues regarding the number of accommodation and the types provided. The eight villas only provided accommodation for the 16 people. The current grid format

planning hindered the planning of more villas and larger options. Expanding the site and the grid to a much larger area the resort would not achieve its target of 32 guests.

Overall

The connection with the site is lost since the design explored the idea of raising the entire resort off the ground by 2.5 metres. This created a notion of separation from the site. Certain areas of the resort need to have a more direct relation to the site. Spaces such as the resort's restaurant and kitchen should be easily accessible from the ground level. This gives restaurant space a sense of being part of the site and its context rather than being separate from it.

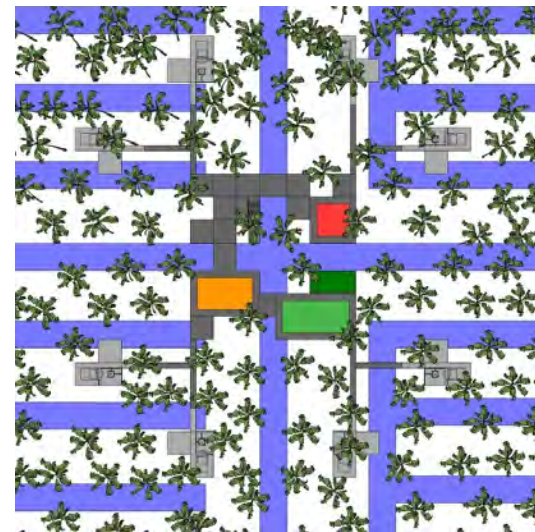


Figure 44: Nalukettu Grid Layout

5.22 Nalukettu Building Footprint Layout

This exploration investigated overlaying the chosen site area with the building footprint of the *Nalukettu*. The original *Nalukettu* plan is scaled up to cover the chosen site in a 100 metre by 100 metre grid. The overlay was used to locate the resort facilities on the site. The facilities were placed in the optimum position, while insuring that each building still had its own privacy yet remained in harmony with the rest of the resort.

The main building's layout follows the principles of the traditional *Nalukettu*. This approach was used since the main facilities of the resort were seen as being more formal and hierarchical. Each space has a specific purpose and needs to work in relation to the other spaces with specific programmes.

The placement of the villas gave each unit its own space without being linked or connected to the other units. Each villa could create its own environment for its guest without being seen as part of a group. The villas are to be designed individually as they were not to be part of a group of architecture, rather they are to be an individual architectural statement on the site.

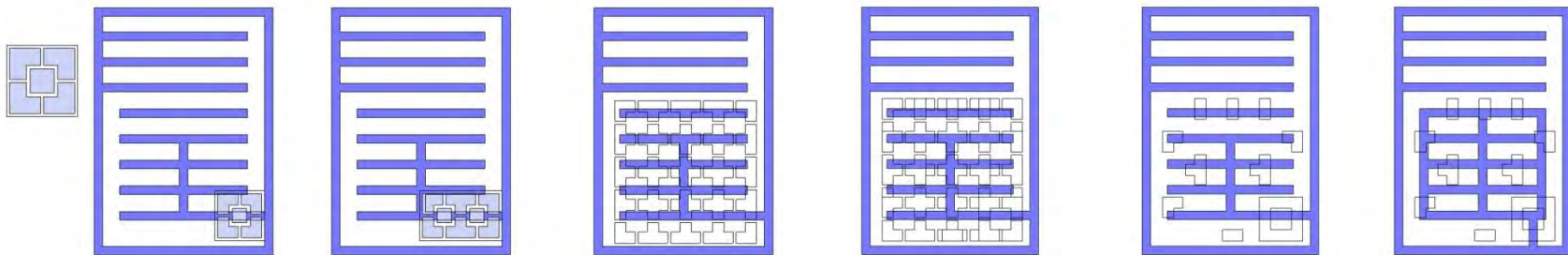
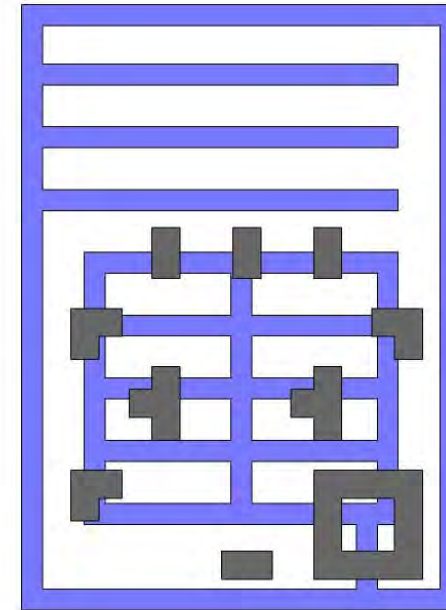


Figure 45: Nalukettu Building Footprint Layout

Outcome of Nalukettu Building Footprint Layout

Access

The placement of the resort toward the front of the site gives excellent access to and from the resorts' site without disturbing the workings of the plantation. The guests are still within the plantation and so are able to participate in its workings. They can join in harvesting of the crops or helping to repair a vallam in the boat shed.

Main Building

The resorts facilities all correspond to spatial allocations on the traditional *Nalukettu* plan. The entrance is to the south, the kitchen is the north-east, the restaurant is in the north and the western side houses the interpretation centre and library.

Villas

The layout allowed for the villas to be spread along the site giving them a greater level of privacy without alienating them from each other. It ensured that the villas could be arranged in the larger two and three bedroom units without having issues around privacy, view points and access.

Overall Planning

This site plan held together all the different types of facilities that the resort needed without hindering the resort's operation. The

exploration of the traditional *Nalukettu* grid ensured the layout kept true to the ideals of the traditional architecture of the area. In the traditional *Nalukettu*, each space had a defined purpose and in this larger scale, these spaces are associated with the villas' accommodation sites than the individual rooms of the *Nalukettu*.

6.0 Architectural Concepts – Formal vs. Informal

The design process led the project through a variety of different experimental schemes which led to the final design. This section will discuss three design schemes leading to the current design.

The research into traditional architecture and precedents has shown a clear differentiation between the formal and informal types of architecture within each scheme. The formal architecture is associated with the ordered and planned areas of the traditional architecture and resort's facilities. The informal architecture is seen as an approach to designing spaces of relaxation and comfort. This type of design is ideal for the resort's accommodation areas.

The designs explored for this project followed the principle of formal and informal architecture and separated the programmes accordingly.

Each design has been assessed according to a list of criteria. The criteria used are explained in appendix.

6.1 Layers and Heights

Exploration one was based on the research into the site and the local architecture, hierarchy of traditional spaces and layering tree canopies on the site. Research into traditional Kerelan architecture revealed strict spatial hierarchies. This approach was used to arrange the interior spaces of the villas with each space being given a spatial value. The value determined by the functions of the space and its level of occupation. The bedrooms were kept in the top layer, followed by the lounge area and then the building entrance.

The idea of layering was taken from looking at the way the tree canopies worked on site. The plantation is planted with a mixture of different plants and trees. These trees help create vistas at different heights, thereby creating a different experience at the varying levels.

By merging the concept of spatial hierarchy and layering into this design, I was able to see how the each space housed with the occupants and dealt with the challenging site conditions.

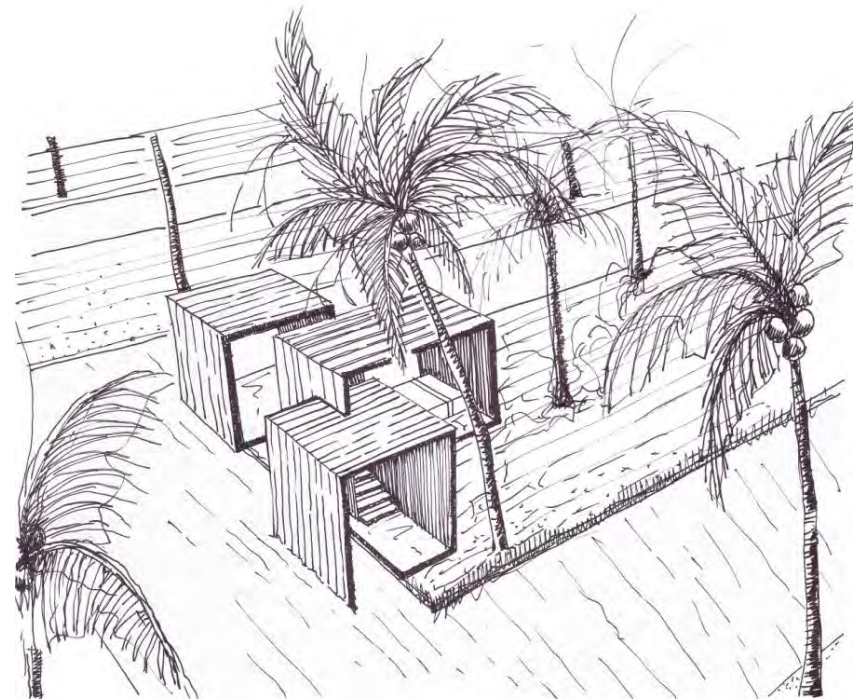


Figure 46: Layers and Heights Concept

Outcome

The exploration into the sectional layering of the internal spaces worked well. The guests were able to experience the site at different levels. The idea related back into how the island was constructed, at 2.5 metres below sea level.

The architecture incorporated the layering idea into the buildings structure and how it linked the different areas. The spaces created many levels with viewpoints from varying heights. The villas roof space became informal balconies and made excellent viewing platforms for the guests.

Strengths

The concept of creating a hierarchy of spaces using the varying floor heights helped give definition to each space. The spaces created connected well with the site. They allowed the guests to experience the site at many different levels, enhancing their experience of site and surroundings.

Weaknesses

The architectural style of the concept did not have a direct connection to the site and its surrounding context. The box design raised issues surrounding how it dealt with the climatic conditions of the site. The internal spaces would become quite hot during that day as the design did not allow for an overhangs or a higher ceiling height to promote air circulation.

The multi-level arrangement of the villas would create problems for the 'ideal clients' as each space is on a different level. Guests would

be required to walk up and down most of the day to get to the different spaces. This is not ideal for a villa and for the resort's guests.

| Criteria | Nalukettu Grid Layout | Nalukettu Building Footprint Layout | Height & Layers |
|----------------------------------|-----------------------|-------------------------------------|-----------------|
| Site | | | |
| Access to waterways | + | + | + |
| Location to entrance | - | + | - |
| Non interference with plantation | + | + | + |
| Main Building | | | |
| Ease of access | - | + | |
| Relation to vernacular | + | + | |
| Connection to Site | - | - | |
| Central position | + | + | |
| Villas | | | |
| Privacy | | | - |
| Relation to vernacular | | | + |
| Outlook | | | - |
| Flexibility of spaces | | | - |
| Original design | | | - |
| Connection to Site | | | - |

6.2 Climatic Angles

Exploration two was a concept based around the climatic research of the site and the way the local architecture dealt with the elements. The concept explored the angles of the sun to create the building's form. The resulting form was designed to create optimum shading for the building and its occupants. The internal spaces were designed to be open to the elements, yet be protected from the harshness of the sites climatic conditions. The villas were enclosed by the surrounding vegetation.



Figure 47: Climatic Design

Outcome of Climatic Angles

The exploration raised issues around privacy of the villas occupants and its openness to the outside spaces. The architectural form created spaces that opened the building's interior spaces to the outside environment. This helped the concept encompass the site surroundings and helped ground the villa to the sites context.

Strengths

The open plan internal spaces created worked well in the way the guest could interact with the outdoor space. The exploration into multi-level living created an interesting opportunity by creating privacy between the different spaces without making them feel segregated from each other. The design outcome explored however could not achieve the spatial connections

Weaknesses

The design exploration when placed on the site was not able to connect with the site or its surroundings. When placed on the site the architectural form felt foreign. The internal spaces had a strong connection to the site, but the form did not connect to the site.

| Criteria | Nalukettu Grid Layout | Nalukettu Building Footprint Layout | Height & Layers | Angles |
|----------------------------------|-----------------------|-------------------------------------|-----------------|--------|
| Site | | | | |
| Access to waterways | + | + | + | |
| Location to entrance | - | + | - | |
| Non interference with plantation | + | + | + | |
| Main Building | | | | |
| Ease of access | - | + | | + |
| Relation to vernacular | + | + | | + |
| Connection to Site | - | - | | + |
| Central position | + | + | | + |
| Villas | | | | |
| Privacy | | | - | - |
| Relation to vernacular | | | + | - |
| Outlook | | | - | + |
| Flexibility of spaces | | | - | + |
| Original design | | | - | + |
| Connection to Site | | | - | - |

Climatic Angles

Main Building Design – Traditional Nalukettu

The main resort facilities were seen as the realm of the formal architecture. Therefore, the concept explored the idea of designing the facilities using the traditional methods of the Nalukettu, with each of the resort facility being orientated to its Nalukettu equivalent. The building is raised off the ground by 2.5 metres to create a sense of hierarchy and authority to the rest of the resort's buildings.

The concept used the design elements of the traditional pitched roof to create the multi-level, gabled roof.

The Performance Hall

The hall follows the rules to create its internal space and operates in the traditional manner. The space is used primarily for performances for the resort guests, but its programme is also based around the community. There are a number of children living on the island and this space could be used to teach them traditional dance. The building will be placed on a raised platform at a height of 500mm.

Outcome of Traditional Nalukettu

Strengths

The planning of the main resort facilities worked well within the site's context and with spatial arrangement of the resort's facilities. The arrangement ensured that the day to day service oriented spaces were able to operate without any problems. They were

connected to both the internal waterway and the main canals outside the resort layout.

Weaknesses

The main resort facilities were raised 2.5 metres above the ground. This created issues around the overall aesthetic of this structure and the feel of the space. The raised floor has created issues with how the spaces connect with the site. The main resort building houses a variety of spaces with different uses. Each space, therefore, should, and will have a different relation to the site. The building should engage with the site rather than be kept away from it. The guests need to experience the site at the different levels. The restaurant and kitchen should be grounded, whereas the interpretation centre, lounge and lobby can be on a raised structure.

The roof design has created a clear separation between the villas and the main resort's buildings. The design should attempt to create a link between the two architectural styles, directly or indirectly.

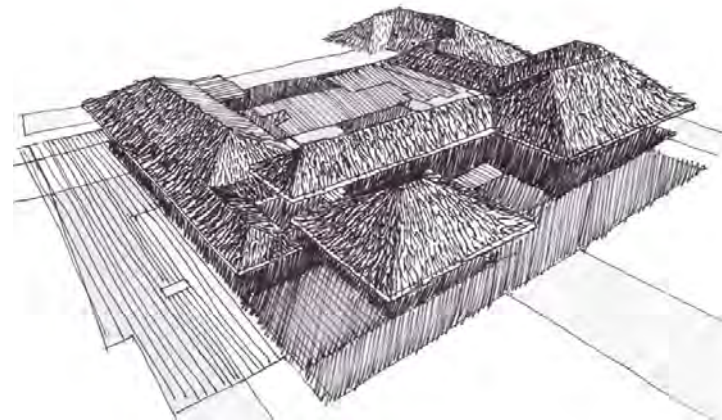


Figure 48: Main Building – Traditional Nalukettu Roof

6.3 Kettuvallam Roof

What this concept was based on

Exploration Three was based on the precedent studies of kettuvallam's, Kerala houseboats. The concept was to incorporate the roofing design and materiality into the villa designs. The roof structure is designed as a separate element from the villa.

This concept introduced the idea of sustainable materials and other eco features to the villa's design. The precedent studies had shown the importance of dual flush, self composting toilets, solar panels, and rain water collection system. The houseboat's roof is made from woven coconut leaves, with bamboo frame and with bamboo latches. This ensured that all the chosen materials were sourced locally and the structure could be constructed using local tradesmen.

Creating the ideal room layout

This concept explored the idea of an ideal room layout for the resort. The idea used design data from the *Metric Handbook*, precedent studies and with the programme requirements to create the ideal room layout. This was done to create a room with all the essential spaces and without any waste, but still ensuring that the guests experience was unique and individual.

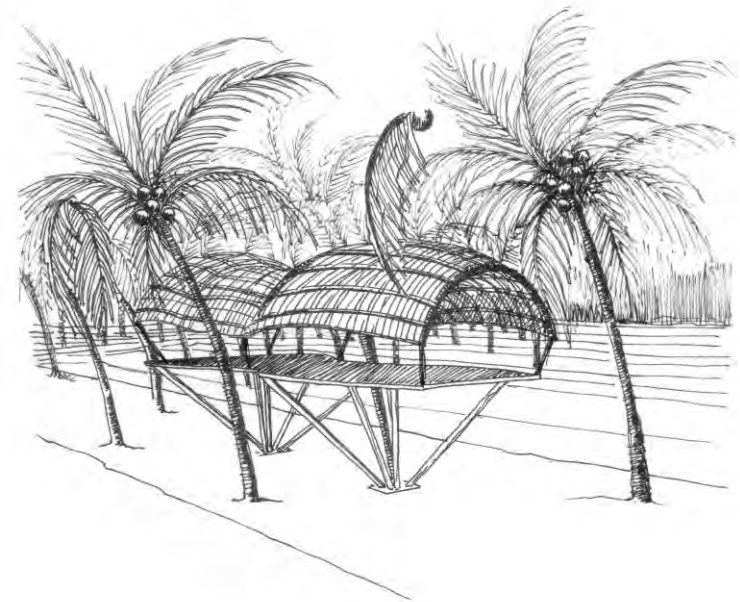


Figure 49: Kettuvallum Villa

Outcome of Kettuvallam Roof

Strengths

The roof concept worked well within the site context in how it dealt with the climatic conditions and how it placed the building in the general context. The choice of building materials has been kept to a minimum, thereby reducing the resort's impact on the environment. This limitation has not, however, reduced the quality of the internal spaces created within each villa unit but rather increased the character of these villas and how they lie onsite.

Weaknesses

The roof design does not connect with the villa design. They seem to act as two separate architectural entities rather than a cohesive element. This is important for the scheme as the design needs to function on its own and connect with the site. If it cannot function as one element, the overall design scheme will suffer.

Solution

The roof design needs to change to a design that is more open to the outside, but wraps around the villas structure. The design should not have the need to replicate the kettuvallam roof. It should use the construction method and replicate them. The chosen materials are extremely flexible in terms of the forms created.

Main Building Design – Kettuvallam roof

The main building’s concept incorporated the curved roof design to see if it can be made to flow with the villa design. The change was an attempt to create a uniform design language rather than separate pieces of architecture. The main building was separated into different areas and each areas height was adjusted according to its programme. The restaurant and kitchen are spaces which need to have a direct connection to the site. They are placed at 500mm above the site on a laterite base. The other spaces are at a raised height of one metre off the ground. Adjusting these heights of the different areas makes it feel more grounded and gives each space a better connection to the site.

The roof was changed to complement the villa’s roof design and materiality. The curved design of the traditional houseboats is adapted to work with the main building.

The Performance Hall

The curved roof was designed on the dance hall to see its placement on the site. Since the building stood on its own, the roof design is an important element in its overall design and function.

Outcome

Strengths

The arrangement of the different spaces at the varying heights worked well in creating separate areas without having internal walls and screens separating them.

Weaknesses

The curved roof design is not complimenting the main building or the performance hall. The idea behind the formal and informal architecture of the region needs to be reintroduced into the concept to create two separate styles of architecture.

| Criteria | Nalukettu Grid Layout | Nalukettu Building Footprint Layout | Height & Layers | Angles | Kettuvallum Roof |
|----------------------------------|-----------------------|-------------------------------------|-----------------|--------|------------------|
| Site | | | | | |
| Access to waterways | + | + | + | | |
| Location to entrance | - | + | - | | |
| Non interference with plantation | + | + | + | | |
| Main Building | | | | | |
| Ease of access | - | + | | + | + |
| Relation to vernacular | + | + | | + | + |
| Connection to Site | - | - | | + | - |
| Central position | + | + | | + | + |
| Villas | | | | | |
| Privacy | | | - | - | + |
| Relation to vernacular | | | + | - | + |
| Outlook | | | - | + | + |
| Flexibility of spaces | | | - | + | - |
| Original design | | | - | + | - |
| Connection to Site | | | - | - | - |

6.4 Hybrid Kettuvallam

This scheme expanded on the idea of the multi-level boat roofs across the three types of villas. The concept explored the idea of using the circulation and spatial arrangement of the traditional houses as a layout for the villas. The internal spaces are arranged around the central courtyard space with rooms spread around this space.

The design of the internal spaces and the overlays of the roof are the main changes between the different units. The eco-features and the method of construction remains the same.

Villa Design

All the rooms are designed to be identical in spatial arrangement. This is

The types of layouts:

One Bedroom Villa

Two Bedroom Villa

Three Bedroom Villa

Main Building

The Performance Hall

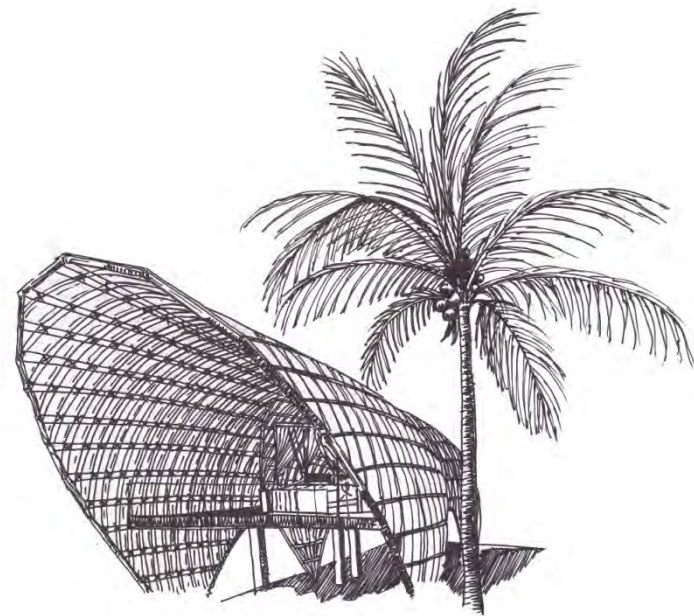


Figure 50: Villa Outer Shell – One bedroom

One Bedroom Villa

The Layout

The internal layout of the villa is kept minimal with lounge and the bedroom space separated by a three meter walkway. Both of these spaces are kept under the same roof to create a unified structure. The layout represents the traditional spatial arrangement of two spaces linking around a central courtyard.

The roof

The roof is constructed using the methods used for the kettuvallam roof. It is constructed of a bamboo framework, with woven coconut mats laid over the top. This is held together with splits of bamboo which are tied to the frame work. The roof design work is exceptionally well in this climate. They would need to be checked on a regular basis and would be replaced every five to six years.

An advantage with this roof design is the flexibility in creating openings around the villa. The roof structure has several hidden window portals which can be opened according to the guests' needs. This promotes air circulation and opens up the villas' internal spaces to the site.

The features

Each villa is designed to function as a self sufficient entity. The villa is connected to its own photovoltaic panel to provide electricity. The bathroom houses a self composting toilet.

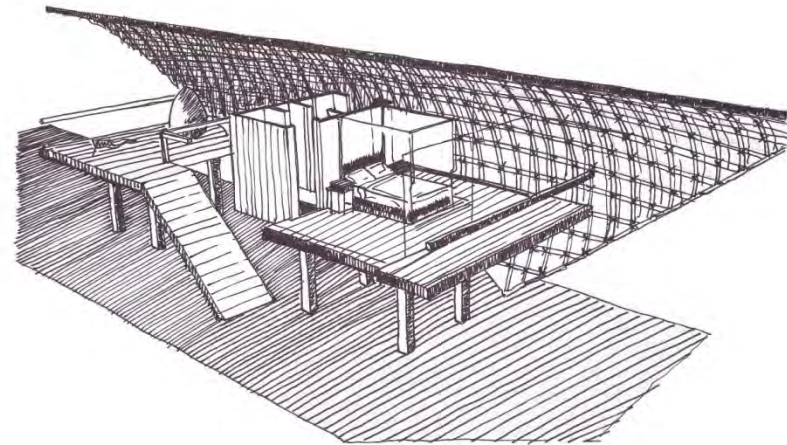


Figure 51: Villa Sectional Perspective

Two Bedroom Villa

The layout

The design of the two bedroom villa is continuation of the layout seen in the one bedroom. The lounge space represents the central courtyard from traditional design and the rooms are designed around it. Each room in the villa is seen as a separate entity which can be connected or blocked off from the others. The lounge is the main social space, therefore is kept uncluttered and open to the outdoors.

The Roof

The roofs' design for the two bedroom villas' is closely related to the one bedrooms' design. The materiality and the structure remain the same.

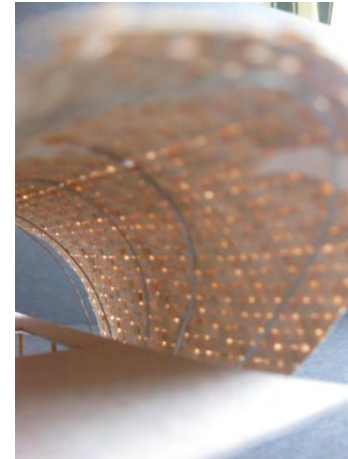


Figure 53: Roof Material Concept

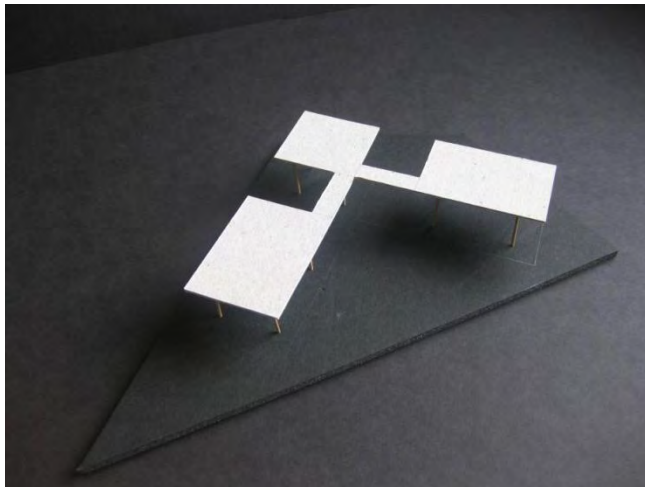


Figure 52: Two Bedroom Plan

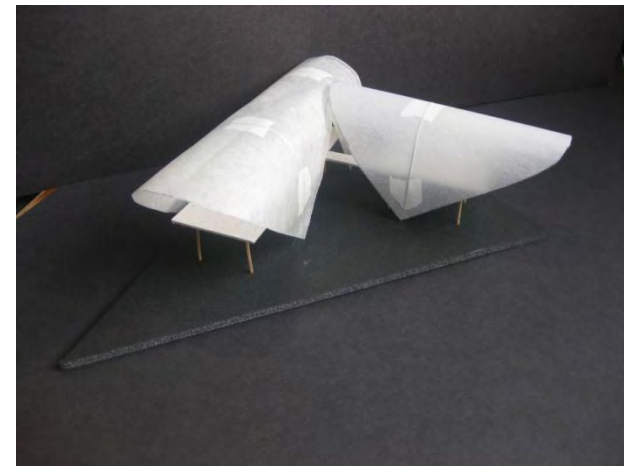


Figure 54: Roofing Model

Three Bedroom Villa

The layout

The three bedroom villas encompass the traditional design with the central courtyard being the main circulation space and all the spaces arranged around it. The lounge space is a large double height space with the three bedrooms located around the central space.

The Roof

The concept designed as three separate roofs that overlaid over the central space. The two smaller roofs cover two of the bedrooms in the concept. The larger roof covers the third bedroom, which sits on higher platform than the others and the lounge space. This creates a double height space for the lounge.

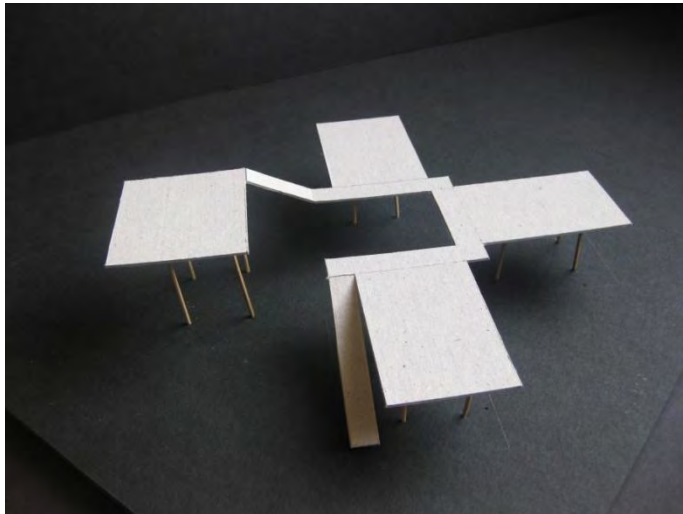


Figure 55: Three Bedroom Plan

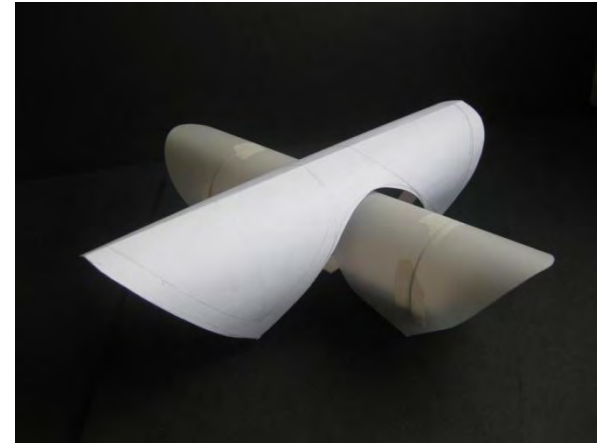


Figure 56: Overlapping Roof

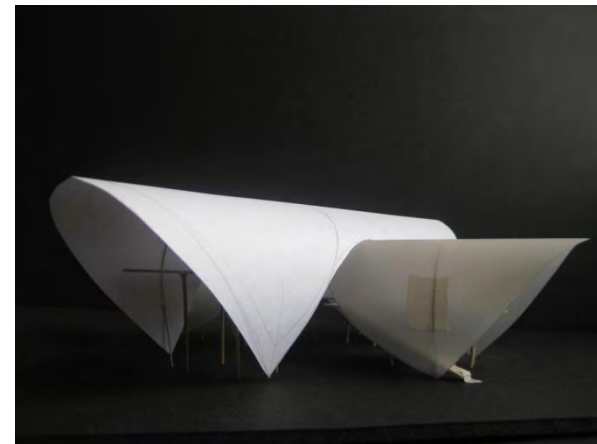


Figure 57: Ground View

Main Building Design – Bamboo and Informal Architecture

This concept explored the choice of materials that could be used for this type of building. Bamboo was the material of choice. It has great advantages over other materials like steel or timber as it is grown on the island and has excellent eco credentials. It can go across large spans and carry huge loads. The choice of material links the main buildings development to the villas.

The adjusted floor plates work well in the way, they connect the guests with the site. The restaurant area is raised 500mm off the ground. It sits on a laterite base, which is commonly used in traditional Keralan architecture.

The Performance Hall

The space follows the roof design of the main building. The flowing structure of the roof and the building gave the internal space its identity. The central space of the hall is where the performer stands and the roof structure is designed to join together at this central point above. This helps create a focal point within this structure.

| Criteria | Nalukettu Grid Layout | Nalukettu Building Footprint Layout | Height & Layers | Angles | Kettuwallum Roof | Kettuwallum Style |
|----------------------------------|-----------------------|-------------------------------------|-----------------|--------|------------------|-------------------|
| Site | | | | | | |
| Access to waterways | + | + | + | | | + |
| Location to entrance | - | + | - | | | + |
| Non interference with plantation | + | + | + | | | + |
| Main Building | | | | | | |
| Ease of access | - | + | | + | + | + |
| Relation to vernacular | + | + | | + | + | + |
| Connection to Site | - | - | | + | - | + |
| Central position | + | + | | + | + | + |
| Villas | | | | | | |
| Privacy | | | - | - | + | + |
| Relation to vernacular | | | + | - | + | + |
| Outlook | | | - | + | + | + |
| Flexibility of spaces | | | - | + | - | + |
| Original design | | | - | + | - | + |
| Connection to Site | | | - | - | - | + |

7.0 Critical Appraisal of Final Design

7.1 Site Planning

The site planning process worked well in the way in approaching the planning of such a large site. The method followed the understanding of how the traditional nalukettu was placed on its site. The arrangement of the various buildings was done through the understanding of how resorts operated and what their guests wanted. The placement of the one bedroom units toward the back of the site was a way to give this type of villas, their own sense of space away from the rest. The occupants are seen as couples and they would prefer their privacy. The two bedroom and three bedroom villas are kept closer to the main buildings, as the guest associated with them are seen to be travelling in groups and would prefer to mingle more with other guests and would want to be located closer to the main building.

The planning of the site works well with the way all the buildings come together over the site. The planning is not too constrictive and is not too spread out.

Access and Entry

The main mode of access to and from the resort is via a boat through the canals. The resort is placed towards the front of the site to ensure access to and from the resort.

The resort has only one entry, located in front of the main resort building. This waterway allows access into the internal canals of the resort.

7.2 Spatial Arrangement

Villas

The internal spaces of the villas were all designed around the concept of the traditional Nalukeetu and its central courtyard space. The one bedroom and the three bedroom designs clearly show the planning to create the central circulation space. The two bedroom villa is designed differently as it uses the lounge as its circulation space. Both of these approaches work as they both deal with how the guests interact with each other and the site. A concept was explored to view how the two bedroom design would function under the other scheme. The layout was too constrictive of the guests' movement around the villa. The new arrangement is less restrictive on the movement of the guests and therefore is successful.

Main Building

The main building's internal layout is based on the traditional planning and spatial arrangement of the Nalukettu.

The spatial arrangement works well with the site's climatic conditions. The design addresses issues associated with the seasonal weather, the issues around flooding and the prevailing winds. The arrangement helped create an open plan space along the northern and western faces. The middle of the eastern face is

left free of any structure to help promote cross-ventilation using the prevailing winds. This also helps keep the building cool.

The main building is raised off the site as a precaution against any unforeseen flooding that may occur in the future. This also creates a sense of hierarchy among the resort's facilities to the site. The restaurant and kitchen are placed 500mm off the site whereas the other facilities are all one meter off the site. The restaurant and kitchen are areas that require a connection with the site and should allow its occupants to freely move in and out from these spaces and onto the site.

7.3 Eco Elements of the Scheme

Features

The main building house a few different elements to help the resort be more self sufficient. There is a rain water collection and filtration system installed. There is a large cistern under the interpretation centre which holds all the water. Each villa has their own photovoltaic panel to generate their own electricity and a water filtration system installed for the showers. The bathrooms have self composting installed in them.

Materials

The design tries to use eco friendly materials wherever possible. The material pallet for this project is kept to a minimum. The roofs of the villas are made from a combination of locally sourced bamboo and woven coconut leaves. The main resorts buildings use bamboo as their structural columns and for the roof. Laterite is used to create the foundation for the restaurant and kitchen.

8.0 Summary

The focus of this project has changed several times during this year to where it is presently. The main changes occurred during the middle of the year, when the programme was adjusted to focus primarily on the resort and leave the master planning of the resort.

The design solution of this project makes no claim that it will save the island from an economic disaster. It seeks instead to create an understanding of conservation and eco-tourism with the guests and locals staying near the resort. The project is an attempt to show how eco friendly, developments are ideal for sites such as this and not the luxury resort which segregate tourists from the locals.

The success of the final design is in its relation to the site, through the spatial arrangement, materiality and programme, which all relate back to the local area. The project had a goal of using architecture as a way of communicating ideas of eco-tourism to the region and in my opinion it has achieved this.

It has been one of the most enjoyable and troublesome projects I have worked on.

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Interviews

Kainady, Titto, Interview by author, February 16, 2011.

Kainady, Titto, Interview by author, August 26, 2011.

10.0 Appendix

10.1 Criteria for Design Table

| Criteria | Nalukettu Grid Layout | Nalukettu Building Footprint Layout | Height & Layers | Angles | Kettuvallum Roof | Kettuvallum Style |
|----------------------------------|-----------------------|-------------------------------------|-----------------|--------|------------------|-------------------|
| Site | | | | | | |
| Access to waterways | + | + | + | | | + |
| Location to entrance | - | + | - | | | + |
| Non interference with plantation | + | + | + | | | + |
| Main Building | | | | | | |
| Ease of access | - | + | | + | + | + |
| Relation to vernacular | + | + | | + | + | + |
| Connection to Site | - | - | | + | - | + |
| Central position | + | + | | + | + | + |
| Villas | | | | | | |
| Privacy | | | - | - | + | + |
| Relation to vernacular | | | + | - | + | + |
| Outlook | | | - | + | + | + |
| Flexibility of spaces | | | - | + | - | + |
| Original design | | | - | + | - | + |
| Connection to Site | | | - | - | - | + |

The table was used to evaluate the design concepts shown in this thesis. Each of the heading on the design table is explained in further detail below.

10.11 Site

Access to Waterways

The site must be situated in an area with easy access to the waterways. This is essential as the guests are taken around the plantation via the waterways and the resort's supplies are also brought via this same way.

Location to Entrance

The resort must be located close to the plantation's entrance. This will ensure minimal travel times between the resort and the plantation. The guests need to be located close to the main entrance as most of their local tours will begin from here.

Non-interference with Plantation

The resort and the plantation must run as separate entities. The interaction between the two programmes is important as the eco-resort is based on the idea of interpretive education of the resort's guests. The two need to work as single entities on a day to day basis but they will have interlinking programmes. The resort's guests will interact with the plantation and its workers on a daily basis.

10.12 Main Building

Ease of Access

Access into the main building is important for not just the guests but also the staff. The guests need to be able to use the different resort facilities available without needing to walk around the site.

Relation to Vernacular

The relation to the local vernacular architecture is important. An eco-resort must always consider traditional and local building methods and style for the construction of its buildings.

Connection to Site

The building spaces must allow its occupants to experience as much of the site as possible. The spaces should be arranged according to the programme and require

Central Position

The resort's main facilities should always be located in a central position to allow for easy access to the various spaces.

10.13 Villas

Privacy

Privacy is an important factor in the design of the resort. The guests must be allowed to create their own private spaces within and around their villas.

Relation to Vernacular

The vernacular architecture is used as an example of how the materials and construction techniques can be used to deal with the site conditions.

Outlook

The design should capitalize on the many vistas available on site.
The design should focus on creating viewpoints for its guests.

Flexibility of Spaces

The spaces designed must be able to change according to the occupant's needs.

Original design

The design should not replicate traditional architecture seen in the area. It should use the knowledge to adapt and design an original architectural element.

Connection to Site

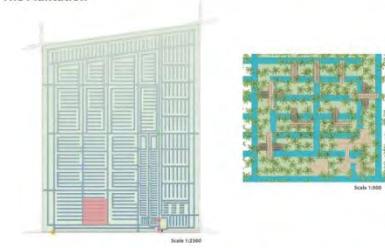
The connection to the site is different from the main building as the spaces have a different type of programmes. The villas should allow the guests to connect with outside while ensuring their safety and comfort.

Final Presentation

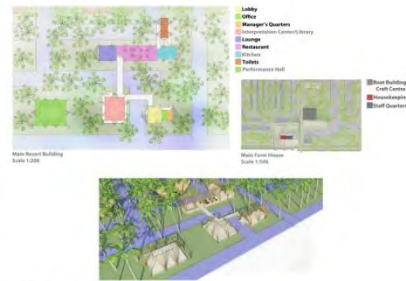
Eco-resort in Rural India



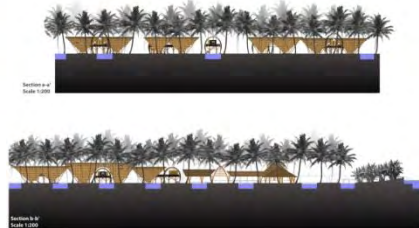
The Plantation



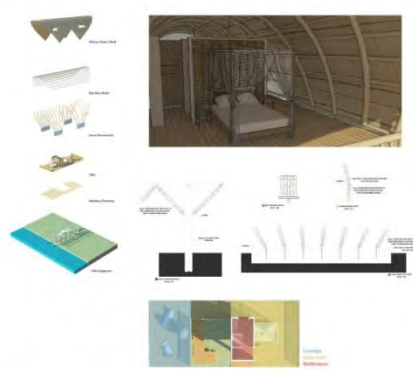
Main Building



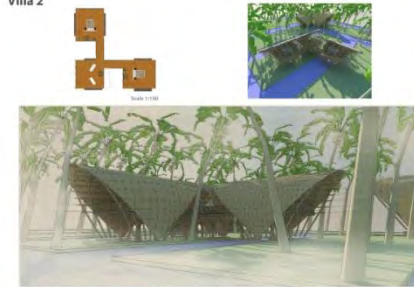
Sections



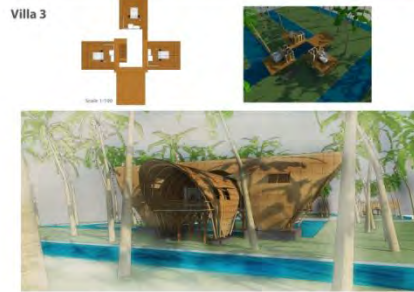
Villa 1



Villa 2



Villa 3

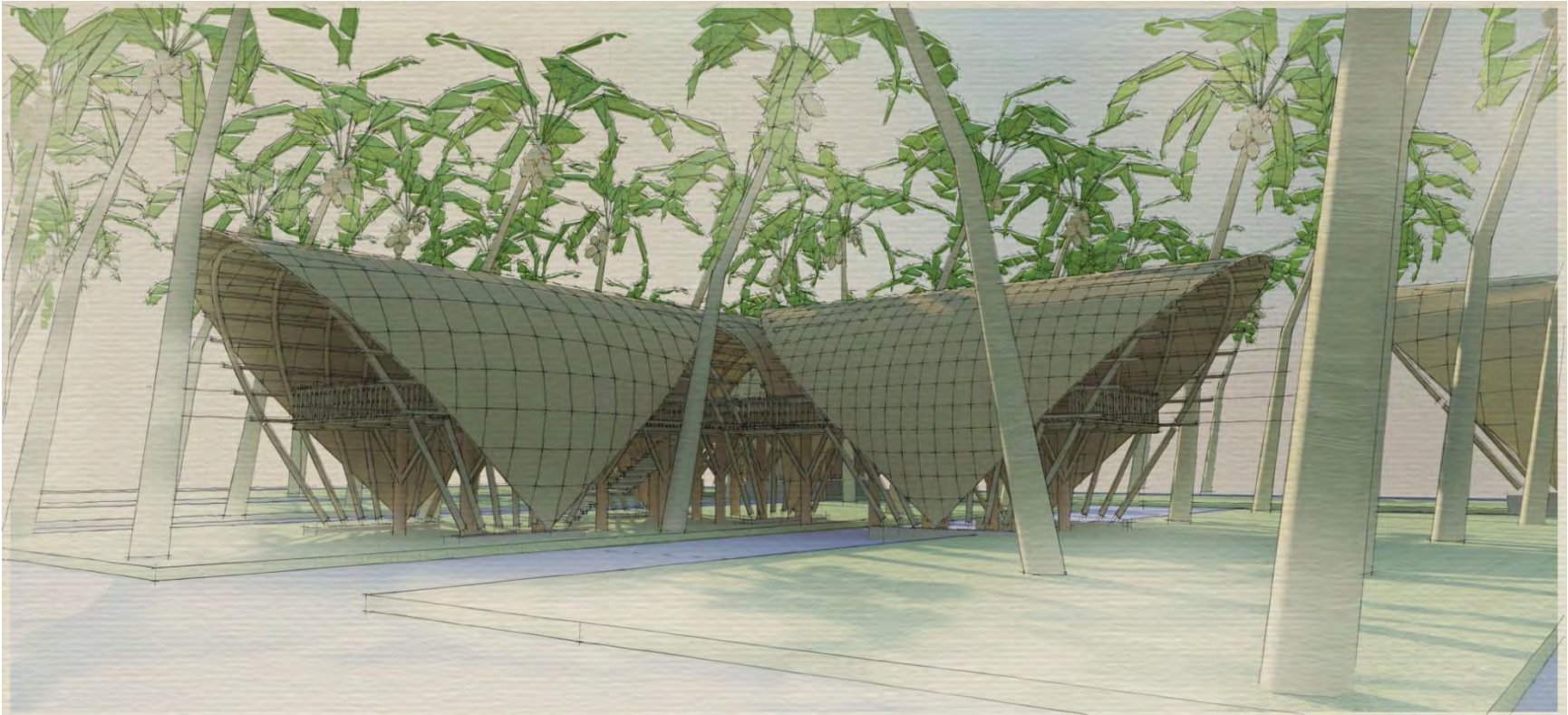




One Bedroom Villa



Two Bedroom Villa



Three Bedroom Villa

