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EROSION CONTROL in the Tropical Monsoon Coastal Tourism Area: Landscape Design of the Sun Moon Bay Resort in Hainan, China

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Nowadays, more and more Chinese people enjoy their holiday in resorts after development of economy. Costal area attracts more enterprises to build up their tourism business because of coastal natural resources. However, costal area as a sensitive ecological zone, there are more conflicts between nature and human development. Here we report series of coastal development problems especially coastal erosion and land erosion influenced by coastal monsoon climate. A system of development strategies in Sun Moon Bay (Riyue Bay) will be presented based on sustainable development principles. Meanwhile, a landscape design plan of the tourism resort Sun Moon Bay will be presented with local coastal feeling. Further detailed design explains the special solutions of water management and erosion prevention. We anticipate that there will be the high-speed development of tourism in natural protection area in China. The design plan offers a solution for the conflict between hilly terrain and the need for barrier-free environment.

There are 4 different reasons which influence the erosion rate in Sun Moon Bay. **1) Ratio of slopes**

1. Ratios of slope between 1:2 to 1:1

The area is not suitable for too much human construction. For example, if we change this area into terraced field, a big amount of soil has to move so the original vegetation will be destroyed and the erosion will be accelerated.This area is in the northern part of the site and will be developed as a forest area with 3 layers of vegetation.

2. Ratios of slope between 1:4 to 1:2

To create more activities areas, the kind of slopes will change into the terraced field with flat land by retaining wall and vetiver grass.

3. Ratios of slope between 1:20 to 1:4 : In the design site, this kind of slopes are the majority and will be the main activities places. Wavy topography and grassed swale will be used in this area to slow down the water speed.

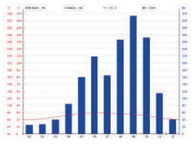
2) Intensity of Rain: The site is located in the tropical monsoon area so a huge amount of rainwater will appear in the wet season. Reservoir and rainwater garden: Changing the topography to create a system of stops and decrease the runoff in the soil surface; Water channel: Different size of water channel with or without vegetation. To let the rainwater run in the suitable places; Drop irrigation.

3) Surface materials: Soil is easier to be eroded because soil is easier to have water flows in the surface and to be brought away. Methods: Stones will be used in the edge of rainwater garden to prevent the rainwater moved the soil.The activities areas are divided into frequent used and less frequent used areas. In the frequent used areas, hard and permeable pavements will be used and tree barks and gravels will be used in the less frequent used areas.

4) Vegetation: The first principle of vegetation suggestions is to abundant the vegetation lawyers. Second principle is that different vegetation will be used in different ratio of slopes. In the steepest slope, the main species of Pinus massoniana will be used with the density 1000～1200/hm2.Castanea mollissima BL. and tea (Camellia sinensis) will be the main species in terraced field. Vetiver (Chrysopogon zizanioides) is one of the plantations which proved that their roots can help to relieve soil erosion. And it will be used in the edge of the terraced field.

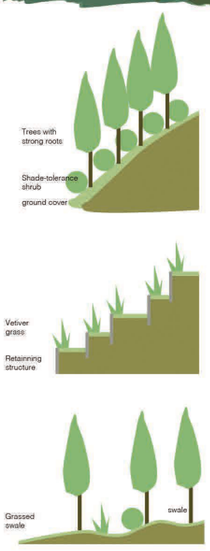
LOCATION

MONTHLY AVERAGE RAINFALL

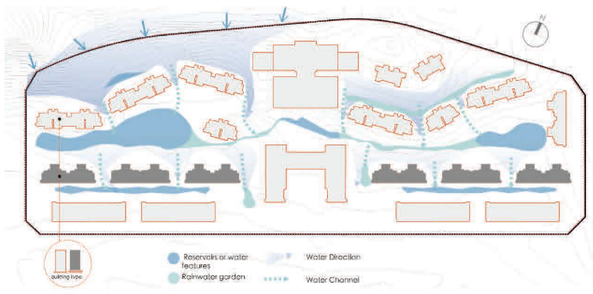


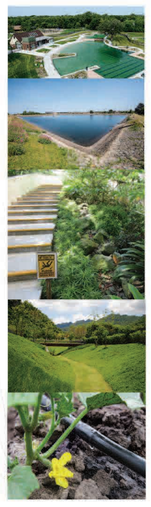
Hainan island is the only tropical island in China. The design site is in the south-eastern located Sun Moon Bay in the 18°（E110.2127555, N18.6281682）of north latitude The area around this 18°of north latitude has one of the best climates for human beings to live. As the biggest island in the tropical zone of China, Hainan island welcomed 67.45 million visitors in 2017.Influenced by ocean, the climate of the site is tropical monsoon climate. The yearly average rainfall is 2400 mm. Compared to Budapest's 70mm average rainfall in wettest month , average rainfall in wettest month of design site can reach 335mm.

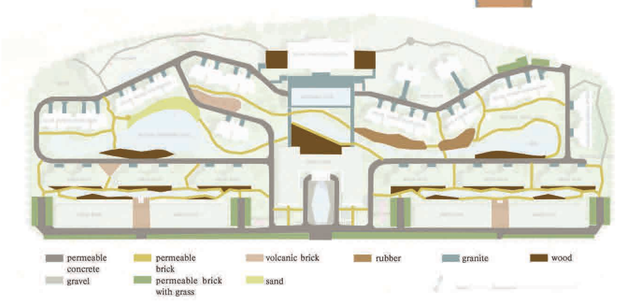
EROSION PREVENTION



According to ration of slopes, slope prevention methods and water management map are purposed. In the the right side of text, there are water management inspirations : natural water swimming pool,resevior, water way, drop irrigation.



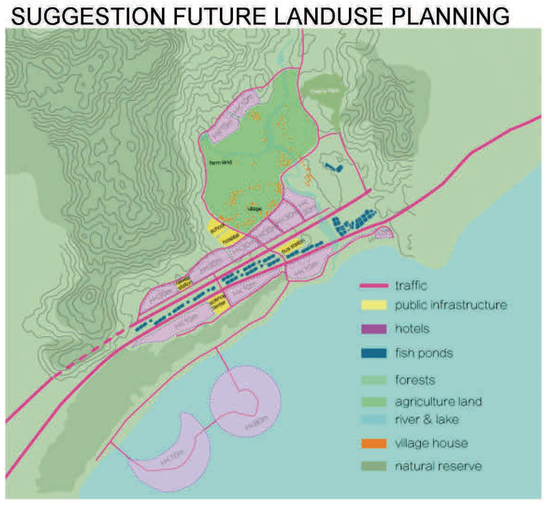




The pavement plan needs to consider about the erosion prevention and the water management. white gravel will be used to emphasize the “Zen” atmosphere.

To connect the local identity, volcanic bricks from local market will be used in the square

SUGGESTION FUTURE LANDUSE PLANNING



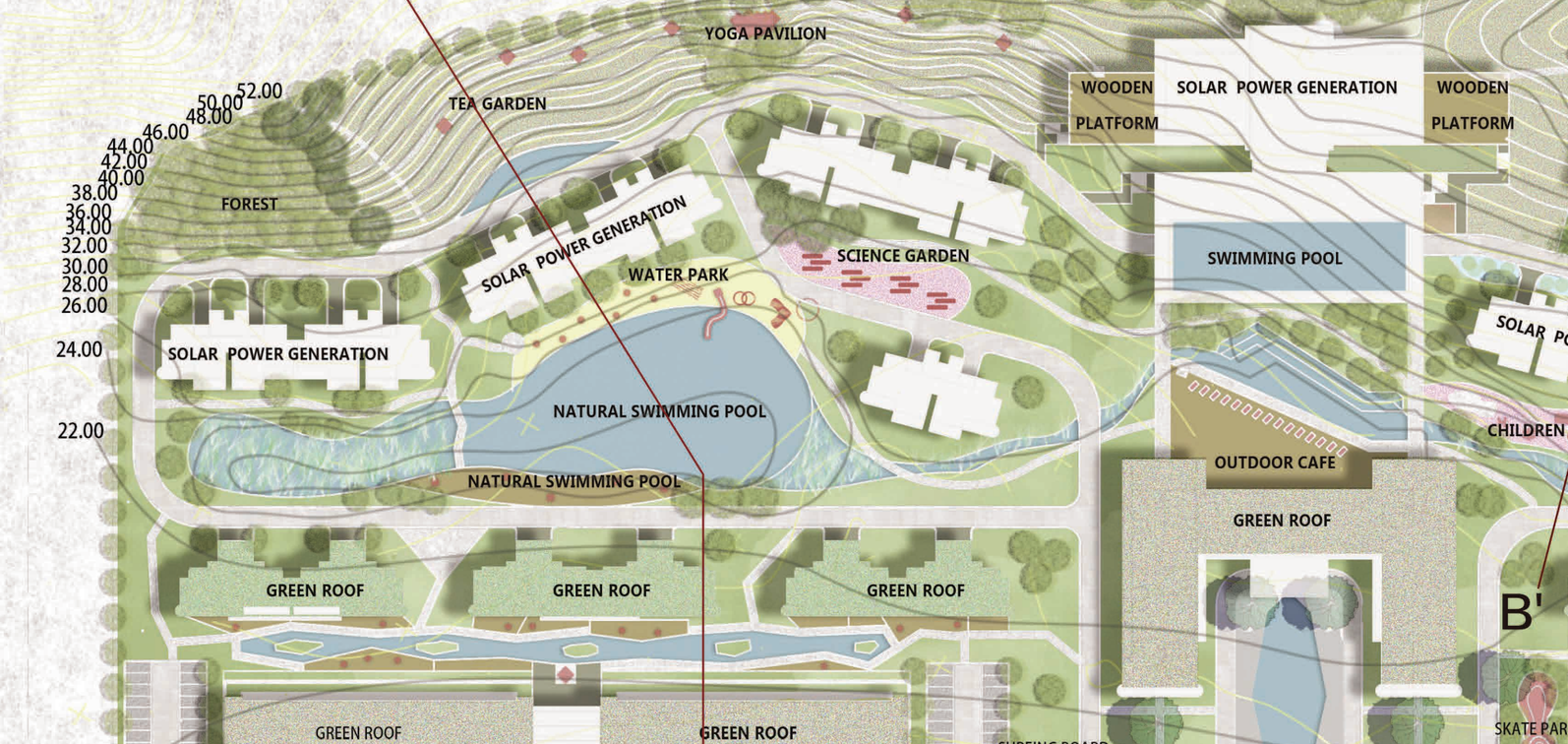
1. Strategy for qurry zone:Soil from the bottom of fish ponds will be the foundation for vegetation as initial intervention. Vegetation will help to relieve rainwater problems in a long run.
2. Strategy for hilly topography:Multiple layers of vegetation to slow down rainwater flows.
3. Strategy for rainwater management:By mixintg the huge building blocks and villages house, leave space for rainwater running.
4. Strategy for coastal erosion:Different function and prevention method will be created according to different erosion situation. For example, safe swimming area, marina area. The area need sand nourishment.
5. Strategy for planting: In the beginning of transplanting, support has to be used to resist seaside strong wind. To increase the resistibility of trees in this area, young trees are better to be planted in the new built area to develop their strong root.

PERSPECTIVE

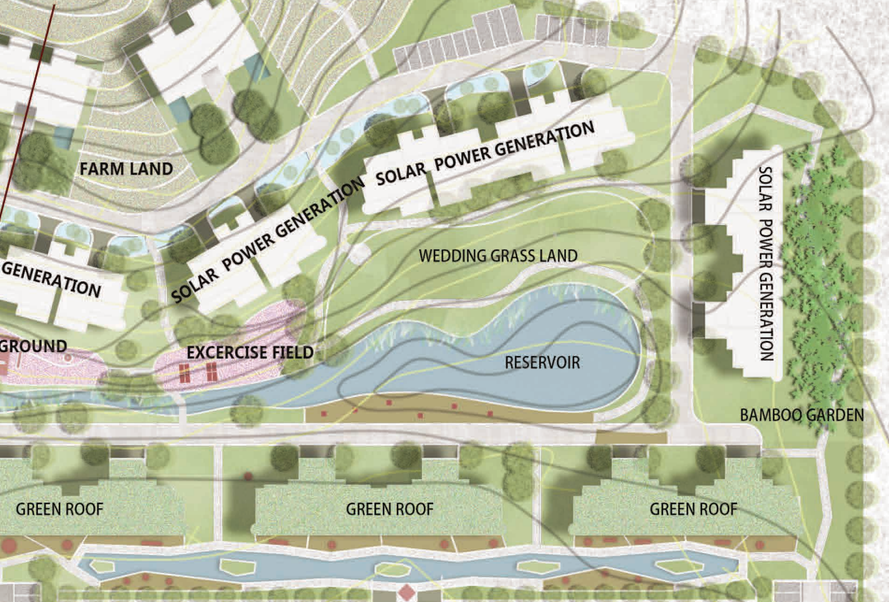
PERSPECTIVE 2

MASTER PLAN OF SUN MOON BAY RESORT

SECTION AA’



SECTION BB’



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