

Implementation of Structural Morphology as a Theme for Educational Tourism Design

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ABSTRACT

This paper focuses on how to increase educational awareness on deforestation and agro forestry via ecotourism. Agro-forestry links agricultural planting system with forestry planting system. Therefore, educational tourism as part of socialization strategy can be a key to reviving interests in eco-tourism and environmental sustainability. Another focus of this project is on enticing visitors to care for the environment. Therefore, structural morphology in terms of architecture is used as a theme and method of the design. The design uses a metaphor of Islamic paradise garden as reminder to the visitor about the greatness of God. The result of the Design shows the form and technological roots applied in arrangement region and architectural building spaces.

Keywords: Agroforestry, education, structural morphology, tourism

INTRODUCTION

The most commonly used definitions of agroforestry are those of Lundgreen and Raintree (Agricultural research for development: potentials and challenges

in Asia, 1982, pp 37–49) and Leakey (Agroforest Today 8:1, 1996). Agroforestry is any land-use system, practice or technology, where woody perennials are integrated with agricultural crops and/or animals in the same land management unit, in some form of spatial arrangement or temporal sequence. It is also a dynamic and ecologically -based natural resource management system. Agroforestry refers to the deliberate introduction or retention of trees on farms to increase, diversify, and

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sustain production for increased social, economic, and environmental benefits. Agroforestry system classification can be based on vegetation structure, function of woody perennials in the system, levels of management input, and environmental conditions and ecological suitability of the system. Agroforestry practices rather than systems are also used as the unit of an ecologically -based classification that is rooted in the role of trees in agricultural landscape.

Therefore, agroforestry is a land management system which is a combination of agricultural production (crop and livestock) and forestry management (Hariah in Sinoaji, 2012) that can help in deforestation. It requires special care from the beginning to the final process, and this is even mentioned in the al-Quran, surah al-Baqarah, 265 which likened the blessing of Allah SWT to lush plantations:

“And the example of those who spend their wealth seeking means to the approval of Allah and assuring [reward for] themselves is like a garden on high ground which is hit by a downpour - so it yields its fruits in double. And [even] if it is not hit by a downpour, then a drizzle [is sufficient]. And Allah, of what you do, is Seeing.”

(al-Baqarah, 265)

In addition to requiring good care, agroforestry crops also require suitable climatic conditions. Indonesia is rich in many plant and tree species and is home to 10% of the world's plants. In fact, the country is dubbed the world's lungs (PBB, *World Conservation Monitoring center*). Currently, the forest cover in Indonesia has decreased from 96 million ha in 2005 to 43 million ha in 2010 due to illegal logging. While Indonesia is the world's top 3 producer of agricultural crops (in 1990, but in 2000 it became no 1 importer of agricultural produce in the world). In 2014, it imported 472,000 tonnes of rice (Aria, 2014). In 2013, Indonesian agricultural labour force decreased from 31.17 million to 26.6 million. Since the country embarked on industrialisation, Indonesians had an image of the farming or planting as backward and ancient. Therefore, green agricultural pastures paved the way for new factories (BPS, 2013).

Therefore, sound agroforestry management and systems are important to overcome the decline in importance of agriculture and forests in Indonesia. Therefore, public awareness via education is important to achieve this objective. Further, agroforestry can be considered a recreational activity for the younger generation and in in shaping their personality (Sari & Murtiningsih, 2013). Therefore, structural architecture that takes into account natural morphology is vital.

Gresik in East Java is an industrial zone and it is divided into four areas whereby one is a designated agricultural zone located in North Gresik (RTRW Gresik, 2011). However since, Reg. Gresik is identified as an industrial zone, there is little interest in its designated agricultural area.

Therefore, in order to increase the productivity of forests and agricultural sector using it is necessary to introduce education in agroforestry education and forests as a means for recreational and nature based activity that reflects the greatness of God and gratitude to Him. Agroforestry principles based on of the theme of structural morphology can be offered as an introduction to agro-forestry approach in the context of education.

METHODS

This study used Structural Morphology and adopted sub- biomimetic design. It combines the functions, physical and technological development from plant roots as the structure of biological form. The translation was done using eye visualization and structure through cuts crosswise with concern the functions of agroforestry thorough introduction as the basic parameters of educational tourism using agroforestry and nature.

DISCUSSION

Educational Tourism

- Tourism is a journey undertaken by a person or group of people by visiting a particular place for the purpose of recreation, personal development, or

learn tourist attraction visited in the interim period (UU RI, 2009)

- Education is the process of changing attitudes and conduct of a person or group of people through teaching and training (KBBI, 2012).

Therefore, educational tourism is a journey for fun and recreation but it has an educational value and character.

Agroforestry

Agroforestry has three levels of planting. Trees as forests, followed by shrubs and grass. Plants are first grown followed by trees in the forest as the deepest area because it does not require special care, followed by shrubs as a managed area and the area with short grass or plants as the main control area (Zamora & Wyatt, n. d.).

Meanwhile, based on the classification, Agroforestry appropriate to the circumstances and needs of the design are as follows:

1. Classification

Agri-silviculture is a production technique which combines agricultural crops with simultaneously raised and protected forest crops. This practice, called agri-forestry, has been in existence since humans learned to clear forests and cultivate land (Sinoaji, 2012).

2. Zone

There are four suitable agroforestry zones in Indonesia: Zone Monsoon

(Tropical), Humid Tropical Zone, Dry Zone and the Coastal Zone (Sardjono, Djogo, Arifin, & Wijayanto, 2003).

3. System

Agroforestry is introduced in the form of household and Agroforestry Complex (Industrial) (Michon & de Foresta, 1997).

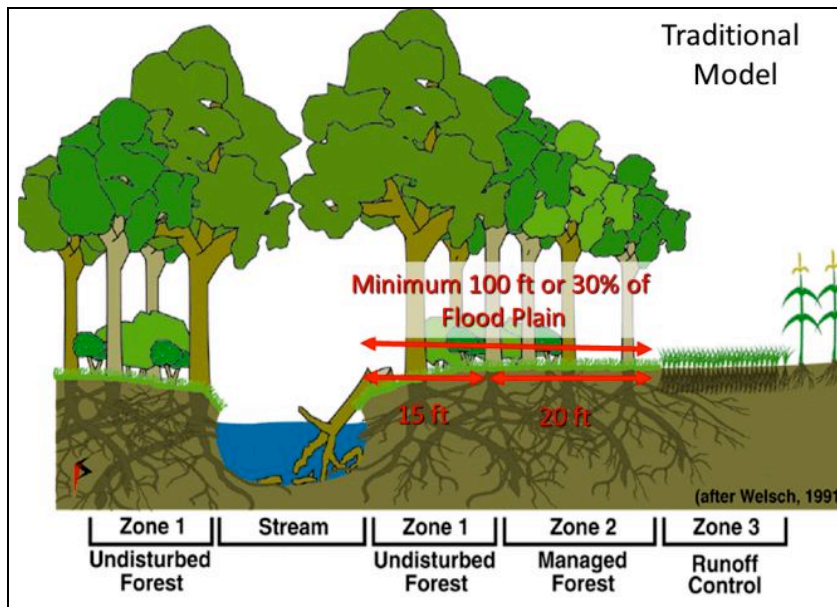


Figure 1. Agroforestry planting type
Source: www.extension.umn.edu

Location

The location is Bungah, and the area is designated for agricultural crops and for irrigation. It has suitable climate for growing tropical plants. The Bengawan Solo River flows through this area which helps in irrigation. The alluvial and grumusol soil are very fertile (RTRW Gresik, 2011).

Structural Morphology

Structural morphology refers to functional technology and functional anatomy in

biology and connects the structure with the surface (Gruber, 2013).

Structural Morphology applied in educational tourism of Agroforestry integrates biological and physical function and embodies Interpersonal Space and Zoning Region, using the philosophy of transitional space and building facades. This is linked to the paragraph in Quran about Heaven being a reward for people with faith.

Design Output

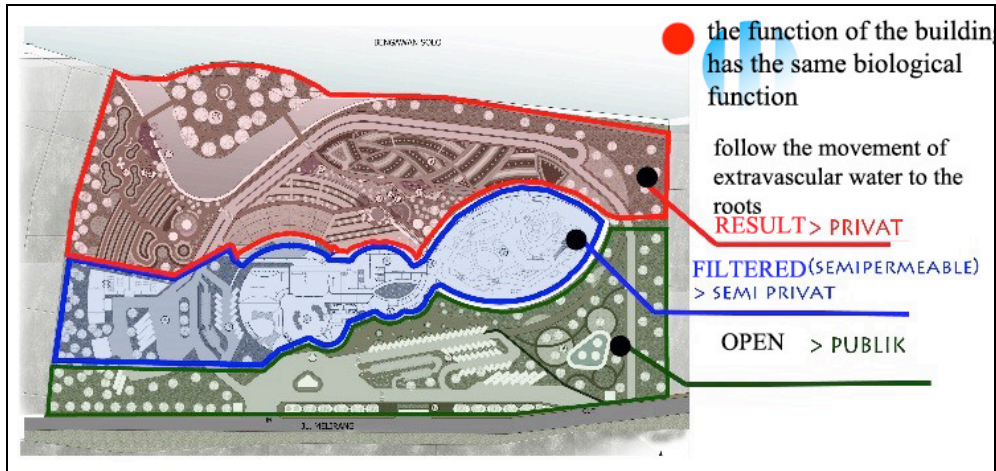


Figure 2. Regional zoning

The pattern arrangement of objects in the area is formed by the zoning division of three areas: public, semi-private and private. Distribution of zoning can be seen physically by building mass semi-private area in the middle of the site. The arrangement is in accordance with the middle way extravascular water flows at the root of the mass of the building as a semipermeable wall or barrier and filtration in the root dicotyl.

Accessibility and Circulation Design

Accessibility design related to tourism Agroforestry Area has only one access gateway and two access exit areas. The circulation division is aimed at protecting the privacy of the tourist zone. Based on the design, after the user enters the site, he or she will see two streets. There is a circulation area for employees and then management of the area marked with street that is not too big and the circulation of the visitors are directed to drop off area with a wider street. For those who are using public transport, they are directed to the front area.

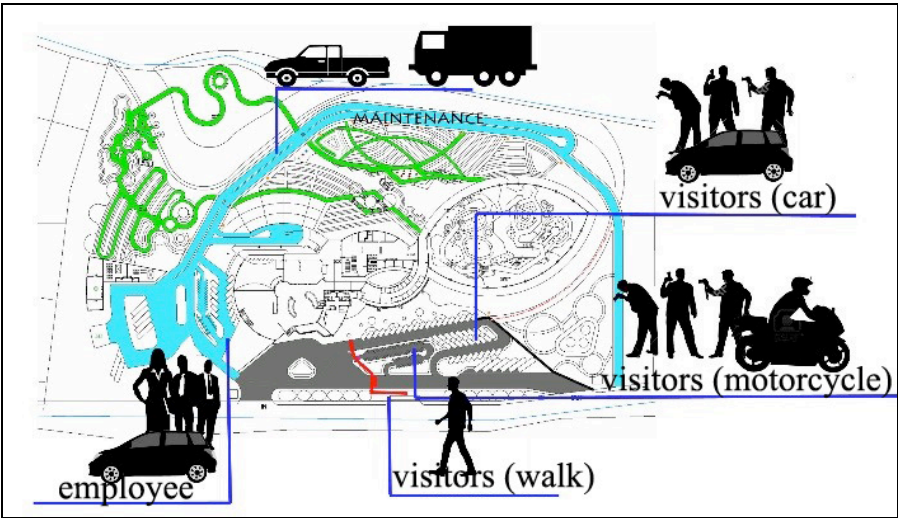


Figure 3. Zoning of accessibility

Circulation in the Tourism area

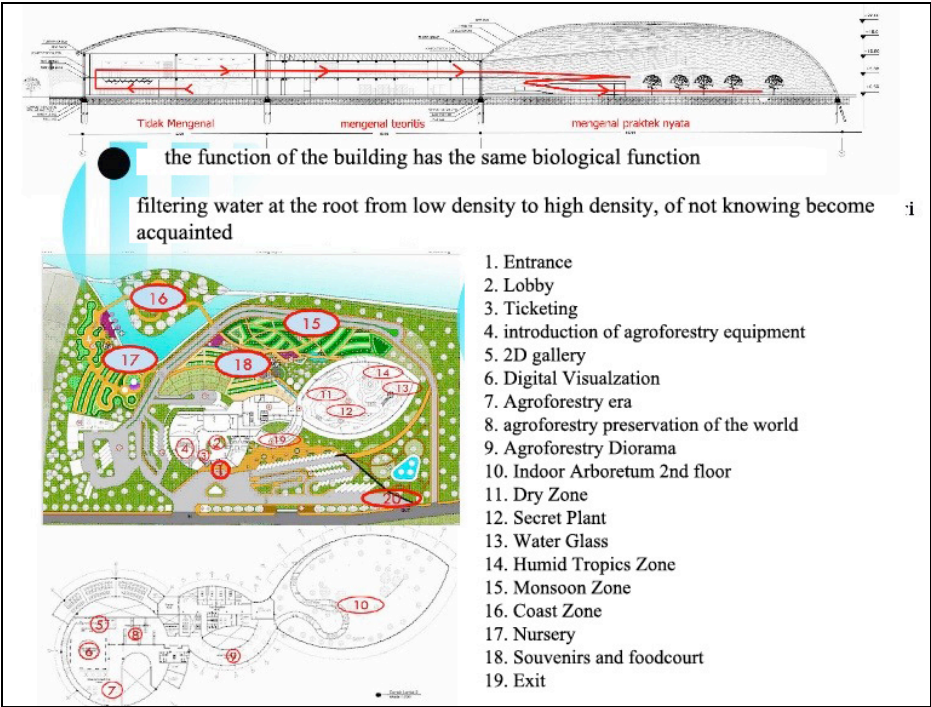


Figure 4. Circulation tourism zone

Circulation in the tourist area follows water filtration process, from low density to high density or from being unknowledgeable to being knowledgeable having gone through several stages. In the tourist areas, visitors are witness a linear flow, which gives a view of the world of agroforestry first, then the complexity of agroforestry in the indoor arboretum and finally, visitors will be introduced to Agroforestry in the region.

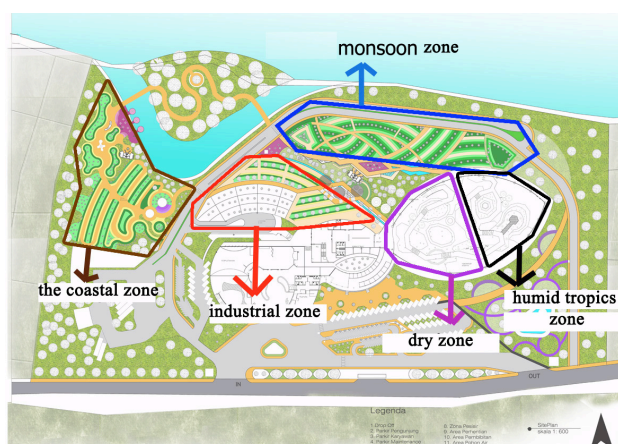
In the last stage, philosophy of diversity in this area is wonderful but paradise is greater.

Vegetation of Agroforestry

Agroforestry uses three level of planting system by dividing the area into four zones, zone (monsoon, coastal, tropical moist, dry) and 1 industrial zone. In every zone, the tourist will remember the greatness of God.



(a)



(b)

Figure 5. (a) Agroforestry planting level; and (b) Agroforestry classification zoning

Building Design

The building design is based on Structural Morphology. It is in the form of roots dicotyl. The basic shape is derived from the

combination of physical form of roots and shape derived from the layers of technology development plant that focuses on the roots of plants.

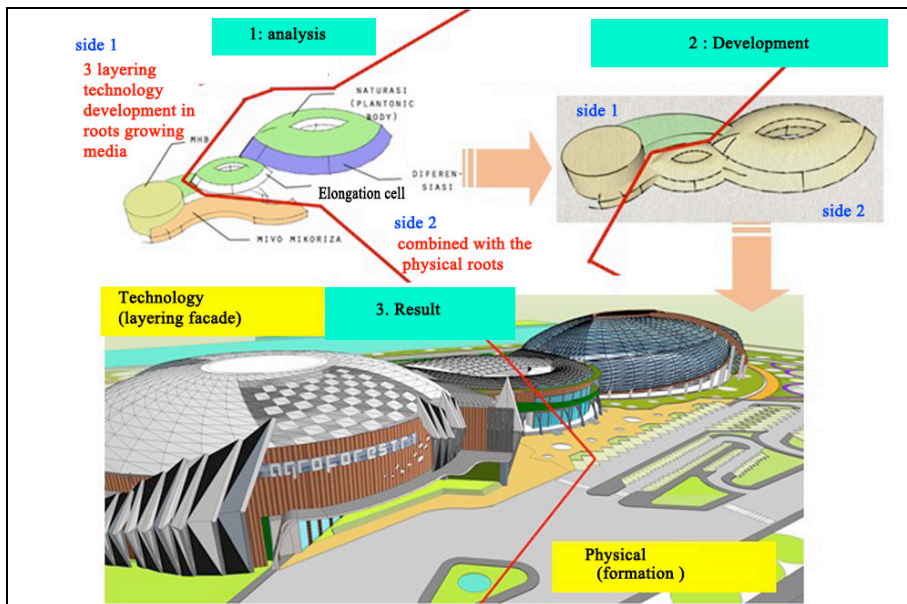


Figure 6. Building shape process

Revenue Plan with 2 parts, the dark and bright areas. This is in accordance with the principle of equality of biological objects, because the root is on a dark ground, but has food reserves as a result of photosynthesis that require bright light. Therefore, part of the building would be dark with closed walls and the light is blocked and reflected by a wind inlet. It is also an arrival area (the first layer MHB). The indoor arboretum utilises

sunlight and FRP materials used for the panels reduce heat and solar radiation but still allow light. Physical appearance also gives the impression of a welcoming view to the area (differentiating root from the soil). But even remain inside Serag shade with inlet design with a reference to the transport system open water getting narrower, with this inlet the hot air will be cold.

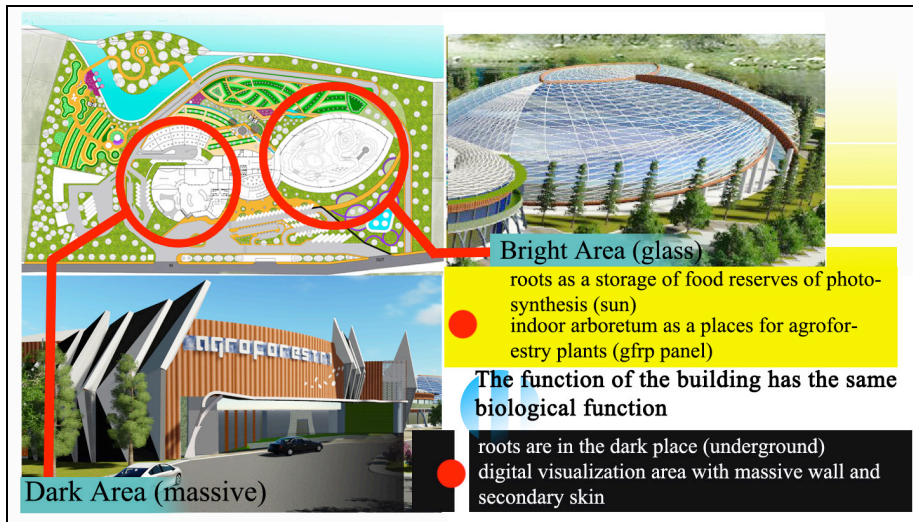


Figure 7. Bright and dark combination

Facade Design

The facade of this agroforestry building has elasticity, strength and reflects a smooth transition from the rough transition structure.

This area shows the physical strength of the roots to penetrate the soil while remaining flexible.

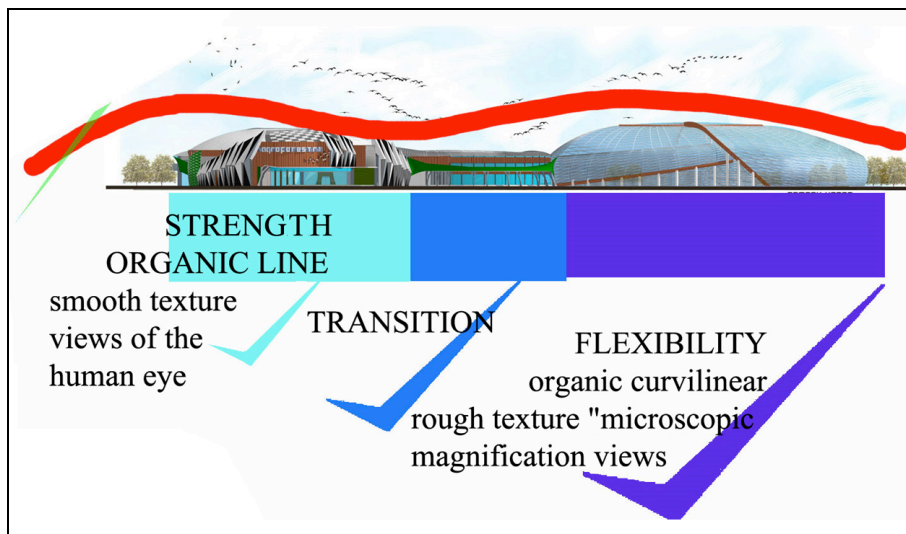


Figure 8. Facade design process

Space Design

The zoning space is based on the roots as follows:

- 1) MHB (good), by making this area a place to receive visitors.
- 2) Mivo Mikoriza (pathogen) by differentiating this area from others.

This area is where the tropical crops are grown.

- 3) Nematodes (binder) (transition zone) this area is used for shopping and also functions as food court, before entering the departure area.

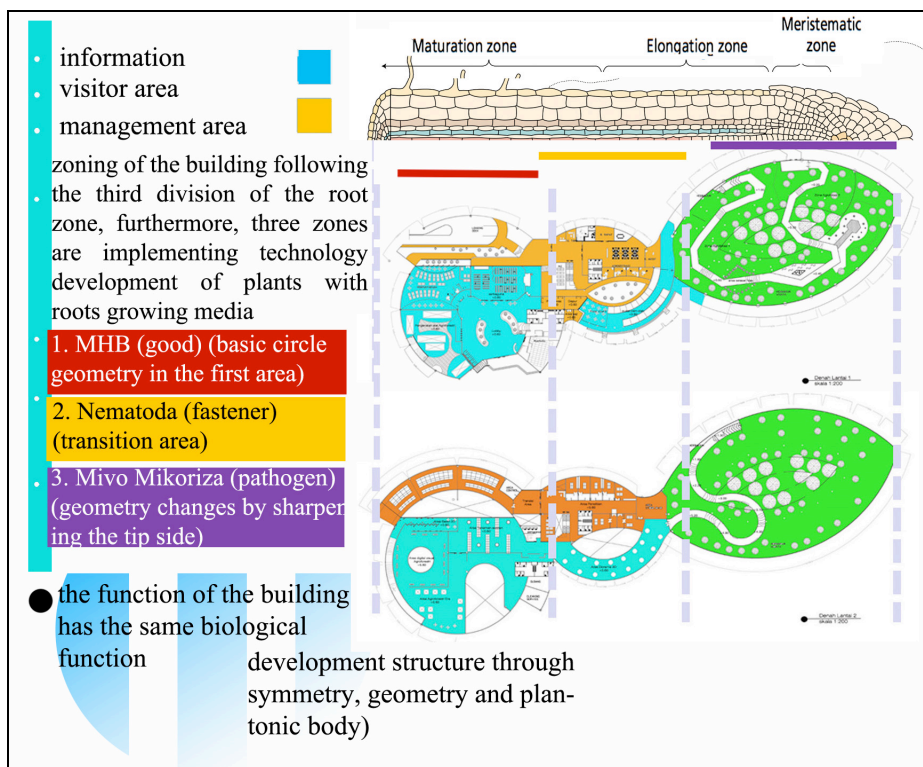


Figure 9. Space zoning process

Interior Design

The interior is inspired by nature and modernity. The dark interior where the roots are formed transitions into a brighter area

as a result of photosynthesis. This interior can also be imagined as being transformed from being Godless to having faith in God who leads people from darkness to the light.



Figure 10. Dark space



Figure 11. Bright space

Structure Design

The structure was designed by the configuration of tree roots, namely the converging of cross-sections with wide

structures. The meeting area has rectangular arrangement while the cosy area has a steel structure with GFRP coating that is used for indoor.

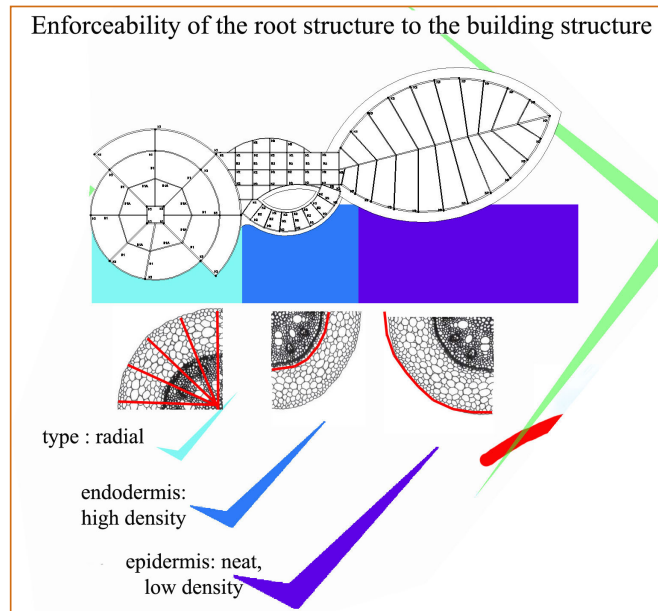


Figure 12. Structural design process

CONCLUSION

Structural Morphology as a theme in Educational Tourism of Agroforestry has led to development of architectural spaces and division of regions into three zones: the first zone is where water flows into the roots, the outdoor arboretum in the south site functions as monsoon zone and the third is a coastal zone.

The architectural building spaces are divided into side area and a transition area. The side area is dark and gives the impression of an underground. The transition area is bright and used as dry zone for storing food; elongation zone in roots for the retail souvenirs and foodcourt in a row.

The Root Interwoven section with organic curvilinear aims to give the

impression a dynamic environment. The transition from dark to the bright side is a metaphor for knowledge that has undergone several stages to attain paradise. The last is the structure that is inspired by the formation and configuration of roots.

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