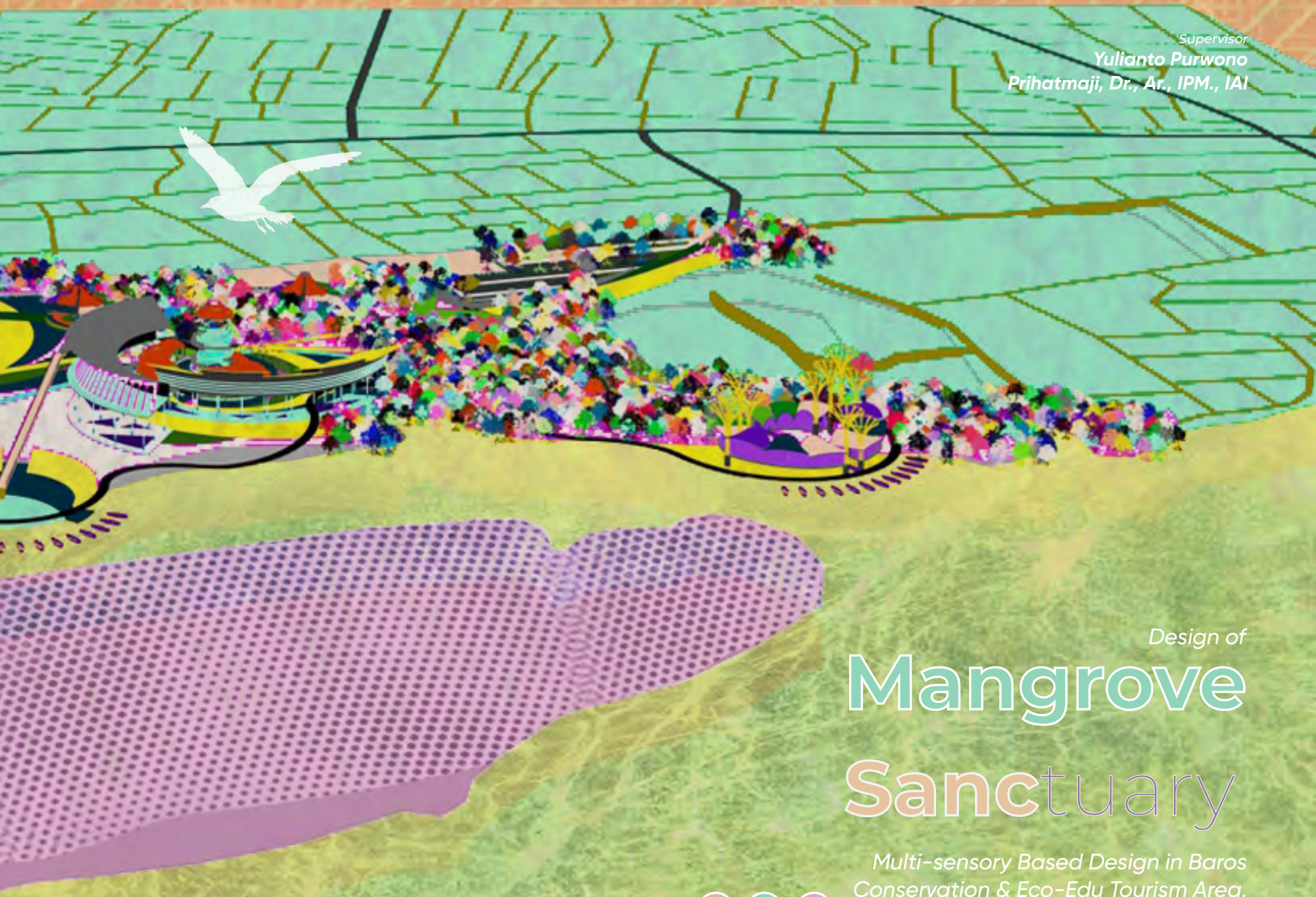
FINAL ARCHITECTURAL DESIGN STUDIO
INTERNATIONAL UNDERGRADUATE PROGRAM

Shafira Satya Nurshanti
18512025

Supervisor
Yulianto Purwono Prihatmaji, Dr., Ar., IPM., IAI



Design of

Mangrove Sanctuary

Multi-sensory Based Design in Baros Conservation & Eco-Edu Tourism Area, Bantul, Yogyakarta

DEPARTMENT of ARCHITECTURE
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00

“GRAVITATING The challenge to find a new center of gravity to see rainbow after rain.”

- Oprah Winfrey -

BEFORE ENTERING THE GATE

List of lessons that will be studied to facilitate a deeper search.

Hello!

I'm Shafira Satya Nurshanti, you can call me Shafira. I come from Yogyakarta, 16 November 2000. I was studied bachelor's degree in international architecture program Universitas Islam Indonesia batch 2018. I loves travelling. Photography is my hobby. Interested with urbanism conceptual narative approach, sense, experience, visual image, and pattern language.

FADS.

Final Architectural Design Studio 2022
International Undergraduate Program in Architecture

English Version:
DESIGN OF MULTI-SENSORY MANGROVE SANCTUARY CENTRE IN BAROS CONSERVATION & ECO-EDU TOURISM AREA, BANTUL, YOGYAKARTA

Indonesian Version:
PERANCANGAN PUSAT SUAKA MANGROVE BERBASIS MULTI-SENSORIK DI KAWASAN BAROS KONSERVASI & EKO-EDU WISATA, BANTUL, YOGYAKARTA

Shafira Satya Nurshanti

APPROVAL SHEET

Studio Akhir Desain Arsitektur yang berjudul:
Final Architecture Design Studio entitled:

Perancangan Pusat Suaka Mangrove Berbasis Multi-Sensorik di Kawasan Baros Konservasi & Eko-Edu Wisata, Bantul, Yogyakarta

Design of Multi-sensory Mangrove Sanctuary Centre in Baros Conservation &Eco-Edu Tourism Area, Bantul, Yogyakarta

Nama Mahasiswa **Student's Name**	**Shafira Satya Nurshanti**
Nomor Induk Mahasiswa **Student's ID Number**	**18512025**
Telah Diuji dan Disetujui pada **Has been evaluated and agreed on**	*Yogyakarta, 22 Juli 2022* **Yogyakarta, July 22nd, 2022**

Pembimbing **Supervisor**	*Penguji 1* **Jury 1**	*Penguji 2* **Jury 2**
Yulianto Purwono Prihatmaji, Dr., Ar., IPM., IAI	*Noor Cholis Idham, Prof., Ar., S.T., M.Arch., Ph.D. IAI*	*Putu Ayu P. Agustiananda, Dr. Ing., S.T., M. A.*

Diketahui Oleh
Acknowledge by
Ketua Program Studi Sarjana Arsitektur
Head of Undergraduate Program in Architecture

Yulianto Purwono Prihatmaji, Dr., Ar., IPM., IAI

STATEMENT OF AUTENTICITY.

I declare that all parts of this work are my own work, except the works mentioned by reference and that there is no assistance from other parties, either wholly or partially in the process of making it.

I also declare that there is no conflict of intellectual ownership of this work, so that all thoughts and writings contained in this work are the main author and supervisor. The final results are submitted to the Department of Architecture, Universitas Islam Indonesia to be used for educational and publication purposes.

Yogyakarta, July 22nd 2022
Author,

Shafira Satya Nurshanti

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Praise and gratitude we pray to the presence of Allah SWT, as well as shalawat and greetings we pray to our lord Prophet Muhammad SAW. along with his family and friends. Only with his grace and merciful, we were able to complete the Architectural Design Final Studio with entitled "Design of Multi-sensory Mangrove Sanctuary in Baros Conservation and Eco-Edu Tourism".

In preparing this undergraduate thesis, we received a lot of help, input, guidance, and support from various parties. On this occasion, we would like to express our appreciation and gratitude to:

1. Allah SWT for all His mercy and grace, the process of writing this Final Project is given ease and blessing.
2. My Parents who provide support, prayers, enthusiasm and motivation.
3. Mr. Yulianto Purwono Prihatmaji, Dr., Ar., IPM., IAI as a supervisor at the Architectural Design Final Studio who has provided additional time, knowledge, criticism, suggestions, and patience so that we can complete the Architectural Design Final Studio.
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For all the prayers, support, and help that has been given, hopefully get a reply from Allah SWT. We realize that this work cannot be separated from the word perfect, therefore all constructive criticism and suggestions for the feasibility of this undergraduate thesis. Hopefully this Final Project can help increase knowledge and experience for readers and can be a reference as well as learning material so that this paper will be better in the future.

ABSTRACT

Indonesia is known as a mega-biodiversity country. As one of the countries with the largest red list for the list of habitats and animal species that are on the verge of extinction. Diversity is also reflected in the number of species. The country has at least a hundred native species and the most diverse species. The potential of mangrove forests that can be utilized is in the form of natural disaster prevention and ecosystem balance. Mangroves provide many benefits. Mangrove conservation not only contributes positively to income, but also plays a role in increasing food security.

Bantul in the agricultural sector is 42% to meet food availability, and there is still a lack of knowledge and awareness of the community and producers on food security even though it is an area rich in resources. Supported by City Branding Yogyakarta as education, tourism, culture. Raising the issue of conservation in mangrove forests that have an impact on food security in coastal areas. On the coast of Bantul Regency, mangroves are found that can grow well, precisely in the estuary area which is the confluence of the south coast with the estuary of the Opak River.

Mangroves are a group of plants that can live in tidal areas which are still influenced by the influence of the sea and land. Baros Hamlet which is overgrown with mangroves is designated as a coastal conservation area. Mangrove Sanctuary to conserve biodiversity is very much needed. The conservation building facilities consist of a conservation center, nursery center, and interpretation room. The multi-sensory approach formed from the word was chosen because it is based on conservation areas causing some side effects that are not good for nature itself. In addition, multi-sensory adoption is adopted so that people are more aware and build environmental interactions. Besides maintaining the balance of nature, it will lift the economy, and appreciate interactive educational places. Humans, mangroves, and species will build a symbiosis or mutualism that is mutually beneficial. Collaborative biodiversity is maintained.

Keyword : Biodiversity; Sanctuary; Mangrove Baros Forest; Conservation; Multisensory Approach

ABSTRAK

Indonesia dikenal sebagai negara megabiodiversity. Sebagai salah satu negara dengan daftar merah terbesar untuk daftar habitat dan spesies hewan yang berada di ambang kepunahan. Keanekaragaman juga tercermin dari jumlah spesiesnya. Negara ini memiliki setidaknya seratus spesies asli dan spesies yang paling beragam. Potensi hutan mangrove yang dapat dimanfaatkan berupa pencegahan bencana alam dan keseimbangan ekosistem. Mangrove memberikan banyak manfaat. Konservasi Mangrove tidak hanya memberikan kontribusi positif terhadap pendapatan, tetapi juga berperan dalam peningkatan ketahanan pangan.

Bantul di sektor pertanian adalah 42% untuk memenuhi ketersediaan pangan, dan masih kurangnya pengetahuan dan kesadaran masyarakat dan produsen terhadap ketahanan pangan meskipun merupakan daerah yang kaya akan sumber daya. Didukung oleh City Branding yogyakarta sebagai pendidikan, pariwisata, budaya. Mengangkat isu konservasi di hutan mangrove yang berdampak pada ketahanan pangan di wilayah pesisir. Di pesisir Kabupaten Bantul ditemukan mangrove yang dapat tumbuh dengan baik, tepatnya di daerah muara yang merupakan pertemuan pantai selatan dengan muara Sungai Opak.

Mangrove merupakan kelompok tumbuhan yang dapat hidup di daerah pasang surut yang masih dipengaruhi oleh pengaruh laut dan darat. Dusun Baros yang ditumbuhi mangrove ditetapkan sebagai kawasan konservasi pantai. Suaka Mangrove untuk melestarikan keanekaragaman hayati sangat dibutuhkan. Fasilitas gedung konservasi terdiri dari pusat konservasi, nursery center, dan ruang interpretasi. Pendekatan multi indera terbentuk dari kata tersebut dipilih karena berbasis kawasan konservasi menimbulkan beberapa efek samping yang tidak baik bagi alam itu sendiri. Selain itu, multi-indera diadopsi agar masyarakat lebih sadar dan membangun interaksi lingkungan, Selain menjaga keseimbangan alam, akan mengangkat ekonomi, dan menghargai tempat pendidikan yang interaktif. Manusia, mangrove, dan spesies akan membangun simbiosis atau mutualisme yang saling menguntungkan.

Keyword : Biodiversity; Sanctuary; Mangrove Baros Forest; Conservation; Multisensory Approach

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01

“BIODIVERSITY is the greatest treasure we have. It diminishment is to be prevented all cost.”

- Thomas Eisner -

STARTING COASTAL CORRIDOR JOURNEY

Findings the code by getting acquainted with the existence of mangroves ecosystem and species as a biodiversity and Interpretation Centre Eco-Edu Tourism based Conservation in Indonesia.

Figure 1. Indonesia Builds National Biodiversity Center
Source: en.antaranews.com (accessed on 20 March 2022)

Figure 2. Marine Ecosystem
Source: istockphoto.com (accessed on 20 March 2022)

Figure 3. Wildlife Ecosystem
Source: https://burungnya.com/3-rahasia-unik-burung-terbang-tidak-tabrakan-dengan-burung-lain/ (accessed on 20 March 2022)

01

BALANCING OF BIODIVERSITY GOING THROUGH DEGRADATION & EXTINCTION IN ECOSYSTEM

The variety of living species on Earth, including plants, animals, microbes, and fungi, is referred to as biodiversity. While the Earth's biodiversity is so diverse that many species have yet to be discovered, a species are facing extinction as a result of human actions, threatening the planet's magnificent biodiversity. Biodiversity is defined as the total of a region's genes, species, and ecosystems (Behera and Das 2008). According to scientists, there are around 8.7 million plant and animal species on the planet. Areas with extremely high levels of biodiversity are called hotspots. Endemic species, a species that are only found in one particular location are also found in hotspots. To survive and preserve their habitats, all of the Earth's species collaborate. According to the Natural Geographic, counting the total number of species living in a given area is a typical way to measure biodiversity. The maximum biodiversity may be found in tropical locations, which are warm all year. Temperate climates have less biodiversity because of their hot summers and frigid winters. Mountaintops and deserts, which have cold and dry climates, have much less.

Biodiversity also refers to the diversity of ecosystems, which are communities of living creatures and their surroundings. Deserts, grasslands, and rain forests are examples of ecosystems.

The sign of the importance of biodiversity is that all living things are intertwined. They are reliant on each other. Animals find refuge in forests. Plants are consumed by animals. Healthy soil is required for plant growth. Fungi aid in the decomposition of organisms, which fertilizes the soil. Pollen is carried from one plant to another by bees and other insects, allowing the plants to reproduce. These links weaken and sometimes break when biodiversity declines, causing harm to all species in the environment. Biodiversity-rich ecosystems are often resistant to disaster than ecosystems with fewer species.

People value biodiversity in a variety of ways. Plants, for example, assist people by emitting oxygen. They also supply food, shade, construction material, medicines, and fiber for clothing and paper. Plants' root systems aid in the prevention of flooding. Plants, fungus, and animals like worms help to keep the soil fruitful and the water clean. These systems deteriorate as biodiversity declines. Plant biodiversity is essential to hundreds of enterprises. Plants are essential to the development of agriculture, building, medical and pharmaceutical industries, fashion, tourism, and hospitality. When an ecosystem's biodiversity is disrupted or eliminated, the economic consequences for the local people can be devastating. But every year, thousands of species go extinct, or die out entirely extinct, or die out entirely. The world's biodiversity is rapidly dwindling, as shown in the graph below. During the previous century. Several species have been extinct.

Extinction is a natural process in which some species die out and new ones emerge. However, human action has altered natural extinction and evolution processes. According to scientists, species are vanishing at hundreds of times their natural rate. Natural habitat destruction is one of the major causes of biodiversity loss. Wild plants and animals are vanishing from the fields, forests, and wetlands where they once thrived. It is necessary to clear land in order to sow crops or construct houses and factories. Timber and firewood are harvested from forests. Fewer individuals may dwell in ecosystems that are shrinking. Genetic diversity declines when the species that survive have fewer breeding partners.

The loss of biodiversity has also been attributed to pollution, overfishing, and overhunting. Global climate change—the most recent increase in average global temperature due to human activity—is also an influence. Introduced species can also impact biodiversity. When people bring species from one part of the world to another, they are frequently without natural predators. These non-native species thrive in their new environment, frequently at the expense of native species.

Thousands of wilderness areas have been established around the world to protect plants, animals, and ecosystems. Local, national, and international groups are working together to protect biodiversity in areas that are endangered by development or natural disasters. The World Heritage Sites program of UNESCO identifies locations of global significance. Many national parks safeguard biodiversity by prohibiting extractive activities such as mining and drilling.

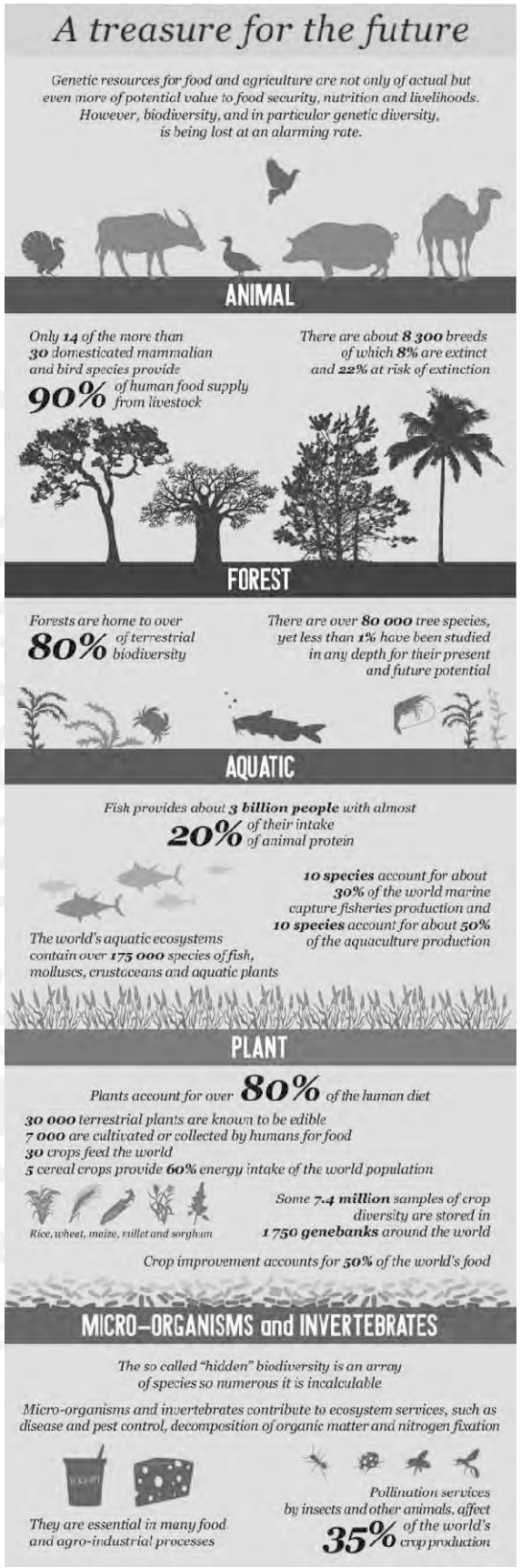


Figure 4. Genetic Resources and Biodiversity to Food
Source: FAO 2013
(accessed on 20 March 2022)

02

EQUATOR LINE — INDIAN OCEAN — PACIFIC OCEAN

HUMAN POPULATION THREATEN HOTSPOT: INDONESIA AS ONE OF MEGA-BIODIVERSITY ARCHIPELAGO COUNTRY WITH TROPICAL CLIMATE IN EQUATOR AXIS

Figure 5. Indonesia Map
Source: google.com/intl/id/earth (accessed on 23 March 2022)

Figure 6. Marine Ecosystem
Source: news.un.org/en/story (accessed on 23 March 2022)

Figure 7. Flora Fauna in Indonesia
Source: balaikliringkehati.menlhk (accessed on 23 March 2022)

Indonesia is one of 17 countries mentioned as mega biodiversity countries. As a biodiversity hotspot, a conservation flagship scheme used to raise awareness and raise funds for areas of the world with more endemic species and with greater threat of extinction. There are 35 world biodiversity hotspots (CI 1999; Mittermeier et al. 2005), of which two are located in Indonesia, namely the Sunda shelf (Sundaland) and Wallacea. A global biodiversity hotspot must meet two stringent criteria, i.e. it must have a minimum of 1,500 irreplaceable endemic vascular plants and it must have 30% or less of the original natural vegetation, so it is moderately threatened. Worldwide, there are 35 hotspots, which covers only 2.3% of the earth's land surface, but supports more than half of the world's endemic species, and nearly 43% of the mammals, reptiles and amphibians. Of the 35 hotspots, two of them are in Indonesia. This biodiversity hotspot is also a hotspot for world language diversity, where there are 3,202 languages (CI 1999; Mittermeier et al. 2005; Gorenflo et al. 2012). This biodiversity hotspot is also a hotspot for world language diversity, where there are 3,202 languages (CI 1999; Mittermeie. In the discussion of world biodiversity, Indonesia is a country that cannot be left behind. Indonesia is very rich in biodiversity, both on land and in the ocean. Because Indonesia is the world's largest archipelagic country, this has an impact on its status as a major biodiversity country (Schroeder 2011). Mega-biodiversity countries are home to at least 2/3 of all non-fish vertebrate species and 3/4 of all higher plant species.

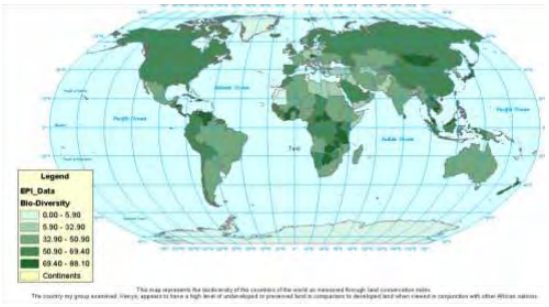


Figure 8. Global Biodiversity
Source: CI 1997
(accessed on 23 March 2022)

Figure 9. Mega-biodiversity Country in the World
Source: CI 1997
(accessed on 23 March 2022)

Figure 10. Hotspot Biodiversity
Source: CI 1999
(accessed on 23 March 2022)

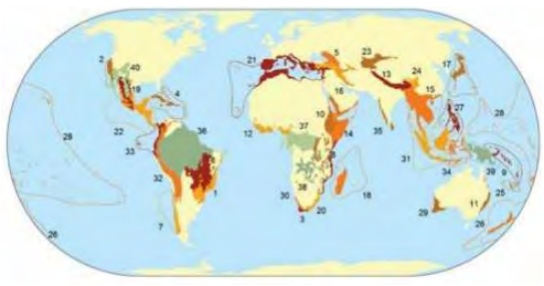


Figure 11. Natural Area High of Biodiversity
Source: CI 2002
(accessed on 23 March 2022)

The concept of a mega-biodiversity country is structured on 4 premises, namely:

1. The diversity of each country is very important for the survival of that country, and must be a basic component of any national or regional development strategy;
2. Biodiversity is not evenly distributed on earth, and some countries, particularly in the tropics, have much greater concentrations of biodiversity than others;
3. Some of the most species-rich and biodiversity-rich countries also have ecosystems that are under the most severe threat;
4. To achieve maximum impact from these limited resources, conservation efforts should be concentrated (but not exclusively) in those countries that are richest in andendemic diversity but most severely threatened.

Why is biodiversity in Indonesia so important?

Biodiversity has many benefits, both tangible and intangible, namely:

1. Ecosystem services, such as: clean drinking water, soil formation and protection, storage and cycling of nutrients, reducing and absorbing pollution, contributing to climate stability, maintaining ecosystems , and plant pollination.
2. Biological resources, such as: food, medicine, industrial raw materials, ornamental plants, stock for breeding and population storage.
3. Social benefits, such as: education, recreation and research, and culture Biodiversity has provided various foodstuffs for human life, but its sustainability is threatened (FAO 2013).

There are seventeen megadiverse countries that account for more than 70% of the world's biodiversity (Rossi 2014). The destruction of nature and the loss of habitat have left tens of thousands of species threatened with extinction. Of the 20 countries in the world whose natural species are threatened, Indonesia occupies the 5th position, where there are 1126 endangered species (Darlington 2010).

The increase in human population in Indonesia resulting the increased consumption is a major anthropogenic cause of decline and loss of habitat for biodiversity. Beyond that, climate change is a necessity that causes change habitat both at sea and on land. Our current level of consumption poses a continuing threat to planet earth. This affects biodiversity and some species are on the verge of extinction. Therefore, appropriate action is needed to overcome it.

"The current population of Indonesia is 278,468,042 as of Sunday, March 20, 2022, based on Worldometer elaboration of the latest United Nations data. Indonesia 2020 population is estimated at 273,523,615 people at mid year according to UN data. Indonesia population is equivalent to 3.51% of the total world population"
- Worldmeter Population.

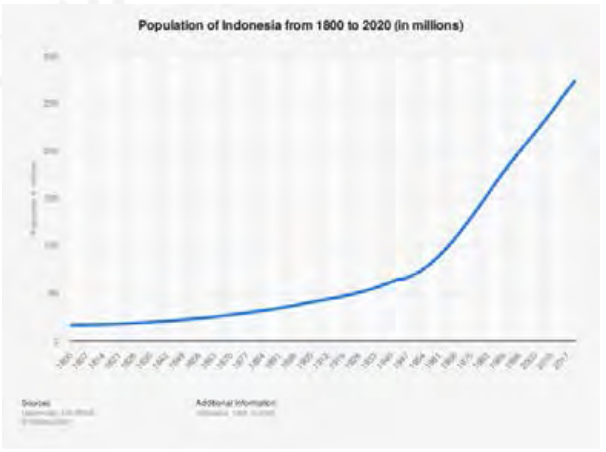


Figure 12. Mangrove Degradation in Indonesia
Source: mongabay.co.id/2019/02/11/degradasi-mangrove-indonesia (accessed on 20 March 2022)

Figure 13. Missing of Mangroves because of Climate
Source: mongabay.co.id/2019/02/11/degradasi-mangrove-indonesia (accessed on 20 March 2022)

Figure 14. Mangrove 2050
Source: kompas.com/sains (accessed on 20 March 2022)

03

THE CAUSES: ENVIRONMENTAL DAMAGE, ECONOMIC CRISIS, AND SOCIAL WELFARE IMPACT

As the result of climate change, extreme weather events are projected to become increasingly common in the twenty-first century bringing significant impacts to coastal ecosystems. More detail, global climate change is triggered by the accumulation of polluting gases in the atmosphere, particularly as a result of human activities such as burning fossil fuels, industry, and exploitative land use, which have contributed to increasing Greenhouse Gases (GHGs) such as Carbon Dioxide (Co2), Methane (CH4), Nitrous and Oxide (N2O), Hydro Fluorocarbons (HFCs), Per Fluorocarbons (PFCs), and Sulfur. Based on data from the Global Carbon Project (GCP), the estimated CO2 emissions in Indonesia were 487 million tons (MtCO2) per 2017, an increase of 4.7% from the previous year. In the same year, Indonesia contributed 1.34% of the world's total CO2 emissions of 36,153 million tons (MtCO2). Then in 2018, GCP researchers calculated a 2 percent increase in CO2 emissions, compared to the previous year. It is projected will going until at least 2030. Indonesia was the world's fourth largest emitter of greenhouse gases in 2015. The 16th biggest economy and the largest in southeast Asia.

The challenge, increase in human population resulting in increased consumption is a major anthropogenic cause of decline and loss of habitat for biodiversity. Beyond that, climate change is a necessity that causes habitat changes both at sea and on land. Our current level of consumption poses a continuing threat to planet earth. This affects biodiversity and some species are almost extinct. Therefore, appropriate actions are needed to overcome them. Climate change and the loss of biodiversity are the greatest challenges today for mankind. It is estimated that we will lose 20-50% of all species in the next century, even some of them before they were discovered. The main causes of biodiversity loss are: habitat destruction, climate change (global warmin, overexploitation, environmental pollution, accident/accident and the arrival of alien species (WWF 2012). The causal factors, drivers, and pressures directly contribute to the degradation of global biodiversity and ecosystem services.

Overexploitation, habitat loss, and the influx of invasive species threaten the world's biodiversity. The current extinction rate is 100 times what it was before humans evolved. Two species have been extinct every day since 2010. Biodiversity is important to mankind as it provides raw materials for food, medicine and industry. Even though protected areas have been created and investments made.

Coastal and marine areas are an integrated and reciprocally correlated ecosystem. Indonesia's forest is one of the forests that has an important role in maintaining the world's environmental ecosystems. Indonesia's forests consist of various types of forests. One of them is the mangrove forest or mangrove forest. The area of mangrove forests in the world is only 0.4% of the world's forest area. However, mangrove forests have a major role as carbon sinks and stores, which are around 4 gigatons C/year to 112 gigatons C/year. Unfortunately, not all residents are aware of the importance of the function of the mangrove forest. Indonesia, which has 75% of the total mangrove forests in Southeast Asia, is still unable to optimize the function of mangrove forests.

On the other hand, mangrove forests are systematically degraded due to human interests. There is a conversion of mangrove forest functions so that it has an impact on decreasing the ability to absorb carbon in the atmosphere and the decomposition of stored carbon through the decomposition process into the atmosphere. The role of the mangrove ecosystem as an absorber and a reservoir for CO2 turns into a contributor to CO2 emissions. These conditions also affect climate change in the world. For the further discussion it can create economic crisis and social welfare.

Carbon storage in mangrove mud substrate can be used as a basic reference in assessing the economic benefits of mangroves in the form of environmental service commodities *C-Sequestration*. Sustainable management of mangrove forests is suitable for carbon sequestration and storage. In addition to protecting coastal areas from abrasion, mangrove plants are able to absorb emissions released from the ocean and air. Absorption of exhaust emissions is maximized because mangroves have a respiratory root system and the unique structure of coastal plants. According to the research that 1 hectare of mangrove forest absorbs 110 kilograms of carbon and a third of it is released in the form of organic deposits in the mud and cannot decompose.

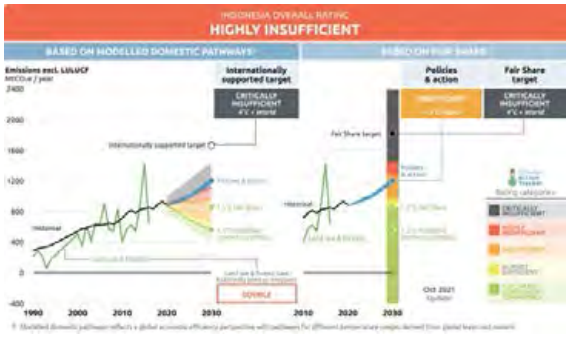


Figure 15. Co2 Emissions caused by Forest & Land Use
Source: climateactiontracker.org (accessed on 23 March 2022)

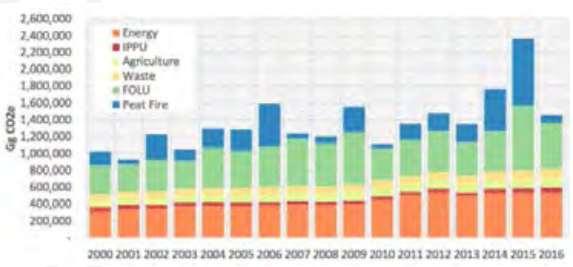


Figure 16. Indonesia's total emissions from 2000-16
Source: carbonbrief.org (accessed on 23 March 2022)

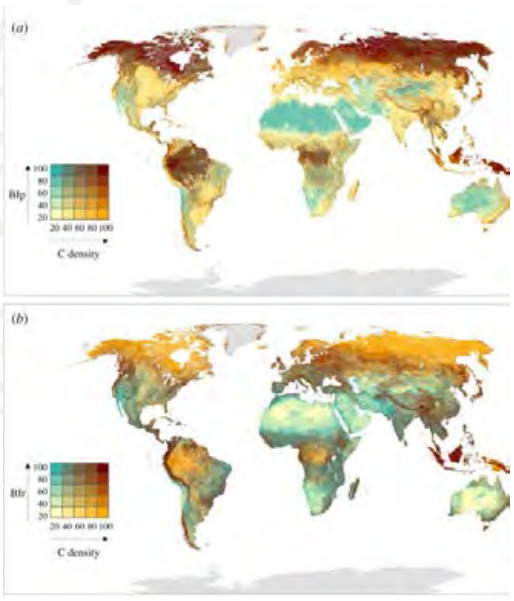


Figure 17. Patial Congruence Between Carbon Density
Source: royalsocietypublishing.org (accessed on 20 March 2022)

04

TOURISM POTENCY: CITY BRANDING OF THREE PILARS IN SPECIAL REGION OF YOGYAKARTA AS A RESOURCES

Figure 18. City of Culture
Source:infojogjakarta.com/2017/03/7-budaya-jogjakarta-yang-paling-terkenal.html
(accessed on 23 March 2022)

Figure 19. City of Education
Source: https://www.hipwee.com
(accessed on 23 March 2022)

Figure 20. City of Tourism
Source: https://akurat.co/ini-alasan-kenapa-turis-asing
(accessed on 23 March 2022)

Figure 21. City of Yogyakarta
Source:https://www.pond5.com/stock-footage/item/84536962-aerial-shot-historical-tugu-jogja-monument
(accessed on 23 March 2022)

A City is a system of human network which is marked by the dense crowd and colored by the heterogeneous social and economical classes with their materialistic characters. A region can be called as a city if it meets three requirements, which are: the number of inhabitants, the diversity of the called jobs and the region's public facilities (Saifullah, R. et All, 2012). In improving the image of regional tourism. City branding, often known as city nicknames, is one of a city's marketing techniques for establishing a large and strong presence in the region and globally. City branding is a city's identity that may be used to promote all of the city's activities, particularly its tourism and cultural potential. According to Kavaratzis (2004, 66-69), city branding influences the image of a city through three stages of communication: primary, secondary, and tertiary communication. Consumers will recognize the product's identity. Yogyakarta is a province of the Republic of Indonesia in the south of the island of Java. It is well-known as a tourist destination with a rich traditional culture and stunning scenery. A province headed by the governor of the kingdom "kraton yogyakarta" with the title of sultanate which is known as a City of Culture, City of Education, City of Fight, and City of Tourism. Yogyakarta Special Region has 5 districts, namely Yogyakarta, Sleman Regency, Bantul Regency, Kulon Progo Regency, and Gunung Kidul Regency.

In fact, Yogyakarta's vision itself, which is "*To create a qualified city of education, a cultural tourism, a firm growth of merit service, an environmentally friendly city as well as civilized society which carries the spirit of Mangayu Hayuning Buwana*"

Javanese culture is one of Indonesia's most distinct civilizations, and it is intimately linked to Yogyakarta. Despite the increasing influx of globalization, Yogyakarta continues to adhere to strong Javanese traditional values. "Plural, inclusive" was mentioned in the ASEAN conference. Yogyakarta was designated as the 5th ASEAN City of Culture (ASEAN City of Culture) for the period 2018 to 2020 by the ASEAN Ministers for Culture and Arts (AMCA) at the 8th AMCA meeting in Yogyakarta. The ASEAN City of Culture movement started in 2008 and aims to strengthen ASEAN identity and enhance ASEAN excellence within and outside the region by celebrating Southeast Asian arts and culture. ASEAN excellence within and outside the region by celebrating Southeast Asian arts and culture. The culture is a representation and expression to gain a knowledge in this city.

On the other hand, one of the results of Yogyakarta's large student population is the growth of educational and discovery learning facilities, which include not only formal education but also non-formal education such as character and cultural education, as well as environmental education. In Yogyakarta, there are roughly 137 universities. Yogyakarta on the other hand, is known as "Student's City," marked by the dynamics of Indonesian students from every regencies ranging from elementary to university and it has evolved into a melting pot area of Indonesia with a cosmopolitan society, with students from all over the country and of many religions flocking to Yogyakarta to continue their studies, have prices that are both affordable and supportive of science's ongoing growth.

Figure 22. D.I.Yogyakarta Regency/City HDI by 2021

Source: bantulkab.bps.go.id/pressrelease/2021/12/01/981/indeks-pembangunan-manusia-ipm-d-i-yogyakarta-tahun-2021.html (accessed on 23 March 2022)

Komponen	UHH (Tahun)		HLS (Tahun)		RLS (Tahun)		Pengeluaran per Kapita (Rp000)	
	2020	2021	2020	2021	2020	2021	2020	2021
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Kulon Progo	75,24	75,27	14,26	14,27	8,86	9,02	10.041	10.069
Bantul	73,86	73,89	15,17	15,38	9,55	9,57	15.517	15.545
Gunungkidul	74,12	74,19	12,97	12,98	7,21	7,30	9.486	9.505
Sleman	74,81	74,92	16,73	16,74	10,91	10,92	15.926	16.060
Kota Yogyakarta	**74,65**	**74,76**	**17,43**	**17,60**	**11,46**	**11,72**	**18.678**	**18.801**
D.I. YOGYAKARTA	**74,99**	**75,04**	**15,59**	**15,64**	**9,55**	**9,64**	**14.015**	**14.111**

Keterangan : UHH = Umur Harapan Hidup saat lahir; HLS = Harapan Lama Sekolah; RLS = Rata-rata Lama Sekolah

Figure 23. D.I.Yogyakarta Regency/City HDI by Component, 2020-2021

Source: bantulkab.bps.go.id/pressrelease/2021/12/01/981/indeks-pembangunan-manusia-ipm-d-i-yogyakarta-tahun-2021.html (accessed on 23 March 2022)

Excellent human resources are required to enable development in these three industries. In 2021, the Yogyakarta Central Bureau of Statistics (BPS) released the Human Development Index (HDI) in five regions. Bantul district has HDI with a comprehensive increase and exceeds the national and provincial index figures. This can help raise the image of a city while developing the program.

Figure 24. Parangtritis South Beach
Source: javatravel.net/pantai-parangtritis (accessed on 25 March 2018)

Figure 25. Mecusuar Pantai Pandansari
Source: sikidang.com/pantai-pandansari/ (accessed on 25 March 2022)

Figure 26. Pine Dlingo Forest
Source: nusakini.com (accessed on 25 March 2022)

Figure 27. Sand Boarding Gumuk Parangkusumo
Source: alodiatour.com (accessed on 25 March 2022)

05

A LINKAGE: IDENTITY, BRANDING, AND CHARACTERISTIC OF SOUTH SHORE AREA

Mangrove baros forest located in south shore area that are famously known as a tourist attraction. As previously described, yogyakarta is often referred to as the "city of tourism". Supported by abundant natural wealth, human resources capable of empowering the local culture, several interesting activities in order to maintain tourist attractions, and equipped with adequate facilities. Its location is strategically in the middle of Java Island as well as own the easy access to places of interest nearby. One of the famous places is the south shore area. The location is continuous from east to west. Nature tourism is widely enjoyed by domestic and foreign tourists. The most popular beach tourism is Parangtritis beach which is on the south coast of Bantul district, Yogyakarta. This tourist area in addition to having tourist attractions in the form of large beach waves because it is located on the south shore which is a beach that is directly opposite the Indonesian ocean, it also has cultural tourism attractions such as ritual ceremonies which are often held to worship the ruler of the South Shore which is believed to provide protection for local residents who still have a belief in supernatural.

Data from kompasiana, the contribution of the tourism sector to local revenue (PAD) of the Special Region of Yogyakarta (DIY) has increased in 2017-2019. However, in 2020 there was a significant decrease in the number of tourists visiting DI Yogyakarta compared to 2019 caused by the Covid-19 pandemic. In this case, steps and strategies are needed to restore the tourism sector. Innovation in the tourism sector needs to be carried out through the use of digitalization and the use of big data as well as tourism development that cares about the environment. Adaptation through the application of CHSE (Cleanliness, Health, Safety and Environment) standards, this aspect is very important for actors in the tourism sector so that tourists who visit feel safer and minimize virus transmission. Collaboration or cooperation with related parties to restore the tourism sector.

The Decree of the Regent of Bantul No. 127 of 2004 concerning the Technical Plan of Parangtritis Tourism Object is to:

1. Improve the physical and environmental quality.
2. Encouraging environmental conservation.
3. Improving the investment climate and community empowerment;
4. Developing the tourism potential.

They are missing the key that will allow them to connect these parts. The tourism magnet is the South Shore. However, they lacked the necessary marketing infrastructure to introduce and educate the general population about mangroves. The goal of this proposed project is to link the mangrove to the surrounding environment in order to get advantage and develop the community and place identity.

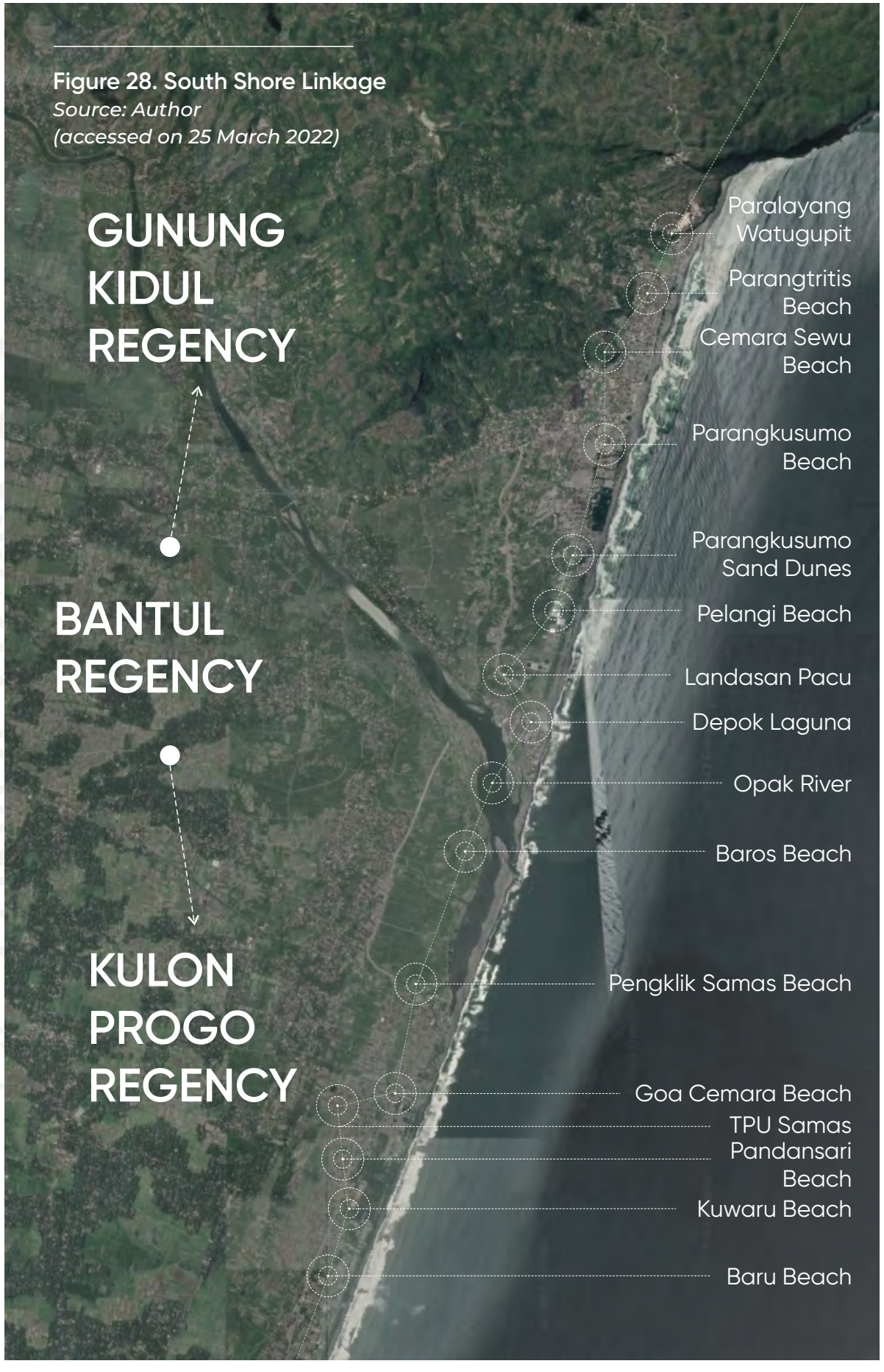


Figure 28. South Shore Linkage
Source: Author
(accessed on 25 March 2022)

06

CRITERIA OF MANGROVE BAROS FOREST UTILIZATION FOR CONSERVATION PURPOSE & FUNCTION

Figure 29. Human Participation of Awareness in Conservation
Source: google.com (accessed on 20 March 2022)

Figure 30. Preserving The Earth
Source: google.com (accessed on 20 March 2022)

Figure 31. Preserving Fauna
Source: google.com (accessed on 20 March 2022)

Humans have a natural attitude toward life in which they take advantage of the resources that nature has offered. Unfortunately, people frequently overlook the fact that indiscriminate biodiversity exploitation has a negative impact. The most serious consequence is that these natural resources will become limited, if not completely extinct. Human survival is profoundly influenced by the scarcity and extinction of diverse species. As a result of this situation, a notion or endeavor to protect natural riches is required. These efforts are based on the idea of mutualism between humans and nature, popularly known as conservation.

The definition of conservation according to the KBBI is the maintenance and protection of something on a regular basis to prevent damage and destruction by preserving. Law No. 5 of 1990 concerning Conservation of Biological Natural Resources also provides the definition of conservation, namely the management of living natural resources in which the utilization is carried out wisely in order to ensure the continuity of the biological supply by increasing and maintaining the quality of its value diversity. According to the International Union for Conservation of Nature and Natural Resources (IUCN), conservation is a management activity between human life and natural resources so that life can be maintained and preserved. Conservation can also be defined as the free and active management of the biosphere with the aim of maintaining the survival of species diversity, maintaining the genetic diversity of each species, as well as maintaining nutrient cycles and ecosystem functions as mentioned by Michael Allaby in A Dictionary of Ecology.

Mangrove forests are important natural resources in the coastal environment, and have three main functions, namely physical, biological, and economic functions.

1. The physical function

a. Developing marine areas into new land, because the roots of mangrove plants are able to bind and stabilize the mud substrate, which results in sediment consolidation in mangrove forests.

b. As a prevention from natural hazard such as windbreak, pollutant filter, wave barrier, flood control and prevention of seawater intrusion into the mainland.

c. As a filter for seawater intrusion from metal industrial waste, which can interfere with the life of living things.

2. The biological functions

a. As a habitat, a spawning ground, a nursery ground, and as a feeding ground for fish and other marine biota.

b. Suppliers of organic food chain systems for organisms that live around them.

c. The provider of energy for living things from the history it produces.

3. The economic function

a. a producer of wood for raw materials and building materials, foodstuffs and medicines.

b. Supporting economic activities in the field of fisheries around the coast.

c. A place for producing ponds and making salt.

d. Meanwhile, Vo et al., (2012) added that mangrove forests also have an economic function as a place for education, tourism and research objects.

4. Cultural fuction

a. the leaf can be used as a batik coloring

b. the wood root can be used for crafting

c. the cambium can be used as a drink

In addition, the function is strategically as a primary producer capable of supporting and stabilizing marine and terrestrial ecosystems (Romimohtarto and Juwana, 2001).

Figure 32. Permeable Sediment Consolidation & Hazard Barrier
Source: panorama.solutions (accessed on 26 March 2022)

Figure 33. Biodiversity Habitat and Food Chain System
Source: forbes.com/sites (accessed on 26 March 2022)

Figure 34. Metal Industrial Waste in Coastal Area
Source: pxfuel.com/en/free (accessed on 26 March 2022)

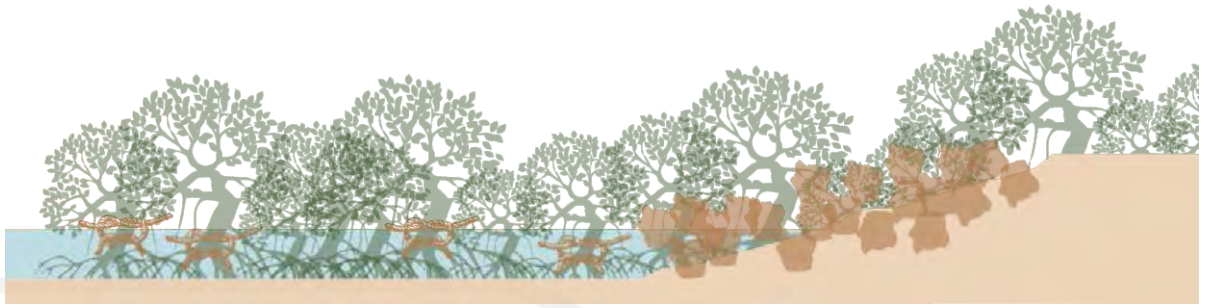
Figure 35. Mangrove Fruit
Source:sigerindo.com/2018/03/diang gap-beracun-buah-mangrove-ternyata.html (accessed on 26 March 2022)

The Food and Agricultural Organization (FAO) revealed that Indonesia has a proportion of 22% of the largest mangrove growth area in the world, of the total global mangrove area.

Mangrove conservation awareness is one of the newly developed coastal educational tours. This mangrove conservation area is located in Padukuhan Baros, Tirtohargo Village, Kretek District, Bantul Regency, Special Region of Yogyakarta. Based on its geographical location, it is located at coordinates 08o 00' 28.6"S 110o 16'59.4"E and has a distance of 18.8 km from the city of Bantul. The existence of this mangrove is a characteristic of coastal areas in the tropics and sub-tropics. Of the approximately 16.9 million ha of mangrove forests in the world, about 27% are in Indonesia (Bengen, 2002). Data obtained from the Directorate General of RRL (1999) in Fatimah (2012) states that the area of mangrove forests in Indonesia is 9.2 million ha (3.7 million ha in forest areas and 5.5 million ha outside). According to Haryani (2013), deforestation of mangrove forests causes mangrove forests in heavily damaged conditions to reach an area of 42%, damaged conditions reach an area of 29%, good conditions reach an area of <23% and in very good condition only an area of 6%.

Physical Function

Stabilize Mud Substrate & Sediment Consolidation



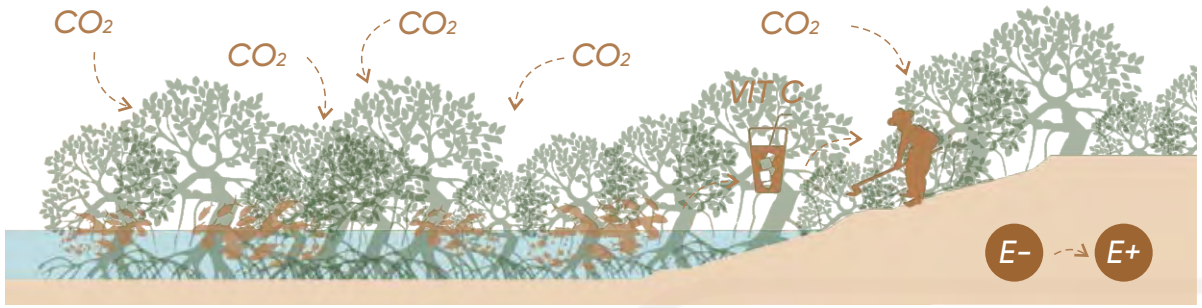
Natural Hazard Barrier: Rising Sea Water, Windbreak, Cyclone

Metal Industrial Waste

Biologycal Function

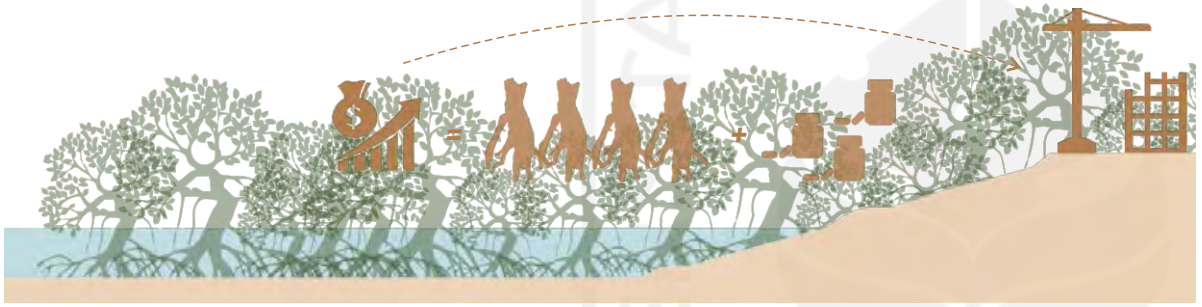
Biodiversity Habitat

Organic Food Chain System & Energy for Living Things



Economic Function

Raw Materials & Construction



Supporting Fisheries, Agriculture, and Community by Sea Salt Pond (Silvofishery, Silviculture)

Education, Tourism, Conservation, & Research

Conservation Aims, the primary purpose of conservation is to safeguard biodiversity and ecosystems so that humanity can continue to benefit from them. These objectives, on the other hand, can be split down into more specific points.

Some of the conservation goals include the following:

1. Protect, restrict, and maintain a valued region or habitat to avoid the chance of damage or extinction of the components that make up the environment, which could lead to an ecosystem imbalance.

2. To avoid new clearance operations such as shifting forest functions to non-forests, emphasizes the reuse of buildings or locations that are no longer in use by upgrading or reverting their functions to their original state so that they can be reused.

3. Protect historical sites, artifacts, and cultural heritage from being harmed or destroyed. The Sangiran Geographical Spatial Unit in Sragen, Central Java, for example, is located in an area with a lot of biodiversity. Environmental precautions are also needed to protect cultural heritage in the area.

4. Ensure the availability of clean water and air to maintain acceptable environmental quality. This ecosystem extends from the land to the sea.

Figure 36. Mangrove Function Scenario Diagram
Source: Author
(produced on 26 March 2022)

The Regional Government established the Baros mangrove ecosystem as a Mangrove Conservation Area on April 28, 2014, through the Regent of Bantul Regency's Decree Number 284 of 2014 concerning Reserves for Coastal Park Conservation Areas, which consists of three zones, namely the core zone (10 ha), other zones (94 ha), and the limited use zone, in an effort to protect and preserve biodiversity in the Baros mangrove ecosystem (28 ha). The Minister of Maritime Affairs and Fisheries of the Republic of Indonesia issued Regulation No. Per.17/Men/2008, which states :

1. The central zone

It was designated as a core zone because it is a spawning location (spawning ground), a nesting site, a nursery region ground, a feeding area for fish and/or aquatic biota, and a distinctive and fragile coastal and small island environment. This area is composed of biotic components. The condition must also be in its original state and have not been disturbed by human hands. Its function is to provide protection for sensitive flora and fauna as well as a source of germplasm.

2. Zone of restricted access

Is a place where habitat and fish populations are protected, as well as tourism and recreation, research and development, and education. This area serves to breed rare fauna and anything that is a buffer for the core zone. The area, which is also used as an area for preserving natural resources, is inhabited by migratory fauna.

3. Additional zones

Is a zone beyond the core zone and a limited use zone that is defined as a specific zone based on its function and condition, including a rehabilitation zone.

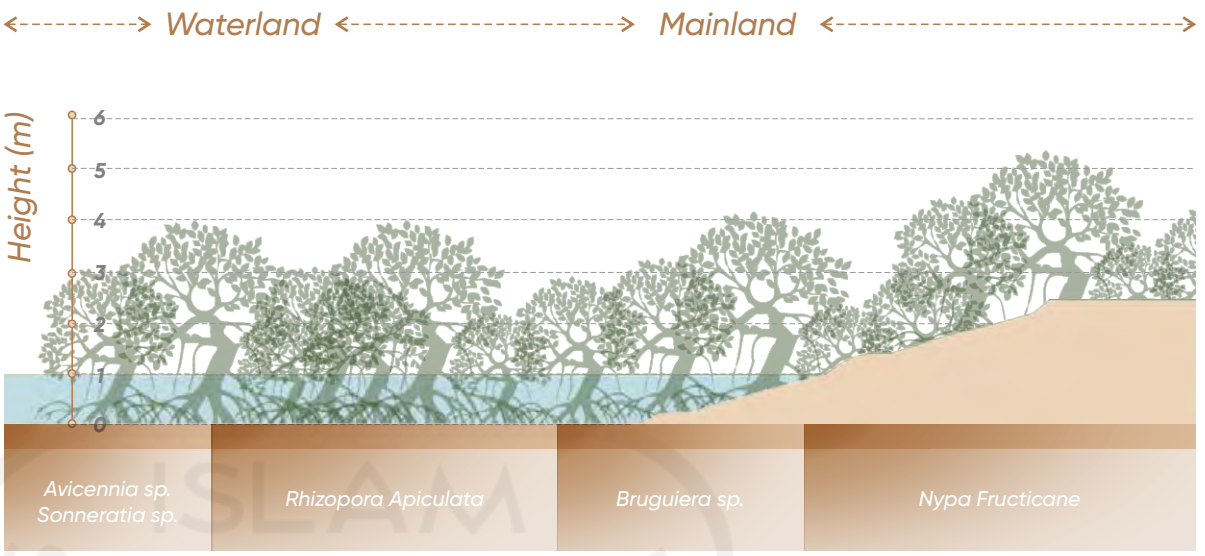
Figure 37. Map of Reserved Mangrove Coastal Park Conservation Areas in Bantul Regency

Source: Dinas Lingkungan Hidup dan Kehutanan Daerah Istimewa Yogyakarta Re-draw by Author (accessed on 13 March 2022)

According to Sukardjo (1993, in Ghufron H. and Kordi K.M, 2012), The mangrove vegetation zone is determined by several important factors Soil substrate, Openness to tidal waves, which determines which substrate can be utilized, Land influences such as fresh water inflow, Salinity is related to the osmotic relationship of mangrove plants, Tidal waves that determine the frequency of plants flooded.

According to Bengen (2002) and developed by Sari (2013), zoning Mangrove forest in Baros consists of:

1. ***Mangroves Open***
   The area closest to the sea, with sandy substrate, often overgrown by Avicennia spp. In this zone, usually associated with Sonneratia spp. which predominately grows in deep silt rich in organic matter. Areas facing the sea or the estuary of Avicennia and Sonneratia because Avicennia seeds cannot grow well in shady conditions and thick mud. Avicennia can live optimally despite high salinity.
2. ***Middle Mangrove***
   More landward, mangrove forests are generally dominated by Rhizophora spp. In this zone, Bruguiera spp. and Xylocarpus spp.
3. ***Brackish Mangroves***
   The next zone is dominated by Bruguiera spp. Grows well and optimally on harder substrates as in clay.
4. ***Mainland Mangroves***
   The transition zone between mangrove forest and lowland forest is usually overgrown by N. fruticans and several other species. Nypa fructicane lives optimally in water containing low salinity compared to other zones.



The mangrove vegetation zones related to tides consist of:

1. Areas that are always flooded even at low tide generally dominated by Avicennia spp. or Sonneratia spp.
2. The area inundated by the tide is dominated by the species Rhizophora spp.
3. The area is flooded only at high tide, which area is more to the mainland. Generally this zone is dominated by Bruguiera spp. and Xylocarpus spp.
4. The area is inundated only at high tide (only a few day in a month) is generally dominated by Bruguiera sexangula.

Because Avicennia sp. mangrove species were found in varied zones near the sea to zones closest to land, the mangrove zone in the Baros mangrove conservation area does not have the correct mangrove zone.From east to west, the dispersion is evenly dispersed. This also happened to Rhizophora apiculata, a mangrove species that was found from near the sea to near the mainland, though not as much as Avicennia sp. ThingThis demonstrates that Avicennia sp is salt tolerant, allowing it to live in the front to back zone (Supriharyono, 2000 in Ghufron H. and Kordi K.M, 2012).

Avicennia sp.
Sonneratia sp.

Black mangrove is probably the best species in the process of stabilizing its habitat soil because of its easy seed dispersal, tolerance to high temperatures, rapid growth of respiratory roots (stake roots) and the root system underneath is able to hold sediment well.

Rhizopora
Apiculata

Red mangrove (Rhizophora spp.) is the second best type. These types can reduce the impact of damage to currents, large waves and wind (Kusmana et al. 2005).

Bruguiera sp.

The most widely used mangrove species are from the genera Rhizophora, Bruguiera, Ceriops, Avicennia, Nypah and Onchosperma (nibung). The first four types produce fuel wood, charcoal, carpentry wood and tanning materials.

Nypa Fructicane

Leaves are used for purposes such as roofs, mats, baskets, wrapping and other household utensils. The flower stalks are tapped to obtain the juice which is cooked into brown sugar and can be processed into a kind of drink, while the nibung stems are used for house poles (Kartawinata 1978).

Figure 38. Mangrove Baros Vegetation Zonation
Source: Arum Laksita Sari Thesis Book Re-draw by Author (accessed on 24 March 2022)

Because of the ability of plant roots to expel or secrete salt, mangrove plants may survive in water with a high enough salinity. Some types of mangrove trees contain roots that may separate salt, according to Johannes (1975) in Ghufron H. and Kordi K.M (2012). The types of mangrove plants in the Baros conservation area are as follows :

&

In the Baros mangrove conservation area there are also plants other than mangroves are:


Bruguiera sp.


Sonneratia sp.


Avicenecia sp.


Nypa Fructicane


Rhizopora Apiculata

Figure 39. Mangrove Baros Vegetation
Source:repository.umy.ac.id/bitstream/handle/123456789/15218/I.%20BAB%20V.pdf?sequence=9&isAllowed=y (accessed on 27 March 2022)

Bruguiera sp. has characteristics similar to shrubs or tiny trees in that the upper leaves are green and the lower ones are yellowish. Solitary flowers hang from the stalk in the leaf axils. This species of mangrove can be found in drier areas, yet it can survive in a wide range of salinity levels.

Sonneratia sp. is a species of Sonneratia.Round leaves with rounded ends, fruit resembling balls with rounded ends, stems and covered by flower petals are characteristics of this Sonneratia variety of mangrove. Sonneratia, on the other hand, hasThe term "chicken claw root" refers to a plant with horizontal roots in the ground and a root that appears above ground as a blunt cone-shaped breath root.

Avicenia sp. is a species of Avicenia.A long, tight breath root appears around the base stem of Avicenia sp. mangroves, often known as api-api. The leaves of this type of mangrove are white or gray in color, with a glossy green underside and upper side.

Nutricia Nypa Mangroves of the Nypa kind feature green elder leaves and yellow younger leaves. The blooms emerge from the leaf axils and are round like eggs, flattened with 2-3 ribs, and have a reddish brown color. The fruit is in clusters and forms a ball with a diameter of 20-30 cm.

Rhizopora apiculata has tunjang roots on its roots, an elliptical leaf shape that widens to a rounded shape with elongated and tapered ends, and an elliptical leaf shape that widens to a rounded shape with elongated and tapered ends. Flower head in the shape of a 39-fork, bisexual, in leaf axils, with 4-8 blooms per group.


Hibiscus tiliaceus


Pandanus odorifer

Hibiscus tiliaceus is a kind of Hibiscus (hibiscus tree)The stemmed leaves of this hibiscus tree are circular in shape, like a heart, with flat sides, and spines with finger leaves. His defensive ability is due to the fact that it can withstand both dry and wet environments.The distribution of hibiscus plants in the Baros mangrove conservation area is dispersed throughout the middle and closest zone to the mainland. Waru can be found on sandy beaches, mangrove woodlands, and riparian areas, according to Nathanael (2013). In the mangrove protection area, there is a waru tree.

The pandanus tree grows in the sea (Pandanus odorifer) has a stratified canopy, having a low canopy in the front and a taller canopy the further back the crown goes. When a tidal wave occurs, this function is to break the waves. Sea pandanus can also endure both dry and wet environments.

Figure 40. Mangrove Baros Vegetation
Source:repository.umy.ac.id/bitstream/handle/123456789/15218/I.%20BAB%20V.pdf?sequence=9&isAllowed=y (accessed on 27 March 2022)

Figure 41. Mangrove Biodiversity Sustainability
Source: inhabitat.com/are-mangroves-the-solution-to-urban-sustainability-in-asia/mangrove-biodiversity/ (accessed on 28 March 2018)

Figure 42. Coastal Ecosystem
Source: iucn.org (accessed on 28 March 2022)

Figure 43. Flying Bird
Source: kindpng.com (accessed on 28 March 2022)

07

PLASMA NUTFAH & FOOD CHAIN: BIODIVERSITY OF FLORA AND FAUNA IN MANGROVE BAROS FOREST

Mangrove forests thrive in a variety of environments around the world. According to Noor et al. (2006), mangrove forests cover 18.1 million hectares worldwide. Mangrove forests may be found in practically every coastal area in Indonesia. Indonesia's mangrove forests cover 4.5 million ha, accounting for 23% of the world's mangrove forests with high mangrove diversity. In Indonesia, there are 202 mangrove species, 43 of which are real mangroves and the others are categorized as linked or related mangroves. In 2005, Indonesia had just 3,062,300 hectares of mangrove forests, with 48% moderately damaged and 23 percent severely damaged (Ginting et al, 2014). As a result of this loss, conservation efforts must be made to conserve or safeguard the ecosystem or natural resources while also maintaining and improving the quality of value and diversity because there were no mangrove plants growing around the Baros coast at originally, the Baros Mangrove Conservation Area is unique. According to the results of interviews, the Baros mangrove forest has grown to 6 ha since its planting in 2003. However, the size of the baros mangrove forest has shrunk to 5 ha.


Avicennia marina


Rhizophora mucronata


Bruguiera parviflora


Nypah fructicans


Casuarina equisetifolia


Hibiscus tilaceus


Acanthus ilicifolius


Inocarpus fagifer


Rhizophora apiculata


Sonneratia alba


Pandanus tectorius


Morinda citrifolia


Terminalia catappa


Calophyllum inophyllum

Figure 44. Mangrove Baros Vegetation
Source: Teresa, D. 2019 UKDW Thesis (accessed on 27 March 2022)

Based on (Teresa,D. 2019), the 14 mangrove species found in the Baros mangrove protection area are categorized into six true mangrove species and eight related mangrove species. *Rhizophora mucronata, Avicennia marina, Nypa fructicans, Sonneratia alba, and Rhizophora apiculata are true mangroves. Hibiscus tilaceus, Inocarpus fagifer, Acanthus ilicifolius, Casuarina equisetifolia, Terminalia catappa, Pandanus tectorius, Morinda citrifolia, and Calophyllum inophyllum are among the associated mangroves.* The species *Avicennia marina* and *Rhizhopora mucronata* are suited and resistant to the circumstances of the baros mangrove habitat, as evidenced by the frequency with which they have been discovered. Because this is not a natural mangrove forest, the type of mangrove in this location has a concentrated and uniform distribution pattern. In this area, the mangrove environment is still reasonably constant and balanced. Tides and river mouths, which are always changing, have an impact on mangrove habitats. Bantul Regency Regional Development Planning Agency 2016, In the mangrove environment, many plants and animals interact. Various creatures use the mangrove conservation area to obtain food, shelter, and a safe place to dwell throughout their lives. The Baros mangrove protection area has evolved into a wildlife refuge. The biodiversity of the Baros mangrove area is made up of both land and water creatures. Popaco, herons, tiny crabs, crustacea, and squid are among the local fauna. Egrets and belodok fish are the most common species found among the varied fauna.

Figure 45. Mangrove Baros Fauna
Source: Google.com
(accessed on 28 March 2022)

The mangrove ecosystem is a site where varied fauna go to spawn (spawning ground), nurse (nursery ground), and look for food (feeding ground) (feeding ground). Mangrove ecosystems provide as a breeding ground for a variety of land and aquatic animals. Life on the coast and near the sea. There are several that have something to do with the mangrove ecology.According to Hadipurnomo (1995), the mangrove environment provides around 80% of the seafood consumed by humans. Suryoatmodjo (1996) stated that while the mangrove ecosystem accounts for only 10% of the sea's surface area, it is home to 90% of marine species. Production fishing is heavily reliant on the mangrove ecology in some regions.

Plants and animals that interact with it are constantly adapting. Many different species use the mangrove ecosystem to find food and refuge, whether they are young or have completed their life cycle. When the tide recedes, plant mangroves to give perches and nice rest for the birds. Ecosystem damage to mangroves can have a significant impact on the number of birds that stop and look for food in the region surrounding the mangroves. Turtles are another animal that comes to a halt in the Mangrove habitat. Turtles lay their eggs in the ecosystem's mangroves, particularly in sandy places. In front of the mangrove ecosystem, turtles are also hunting for food in the form of seagrass. The turtles swim across the water after laying eggs and searching for sustenance.

The main link in the food chain in the mangrove ecosystem, part of the coastal. has high biological productivity. Logo and Sendaker (1974) confirmed that the primary productivity of mangrove forests can reach 5,000 g C/m2/yr.

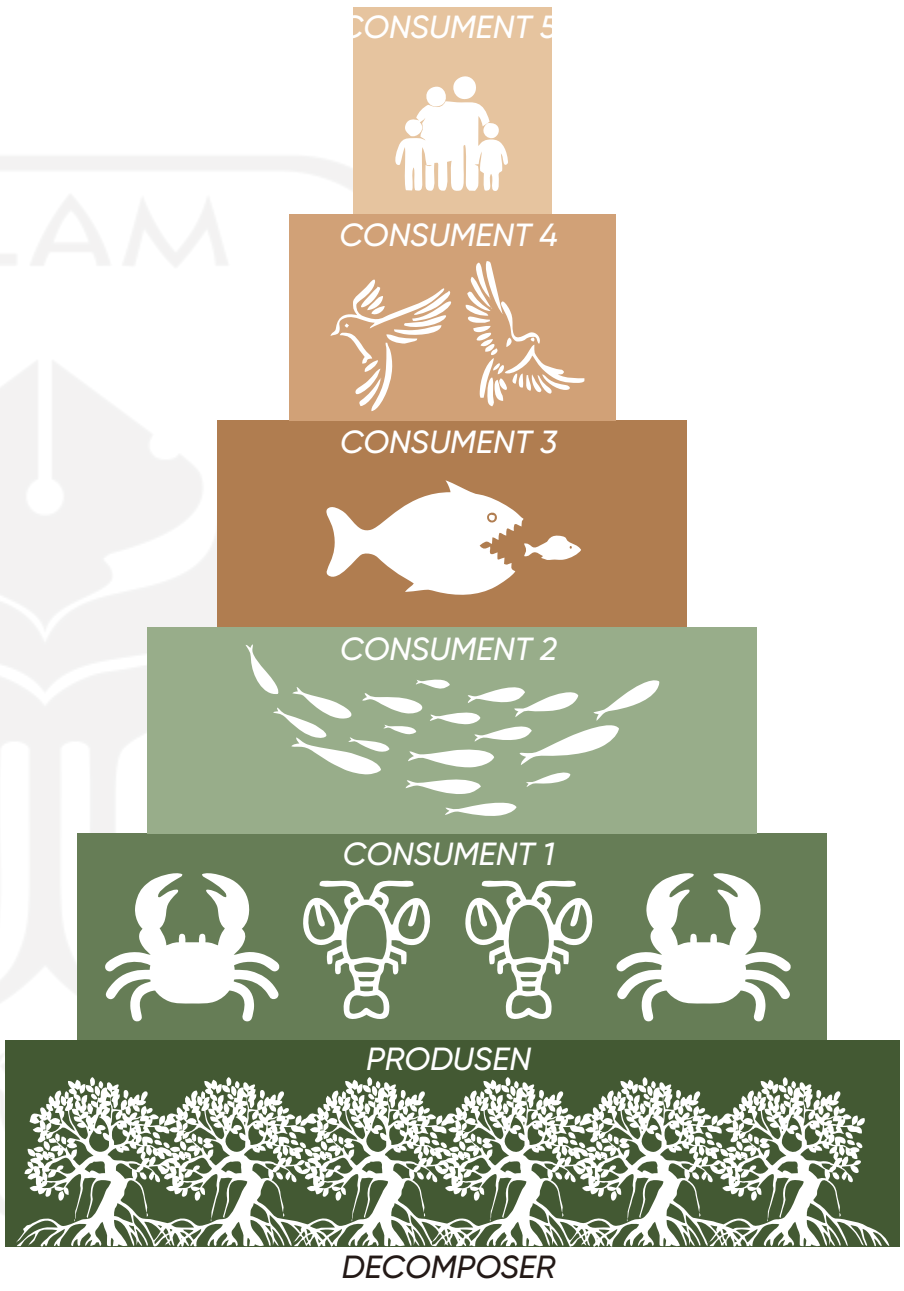


Figure 46. Mangrove Forest Food Chain as Produsen and Habitat
Source: sehat cerdas.blogspot.com (proccessed on 27 March 2022)

08

TYPE OF MANGROVE FOREST: MANGROVE BAROS FOREST UTILIZATION FOR ECO-EDU TOURISM PURPOSE & FUNCTION

Figure 47. Mangrove Baros Conservation Eco-Edu Tourism
Source: visitingjogja.jogjaprov.go.id (accessed on 09 March 2022)

Figure 48. Fishery Activities in Mangrove Baros
Source: vekonomi.bisnis.com (accessed on 10 March 2022)

Figure 49. Mangrove Baros Planting Community
Source: www.krjogja.com/berita-lokal/diy/bantul/prajurit-lanal-yogyakarta-tanam-mangrove-di-pantai-baros/ (accessed on 10 March 2022)

In the sphere of tourism, Indonesia has immense potential for development as a source of money in the context of its national development.Indonesian tourism is supported not only by natural conditions such as location and geography (oceans and lands) of fertile soil and panoramic views of great beauty as a result of geological ecology, but also by flora and fauna, as well as cultural diversity passed down from generation to generation young. Tourism is one of the businesses in Indonesia that is now undergoing extensive development. This is because tourism is one of the country's main foreign exchange earners. The existence of the baros mangrove forest has had a societal impact and economic conditions of the local community.

Ecotourism is defined as *"a type of tourism conducted in naturally contaminated places with the goal of studying, admiring, and enjoying the state of environment, its flora and fauna, as well as the cultural manifestations of the people who live in the area"* - Ceballos and Lascurain.

Another theory said that ecotourism is responsible travel to natural regions that preserves (conserve) the environment while also increasing the well-being of local people.

Bantul Regency is one among the tourism spots. This area is part of the province of Yogyakarta's Special Region, which has a lot of potential and unique tourism attractions. Bantul Regency is situated between the latitudes of 07° 44′ 04″ and 08° 00′ 27″ south and the longitudes of 110° 12′ 34″ and 110° 31′ 08″ east. Bantul district has a total size of 508.85 km2, with

lowland topography and highland areas that are less fruitful. The Oyo River, the Opak River, the Code River, the Winongo River, the Bedog River, and the Progo River all flow through Bantul Regency. The district is bounded on the north by the city of Yogyakarta and the Sleman districts, on the east by the Gunung Kidul district, on the south by the Indian Ocean, and on the west by the Kulon Progo district. The limestone mountains that make up the southern half of this area, which is located at the western end of the Sewu Mountains, dominate the landscape. Kali Progo is a major river that flows through the area (limiting this district with the districts of Kulon Progo, Kali Opak, and Kali Tapus).

Bantul district itself has a lot of tourist attractions that are worth visiting, such as the famous marine tourism in Bantul, namely Parangtritis beach, Parangkusomo, Depok Beach, Samas Beach, Pandansimo Beach, Goa Cemara Beach, Baru Beach and Kuwaru Beach. For other natural attractions, there are Selarong Cave and Cerme Cave. Then for cultural or religious tourism there is an imogiri cemetery and the tombs of the kings of Kotagede. Meanwhile, the district of Bantul has a number of tourist settlements. Bantul is mostly a craft-producing village. Kasongan (pottery producer), Pundong (pottery producer), Pucung (leather crafts), Gendeng (leather crafts, especially wayang), and Krebet tourist village are among the localities mentioned (producing wood crafts, especially masks). Aside from the villages visited on this tour, handicrafts can be purchased at the Gabusan Art Market on Parangtritis Road. But, in addition to these well-known tourist attractions, there are others.The Baros Mangrove Forest is a relatively new tourist attraction that has quickly become one of the most popular in Bantul (Indah. A. N, 2018).

Figure 50. Tourist Attraction Parameter & Indicator
Source: Armindo, 2015 (accessed on 30 March 2022)

an ecotourism location for mangrove forests and south coast tourism. The Baros Mangrove Forest is located near Bantul, to the west of the Opak River's mouth and to the east of Samas Beach. Baros Hamlet, Tirtohargo Village, Kretek District, Bantul Regency is precisely placed. The Relung NGO pioneered and administered a nursery program in the Baros Mangrove area in the Opak River estuary, and now local organizations are members of the Baros Youth Youth Group (KP2B), and the cooperation of numerous agencies has contributed to the success of mangrove forest development and rescue Estuary of the Opak River. The present mangrove plants will be able to continue to exist. The leaves do not dry out despite being planted on soil that is a mixture of silt, volcanic sand, and clay due to volcanic ash deposits from Mount Merapi's eruption.

This idea was established on the concern and initiative of local residents who noticed the natural potential around the banks of the Opak River estuary and Baros Beach that may potentially be developed as an attraction in the area. Because this place has the potential for human resources, natural resource potential, and other potential to be developed, such as as a natural tourism region, the presence of mangroves in Baros Hamlet has a lot of potential to be exploited (Ecotourism). Some of the existing facilities in the mangrove baros debt according to research from (Indah. A. N, 2018) are Baros Mangrove Forest Icon, Lookout Tower, Educational Tour, Boat Ride. The concept of ecotourism tries to combine three important components, namely nature conservation, empowering local communities, increasing environmental awareness.

Building designs in conservation zones must be able to adapt to their surroundings, as well as existing ecosystem conditions, so that their presence does not harm existing ecosystems. They must also be able to adapt to changes in natural conditions. Ecotourism aims to promote a tourism concept that is environmentally conscious. The ecosystem in the vicinity shall not be harmed by the construction of ecotourism object buildings.

The nature, quality of being easy to adapt to the environment is required for adaptive design (chameleon/mimicry) to respond to site conditions. Adaptation is the process through which organisms deal with environmental constraints in order to live and respond to changes in their environment.

Adaptability is classified into three categories:

1. Morphological adaptation refers to shape adjustment as a form of adaptation.
2. Physiological Adaptation is a term that refers to the adaptation of a person's bodyAdaptation entails changing the building's purpose to the surrounding conditions (ecosystem).
3. Behavioral Adaptation Is an adaptation in which living things modify their behavior in response to natural conditions and situations (sun, temperature, light).
4. Environment acclimatization.

Figure 51. Mangrove Baros Eco-Edu Tourism Activity
Source: Instagram.com (accessed on 25 March 2022)

In Indonesia, education on mangroves is vital in efforts to protect mangroves, which is aimed not just for specific communities, but for the entire community, so that the quality and quantity of the Mangrove ecosystem can increase more quickly. The Mangrove Conservation Center was designed to help with conservation, education, and entertainment in the Mangrove Forest area of Baros Beach, Bantul Regency. This facility's acquisition is focused on Mangrove plants and the biotic-abiotic environment that makes up the Mangrove ecosystem.

The youths, led by one of them by Dwi Ratmanto, have since 2012, developed eco-edutourism with the theme "agrosilfofishery tourism". The development of environmental education-based tourism is based on the Decree (SK) of the Bantul Regent No. 284/2014 concerning the Declaration of Coastal Park Conservation.

Quoted from the KP2B Conservation Division, part of the mangrove area around the Opak river should not be opened for mass tourism. Therefore, we develop special interest tourism. With various tour packages offered, such as live in kampoeng, mangrove forest camping, tourist attractions, conservation, and outbound visits, within a month his party is able to attract 400-700 tourists, both local and foreign. 80 percent of tourists choose to plant mangrove trees.

The principle of ecotourism, according to Nugroho (2015), is to reduce environmental damage, improve environmental consciousness and culture, give a positive experience for tourists (visitors) and recipients (hosts), provide benefits, and empower local communities. Edu-based Ecotourism is also a solution to children's understanding of the environment through education, as mandated in Surat Joint Decree No. Kep.07/MenLH/06/2005 and No. 05/VI/KB/2005 concerning Development and Environmental Education Development Life by the Ministers of Environment Life and National Education.

While increased environmental education is the goal,The emphasis is on imparting a perspective as well as the proper attitude toward nature, so that students are expected to be environmentally conscious (Keraf 2014). In general, edu-ecotourism is about selling local science and philosophy, or Ecosystem and Sociosystems Philosophy, as well as natural places. Increased environmental consciousness among various parties and issues with ecologically friendly development have contributed to a better understanding of the need of sustainable tourism concepts. (Bappeda West Java 2016, Appeda West Java, Appeda West Java, Appeda Principle tourism is meant to protect the environment, preserve culture, improve educational quality, empower local communities, and assist local communities, regions, and governments economically. To attain this goal, tourist management activities that can support environmental sustainability through implementation of the edu-ecotourism pattern as a medium for character education based on the environment are required.

Benefits of "Baros Mangrove Forest" for Surrounding Communities with the existence of mangrove forests, it has a positive impact on the surrounding community, among others:

1. Able to improve the economy of the surrounding community
2. Opening business opportunities and job opportunities
3. Increase public awareness to protect and preserve the environment, and maintain the balance of the ecosystem
4. Influence on social, economic and physical conditions
5. Able to provide a sense of belonging to the community
6. Protecting community rice fields from abrasion
7. Protect agricultural crops from high salt sea breezes
8. Expanding the network of the surrounding community with various parties who care about environment

The presence of mangrove ecotourism in conservation areas can serve as a forum for sharing information that aids in the advancement of science, conservation, and research on mangrove ecosystems that use mangroves as natural tourist destinations without causing significant disruption to the mangroves existence.

Edu-ecotourism is a progression from the initial ecotourism, which was introduced in 1990 by the organization The Ecotourism Society and is a type of responsible tourism that focuses on environmental conservation, life preservation, and the well-being of local communities (Alamsyah, 2013)

Edutourism activities as well as other ecotourism activities also have a component of facilities and services. According to Wood (2002:28), the characteristics of edutourism facilities and services, looking at the types of eco-edu tourism facilities and services is as follows:

1. Protecting the surrounding environment, both in the form of the natural environment and local culture.
2. Has minimal impact on the natural environment during its construction and operation.
3. In accordance with the cultural and physical context of the local area, for example, it is marked by an appropriate architecture blends with the shapes, landscapes and colors of the local environment.
4. Reducing the level of water consumption and using alternative sustainable ways to obtain additional water.
5. Manage waste and garbage with care.
6. Meeting energy needs through the use of passive design tools and facilities (designs that do not changes the natural environment a lot)
7. In its development and management seek cooperation with local communities.
8. Offer quality programs to provide education about the natural environment and local culture towards workers and tourists
9. Accommodate various research programs in the context of contributing to edutourism activities

to the sustainable development of the local area.

"This is urgently needed"

"to allow for mangroves and other coastal ecosystems to be taken fully into account in the development of and future reporting against the post-2020 Global Biodiversity Framework."

- Julika Tribukait, Policy Advisor on Coastal Ecosystems at WWF Germany

Warsidi et al (2013:7) highlighted three aspects of ecotourism that are currently being developed: 1) conservation, 2) educational, and 3) economic. According to Sulistiani, et al (2011), there are two tactics that can be used in the development of edu-Ecotourism: designing varied tourism goods and developing the abilities, skills, and competence of the surrounding community.

Figure 52. Mangrove Baros Eco-Edu Tourism Facility
Source: Author
(Taked on 15 March 2022)

On Thursday, October 31st, the Yogyakarta KSDA Hall hosted a meeting to discuss the formation of KEE Mangrove Baros. The Ministry of Environment and Forestry, DIY Government Agencies, Regency Government Agencies Bantul, Academics, NGOs, as well as the Trihargo Village Government and the Baros Youth Family, were all present at this event.Wetland Ecosystems, Wildlife Corridors, High Conservation Value Areas, and Conservation Parks are all KEE criteria. The following are some of the agreements reached as a result of this meeting:

1. The Baros Mangrove region fits the criteria for an essential wetland ecosystem area with endemic species and provides a habitat for water birds and migratory birds such as the Javan Lathe, Javan Plover, Javanese Trinil, Semak Trinil, and Kareo Padi, therefore it is possible to request that it be recognized as such.
2. All parties present agreed that the Bantul Regency's Baros Mangrove area should be maintained and considered as an important ecosystem area. There are two alternatives for determining the mangrove baros area to be used as KEE, namely option 1 with an area of 19.18 hectares and option 2 with an area of 9.06 hectares.
3. a resolution on area choices to the DI Yogyakarta Environmental and Forestry Service and the Yogyakarta KSDA Hall.
4. a collaborative Forum for the Management, which is coordinated by the Department of Environment and Forestry, DI Yogyakarta, and the Yogyakarta Natural Resources Conservation Center, in order to propose and manage.

Law No. 41 of 1999 determiningn the Forest types can be distinguished based on the following, namely:

Based on the function

a. *Protected forest*
is a type of forest that helps to conserve soil and regional water systems.

b. *A Forest Nature Reserve*
is a forest area that has been particularly established for the protection of biological nature or other benefits due to its unique qualities. Nature reserves and wildlife reserves are included in forest nature reserves. a nature reserve area with a distinguishing feature in the form of diversity or uniqueness of animal species, which can be carried out under the guidance of their habitat for their survival.

c. *A tourism forest*
is one that is designed to be nurtured and maintained for the purpose of promoting or developing tourism. A Tourism Park, a New Park, and a Marine Park make up the tourist forest. Tourism Park is a tourism forest with natural beauty, including both vegetable and animal beauty, as well as its own unique natural beauty that can be exploited for recreational and cultural purposes. Taman Baru is a tourism forest with new creatures that allow leisure hunting on a regular basis. The term "marine park" refers to an offshore marine area or sea that is still within the Indonesian marine area and has empty rocks or biota.

d. *Production Forests*
provide timber and non-timber goods, such as those used in the lumber and pharmaceutical sectors.

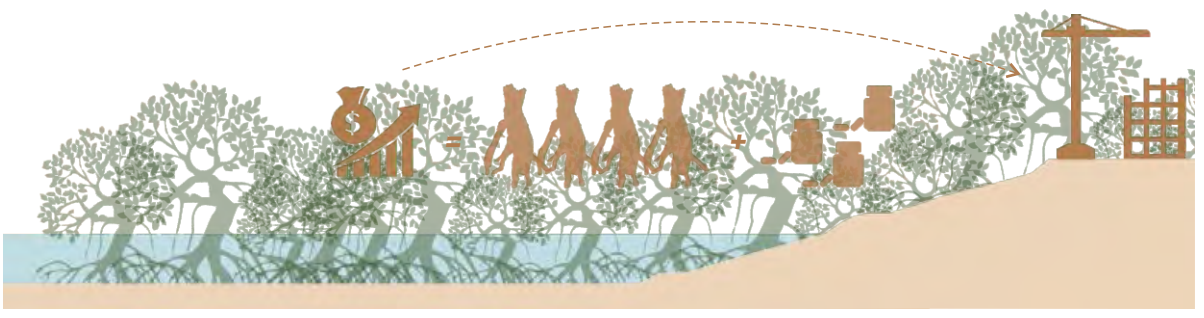
Based on the Fuction

Protected Forest

Nature Reserve Forest

Tourism Forest

Productive Forest



Based on the type of Tree

a. *Heterogen Forest*
   Heterogeneous forest is a forest that is overgrown by various kinds of trees.
b. *Homogen Forest*
   Homogeneous forest is a forest that is overgrown by one type of plant. In general, homogeneous forests are created for a specific purpose, for example for reforestation, reforestation, or industrial expansion purposes.

In this case, the baros mangrove forest is a heterogeneous type.

Based on the process occurs

a. *Original Forest*
   made in nature.
b. *Artificial Forest*
   made by humans. Usually this forest consists of trees of the same type and made for a specific purpose.

Especially for mangrove forests (mangroves) mostly natural forests, but there are also mangrove forests that are intentionally created by humans to cope with the beach from the dangers posed by waves or ocean currents, like baros mangrove forest.

Based on the type of forest

a. *Conservation Forest and National Park*
b. *Limited Production Forest and Fixed Production Forest*
c. *Protected forest*
d. *Conversion Forest*

The thickness or width of the mangrove forest zone rarely exceeds 4 km, except in some areas around the estuary and shallow and closed bays (Noor et al., 1999). This type of mangrove grows well on muddy soils, accumulated silt soils.

Based on the Zones of Heterogenous Forest

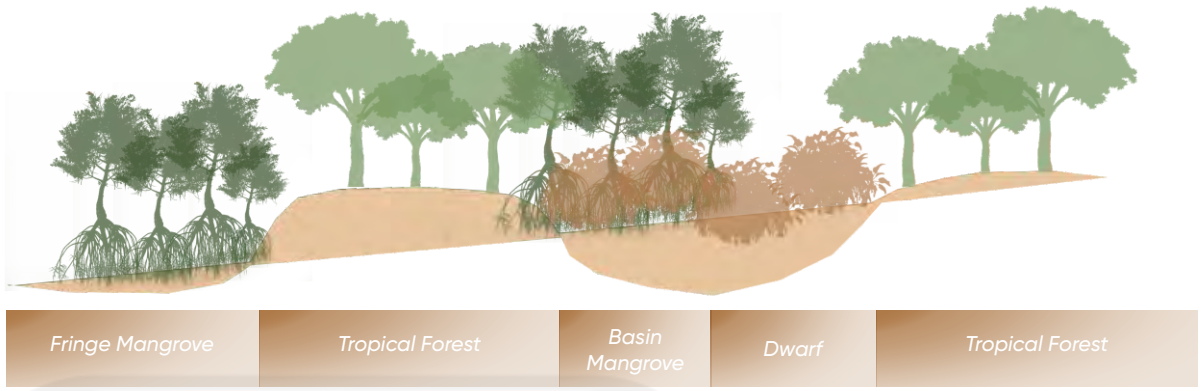


Figure 53. Mangrove Forest Type Scenario Diagram
Source: Author
(produced on 26 March 2022)

Figure 54. Mangrove Baros Tourism Zonation
Source: Arum Laksita Sari Thesis Book Re-draw by Author (accessed on 24 March 2022)

The Core Zone
a designated area for tourism attractions that are linked to educational tourism. The mangrove area, agricultural land for horticultural and food commodities, fisheries area, and the opaque river's estuary are all included. This is predicated on the mangrove area's potential as an educational tourism destination, which is present in these four factors. The potential of the mangrove region consists in the perspective of the mangrove area, the cultivation of mangrove plants, and understanding of mangrove plant benefits. Agricultural land in the mangrove area provides the potential for agricultural resources located in cultivation, farmer activities, and a pretty wide perspective of agricultural land. Because the fishing area and estuary of the Opak River have potential in the scope of fisheries, the fishery area and estuary of the Opak River have potential for fishery resources that are an attraction for educational tourism. Fishery regions and the Opak River's estuary might be developed for aquaculture educational tourism, and educational tourism for estuary fisherman could be established in the estuary. The beauty of nature and the seas can be utilised as a tourist attraction. The mangrove conservation area's diversity of potential can be combined to create a tourist product that tourists will be interested in.

Zone of Buffering
This zone is part of a larger area that can safeguard the core zone, and it's just next to the estuary. The buffer zone serves as a vulnerability or protection for the area against abrasion, and it is vital to have one in order to reduce abrasion caused by large sea waves. The Baros mangrove conservation area already has various buffer zone sites, but not all areas do, therefore a buffer zone in the Baros mangrove conservation area is extremely important to preserve the tidal wave core zone.

The Rehabilitation Zone
an area that has been damaged, and restoration efforts are required to return the ecology of the damaged region to its natural state. This rehabilitation zone is located in Padukuhan Karang, which is in the east. Because this area has been severely damaged by abrasion, it is vital to rehabilitate it so that Padukuhan Karang does not sustain further abrasion damage.

The Agricultural Development Zone
a piece of land that is utilized to grow plants. Food and horticulture crops are examples of cultivated crops. This site for agricultural development has a lot of potential. The agriculture industry supports the livelihoods of residents in the surrounding area. This agricultural development zone offers an attractiveness or potential for educational tourism.

Zone of Tourist Services
This zone contains all of the necessary amenities and activities for tourists. The amenities required, for example, stalls to eat, and information about the location. This zone is established based on the proximity of the region to existing infrastructure. Various tourist services, such as parking lots, restrooms, and so on, can be established in this zone.Farmers can sell their harvests, allowing tourists to discover a trait of a tourist attraction they have visited.

Zone of the Tambak
One of the possible fishing resources that could become an educational tourism attraction is the pond area zone. This is because shrimp ponds can be turned into a shrimp farming teaching tour or a tourism estuarine fisherman education center. Water tourism and nature tourist development can also be carried out in the pond area. The area's natural environment and waters can be utilised as a tourism attraction, attracting visitors to the area.

Pengklik Tourist Zone
Because it is located in a tourist location, this zone has a lot of potential.This clicker contains attractions that may entice tourists to visit, such as a playground, a fishing spot, and estuary tourism. Clicking estuary tours, guests take boats around the estuary while viewing the mangrove region from the Opak river's estuary. The pricing is reasonable; one person on a boat costs Rp. 10,000. The clicking area entered into a collaboration and collaboration to conduct out collaborative mangrove

Figure 55. Mangrove Baros Vegetation
Source:repository.umy.ac.id/bitstream/handle/123456789/15218/I.%20BAB%20V.pdf?sequence=9&isAllowed=y (accessed on 27 March 2022)

Figure 56. Mangrove Conservation Area
Source: Author
(accessed on 26 March 2018)

Figure 57. Conserving Mangroves, a Lifeline for the World
Source:apple.com/newsroom/2019/04/conserving-mangroves-a-lifeline-for-the-world/
(accessed on 24 March 2022)

Figure 58. Securing Livelihoods through Mangrove Conservation and Restoration
Source: panorama.solutions
(accessed on 24 March 2022)

09

TRACING BACK THE EXISTENCE OF THREATENED BIODIVERSITY IN MANGROVE FOREST CONSERVATION

On the land-sea border, mangroves are a rare, magnificent, and prolific environment. These extraordinary ecosystems play an important role in the well-being, food security, and protection of coastal communities all over the world. They maintain a diverse ecosystem and serve as an important nursery environment for fish and crabs. Mangroves also serve as a natural barrier against storm surges, tsunamis, rising sea levels, and erosion along the shore. Their soils are excellent carbon sinks, absorbing large amounts of carbon. Taken from World United Nations Educational Scientific and Cultural Organization 2018 (UNESCO), mangroves disappearing three to five times faster than worldwide forest losses, posing major ecological and socioeconomic consequences. According to current estimates, mangrove coverage has been cut in half over the last 40 years. They are highly preserving mangroves while also promoting the long-term prosperity of their communities. The inclusion of mangrove ecosystems in Biosphere Reserves, World Heritage sites, and helps to improve mangrove ecosystem knowledge, management, and protection around the world.

Ironically, Indonesia is known as a country with the largest mangrove area in the world. The total area of mangrove areas in Indonesia is 3 million hectares, or about 23 percent of the world's total mangrove ecosystem. The loss of mangrove forests accounts for 42 percent of greenhouse gas emissions due to the destruction of coastal ecosystems, including swamps, mangroves, and seaweed.

Whereas, the mangrove plant in Yogyakarta's Special Region is used as food and a natural color for batik by the locals. Many people are unaware that mangrove fruit may be eaten and that mangrove bark can be used to color fabrics. Yogyakarta's Special Region features a large mangrove protection area. The planted conservation area is an 8-hectare conservation reserve in the Baros. The mangrove forest, which has been preserved, can be utilized for tourism. The community's decision to protect mangrove habitats.

According to the research from (Sugandini, 2014), these qualities include a high level of environmental responsibility, a human connectedness to nature, and environmental knowledge. Those issue define in 4 categories, such as :

1. **Perceived Environmental Responsibility**
   Individuals' or groups' actions that support the sustainable use of natural resources are referred to as perceived environmental obligations (Sivek and Hungerford, 1990). Environmentally responsible people will have a positive attitude toward the environment and understand the value of nature and the environment (Schultz, 2000; Stern, Dietz, and Guagnano, 1995).
2. **Man Nature Orientation**
   Man-nature The orientation of human relationships with their natural surroundings is characterized as orientation. People believe that people have dominion over the natural world (Jandt, 2004).
3. **Environmental Knowledge**
   Environmental knowledge (Fryxell and Lo, 2003) is defined as "common knowledge" concerning facts, concepts, and links between the natural environment and the ecosystem. The stage when individuals are aware of the product and have a basic comprehension of its function and benefits is referred to as knowledge. What kind of knowledge has an impact on the decision-making information source preferences procedure (Brucks, 1985; Rao and Monroe, 1988).
4. **Environmental Atitude**
   Environmental attitudes were originally utilized to predict behavior in terms of energy saving, ecology, and product awareness (Mustafa 2007). It can determine behavior that either increases or decreases environmental quality.

To respond to this issue, human participation and interaction with the environment is needed which can then increase response in term of behaviour so that they are more guarded and aware of the environment. The Indonesian Institute of Sciences (LIPI) as the largest research institution in Indonesia is currently very serious in increasing the awareness of the Indonesian people about the importance of maintaining this biodiversity.

Figure 59. Environmental Responsibility
Source: instagram.com (accessed on 23 March 2022)

10

THE SHRINKING OF MANGROVE FOREST BY COASTAL ILLEGAL SAND MINNING ESTUARY

Figure 60. Sand Mining at the Mouth of the Opak River
Source:http://dlhk.jogjaprov.go.id/penambangan-pasir-dan-ancaman-bagi-pelestarian-kawasan-pesisir (accessed on 20 March 2022)

Figure 61. DAS Illegal Sand Mining
Source: tribunnews.com (accessed on 20 March 2022)

Figure 62. Heavy Equipment
Source: google.com (accessed on 20 March 2022)

In the Opak River estuary area around the Baros Mangrove Forest, illegal sand mining occurs. Sand mining activities at the mouth of the Opak River and the Baros coast have been complained about by people of Padukuhan Baros and Padukuhan Karang, Kalurahan Tirtohargo, Kapanewon Kretek, and Bantul. Illegal sand mining is a concern in the Mangrove Baros. At least 100-150 ships delivering sand come and leave in the southern coastal area, according to (Setyo, 2016). Mangrove trees and agricultural land in coastal areas are destroyed as a result of this. Mangroves are vital in reducing a variety of disasters, from abrasion to tsunami waves, as well as for educational and research purposes. Furthermore, unpermitted mining has the potential to induce seawater intrusion, causing inhabitants' well water to taste salty.

Sand mining is also used to harvest sand from the Opak River's bottom. However, mining is now out of control, and sea sand is being mined as well. if the sand miners are only told to work on the south side The reason for this is that it has been pegged on the north side, where a transit point will be erected later at the site of the stake. When the Southern Java Cross Road (JJLS) bridge was erected, it served as a spot to disembark from the boat. The villagers' agricultural land is harmed by abrasion owing to mining activities on around 15 hectares of land, consisting of 10 hectares to the east and 5 hectares to the west. Many people, including the manager of the Baros Mangrove Forest, are concerned about this, especially those who have been diligent in carrying out coastal conservation measures. With this visit, the Head of DLHK DIY hopes to personally evaluate the previous sand

mining site in the hopes of formulating future rehabilitation and conservation measures for damaged beaches. It triggers extensive erosion on the coast and mangrove ecosystem and affects the naturally formed substrates required for mangrove development, thus threatening the sustainability.

Even though, According to Swangjang and Kornpiphat (2021), the size of a sustainable tourism industry is determined by
a. contributions to natural resource conservation,
b. contributions to environmental improvement and mitigation of negative impacts, c. contributions to social welfare, fair distribution of benefits and costs, and respect for cultural traditions,
d. assurance of the quality of tourism and activities managed, and
e. assurance of quality and housing services.

Sand is mostly ejected from Merapi Volcano and is widely used for building construction needs. Sand that has accumulated on beach ridges is frequently extracted, resulting in the deepening of river beds and estuaries, as well as the enlargement of river mouths and coastal bays (Podila Sankara Pitchaiah 2017). Environmental quality deterioration, habitat loss on beaches, deltas, and coastal areas, loss or change in vegetation structure in riparian zones, and increased or reduced downstream sedimentation are all consequences of this. As a result, habitat quality is impacted (Koehnken and Rintoul 2018). Because of unsustainable sand mining, the supply of sand from the higher reach cannot cover or compensate for the quantity of sand being dredged over time, there will be a serious sand shortage in the lower reach of catchments in the long run (Kastl et al. 2012). Continuous sand flow to the delta system is critical for delta stability and shoreline positioning, as well as providing front-line protection against storms and other extreme weather events (Anthony, et al. 2015). Illegal sand mining on beaches and rivers is rampant due to the high demand for sand by construction projects both within and beyond the area. It causes considerable erosion on the shoreline and in the mangrove environment, as well as affecting the naturally generated substrates needed for mangrove development, posing a threat to the ecosystem's long-term viability.

Sand mining is then indicated to be one of the problems for the preservation of coastal areas. Some of the impacts that can be caused by sand mining activities in coastal areas, including:
1. Increasing coastal abrasion and coastal erosion;
2. Reducing the quality of marine and coastal waters;
3. Potential to increase coastal pollution;
4. Decrease the quality of sea water by increasing the turbidity of sea water;
5. Damage the existing mangrove ecosystem and fauna habitat, especially migratory birds;
6. Damage the fish spawning area and nursery ground;
7. Destroying turtle nesting areas;
8. Disturbing agricultural land around the area

Basically, everyone is prohibited from doing actions that cause pollution and/or damage to the environment. This is in accordance with Article 69 Paragraph (1) letter a, Law no. 32 of 2009 concerning Environmental Protection and Management. Article 35 letter i, Law no. 27 of 2007 concerning the Management of Coastal Areas and Small Islands, states that, "In the utilization of the Coastal Zone and Small Islands, everyone is directly or indirectly prohibited from mining sand in areas which, if technically, ecologically, socially, and culture causes environmental damage or pollution or harms the surrounding community." If their habitat is disturbed, the area will decrease, their nests will automatically be disturbed. In fact, to plant mangroves is quite complex. After planting, the mangrove area is covered with a net so that the garbage carried by the current does not directly hit the mangrove seedlings. But if the current is too big, it will be difficult to plant mangroves. In conclussion, Sand miners should be given training to be more aware of the environment and the importance of mangrove ecosystems in coastal areas.

Figure 63. Direct Handling of Beach Abrasion
Source: sda.pu.go.id (accessed on 20 March 2022)

Figure 64. Abrasi in Coastal and Estuary Area
Source: balitribune.co.id (accessed on 20 March 2022)

Figure 65. Mangrove Baros Planting Community
Source: krjogja.com/berita-lokal/diy/bantul/prajurit-lanal-yogyakarta-tanam-mangrove-di-pantai-baros/ (accessed on 20 March 2022)

11

RISING SEA LEVELS: ABRATION & EROTION DESTROYING THE MANGROVE HABITAT

Due to illegal mining, it causes land subsidence in coastal areas. Mangroves are difficult to plant and cause abrasion when the sea waves are high. (Mandiri, Z. T., 2018) interview with KP2B, the Baros mangrove area was 8 ha in 2008, but has now shrunk to the Samas area, with only 3 ha remaining. The power of the waves, the difficulties of natural regeneration as a result of incorrect planting zoning, and human activities that harm the environment are all elements that contribute to the decline of the mangrove area in Baros, thus measures must be done to avoid bad consequences.

The shoreline of Bantul Regency is roughly 17 kilometers long (DKP Bantul. 2013). Mangroves that can grow well are found on the coast of Bantul Regency, namely in the estuary area, which is the confluence of the south coast with the mouth of the Opak River. Mangroves are a type of plant that may grow in tidal environments that are nevertheless influenced by both the sea and the land. According to Minister of Marine Affairs and Fisheries Regulation No. 17 of 2008, the overgrown mangroves of Baros Hamlet have been designated as a coastal

conservation area, which is defined as an area with certain characteristics as an ecosystem unit that is protected, conserved, and/or used sustainably to achieve sustainable coastal area management. The mangrove conservation area on the Baros coast did not emerge overnight, but rather after a lengthy process.

The area for mangrove planting on the Baros coast was chosen for a reason. The coastal area of Baros is a complex transitional zone between land and sea habitats, with many ecosystems, including estuarine and coastal ecosystems. Converting to agricultural land. The increasingly densely inhabited Baros beach community has an indirect impact on the environment and life around the beach. Land began to shift purposes over time, with towns and farming fields being the most common uses (Setiawan, 2014). Natural deterioration is beginning to appear on as a result of excessive land use. Tidal flooding, abrasion, river estuary shifting (downstream), and limited animal habitat are all effects of community activities along the Baros Beach coast. The threat of agricultural land erosion owing to river flows and sea waves, as well as dry plants due to the lack of a barrier between land and sea, causing salt particles from sea water to attach to plant leaves, is something that the Baros people are starting to notice. The planting of mangroves was begun in an effort to mitigate the effects of human activity. The condition of the mangrove baros is urgently needed a nursery efforts because it is located in the coastal and estuary of the opak river. Hybrid engineering, Construction of protective mangrove seedlings (Wave Breaking Tool) that will be planted is very important because it will reduce the risk of seedling death of mangroves.

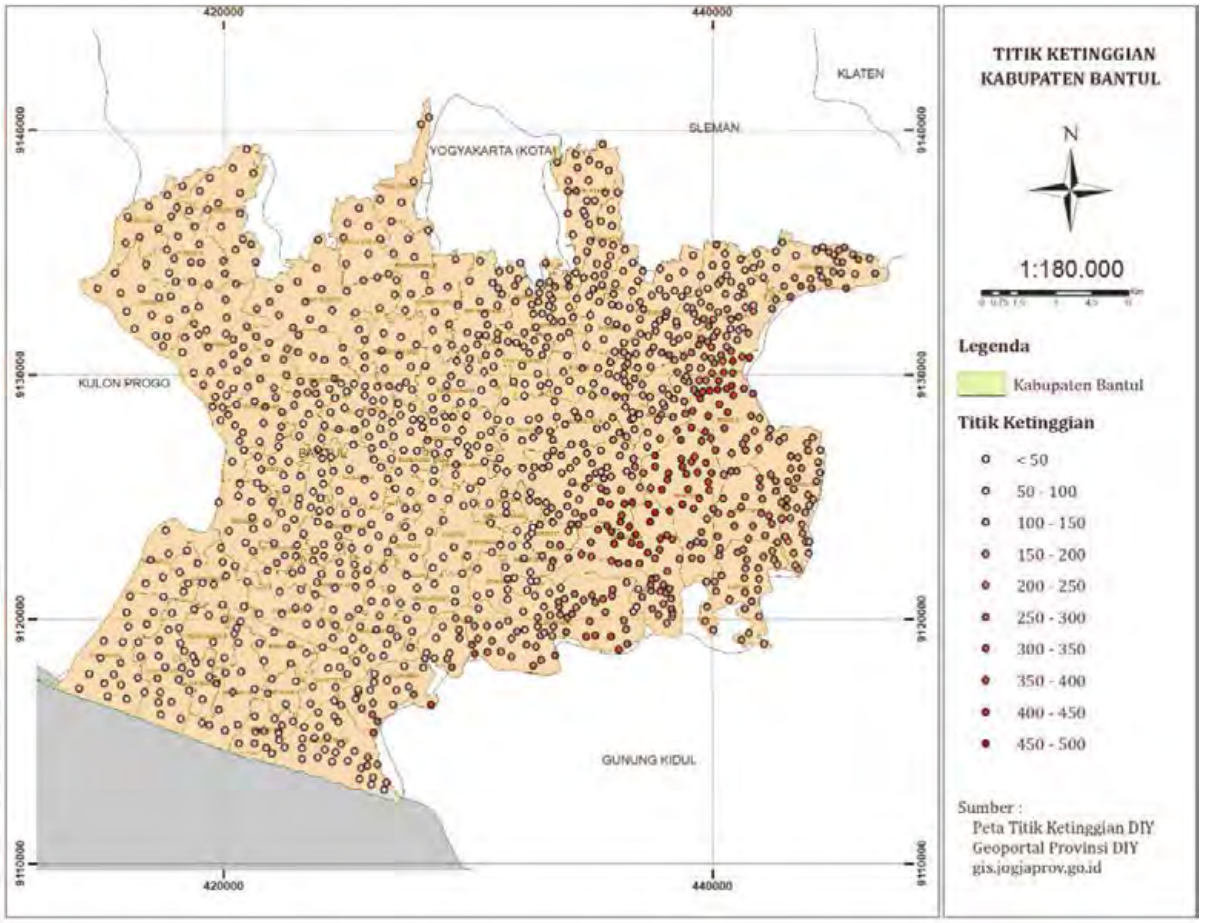


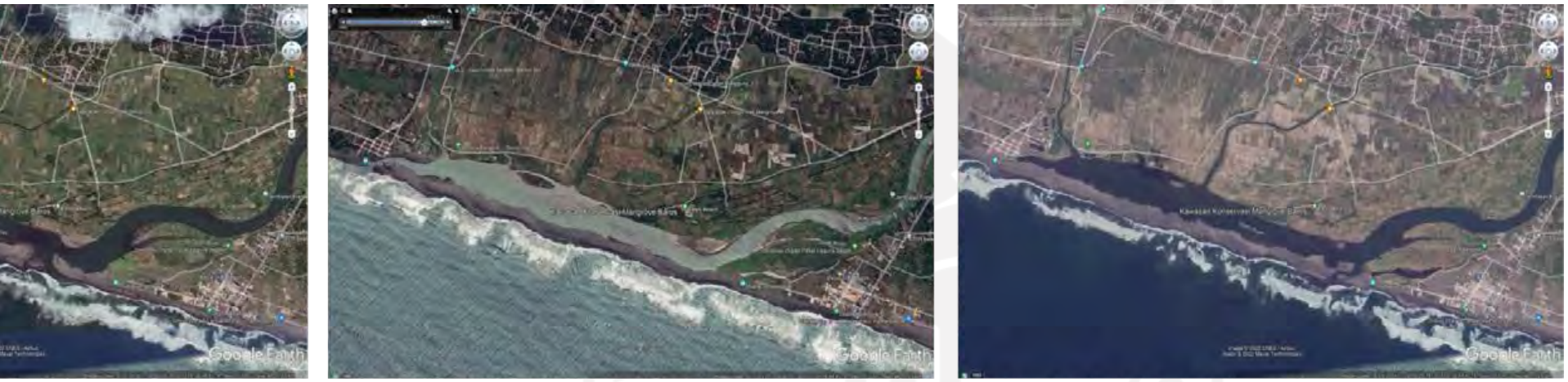
Figure 66. The elevation of Bantul Regency
Source: bantulkab.go.id (accessed on 20 March 2022)

WATER LEVEL & DISTANCE (RISING SEA WATER)

Figure 67. Water Level & Distance of Rising Sea Water
Source:coastal.climatecentral.org (accessed on 16 April 2022)

WHAT WILL HAPPEN IN 2022-FUTURE?

Figure 68. Satelite Coastal Water Level Preview
Source: Google Earth (accessed on 16 April 2022)



THIS IS HAPPEN IF WE ARE TRACING BACK

THE FUTURE


2030
SONO
Opak River
Opak River
Opak River


2040
Opak River


2060
SONO
Opak River
Opak River
Opak River

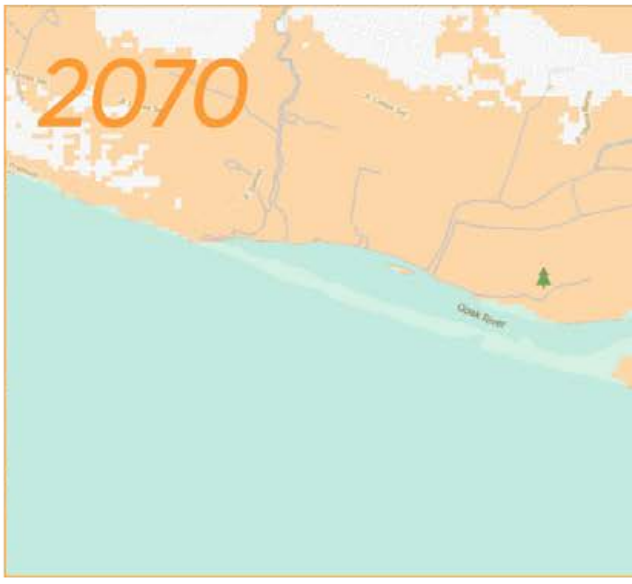

2070
Opak River

Figure 69. Future Rising Sea Water per Year
Source:coastal.climatecentral.org (accessed on 16 April 2022)

12

GARBGE ACCUMULATION IN COASTAL & ESTUARY AREAS CAN CAUSE A SLUM AREA

Figure 70. Trash Threatens The Sustainability of Baros Mangroves
Source: jogja.tribunnews.com/2016/10/16/sampah-ancam-kelestarian-mangrove-baros http://www.portaldomeioambiente.com.br/entenda-como-o-comercio-de-sucata-se-mantem-tao-consistente-no-mercado/ https://www.zsl.org/conservation/regions/asia/rehabilitating-mangroves-in-the-philippines (accessed on 30 March 2022)

Figure 71. Garbage Accumulation Bellow the Bridge & Coastal
Source: Photo taken by Author (accessed on 15 February 2022)

As a result of the abrasion and the strategic location between the confluence of the river and the beach, the mangrove baros becomes a place through which the flow of garbage then settles and stagnates because it is blocked by mangrove roots. Although it has been designated as a conservation area, the mangroves in Baros, Tirtohargo Village, Kretek District, Bantul, are still haunted by a number of threats. Among them, such as garbage that has piled up on the southern shoreline, and in the conservation area. According to the Head of the Baros Youth Family Conservation Division (KP2B), Dwi Ratmanto, the large amount of garbage in the Baros mangrove conservation area is a serious threat to the preservation of mangroves on the south coast. The garbage is carried by the river current (Opak), then it reaches the estuary. Almost every day a lot of piles of garbage that reach the estuary. Even when it rains heavily and floods upstream, the piles of garbage piled up in Baros can be tens of tons. To deal with this problem, according to him, synergy from a number of groups is needed, not only people who are downstream, but also people upstream so that they no longer throw garbage in the river. The growth of mangroves is less than 20% because the main disturbance is plastic waste. The mangrove forest in the Opak-Baros estuary area, continues to be developed by planting tree seedlings, so that the forest area continues to grow from the current five hectares. In addition, the accumulated garbage is also caused by low public awareness by disposing of waste in coastal areas and river estuaries. Waste management efforts need to be carried out so that the area is not slum.

Figure 72. Garbage Accumulation Below The Bridge
Source: Author
(proccessed on 15 March 2022)

Figure 73. Consumption of Mangrove Coastal Land for Tambak

Source: news.kkp.go.id
https://kupang.tribunnews.com/2020/12/06/panen-udang-vannamel-di-supm-kupang-wah-jenis-udang-ini-sungguh-berkualitas
https://www.nature-basedsolutions.com/page/432/building-with-nature-indonesia
(accessed on 30 March 2022)

13

CULTIVATION: LACK OF AWARENESS & KNOWLEDGE IN PERCEPTION AS AN EDUCATION WILL DAMAGE THE AREA

As a developing country, Indonesia is now dealing with a slew of issues, one of which is the environment. According to data from the Environmental Quality Index (IKLH) published in 2012, the quality of the environment in Indonesia has deteriorated, with a number of environmental quality around 61.07 in 2010 but a range of numbers between 60 and 25 in 2011, as measured by water quality, air quality, and forest cover (KLH, 2012).

Environmental issues that are now occurring can be classified as a moral issue because they are linked to human activity. The environment is not always linked to technological issues, but it can also become a global moral dilemma. Forests, seas, water, soil, atmosphere, and several other types of damage continue to be polluted and ruined as a result of human behavior that is irresponsible and only considers their own wants. Humans are the primary source of pollution and environmental harm. (Keraf et al., 2010).

In this scenario, one of the options for increasing community awareness and concern, especially in the

context of environmental care, is to plant trees and apply pro-environmental behavior. There are six (6) indications of pro-environmental conduct: (1) energy conservation, (2) mobility and transportation, (3) waste prevention, (4) recycling, (5) consumerism, and (6) behavior targeted at environmental preservation. the natural world (Kaiser et al. 2007).

Some of the problems that have been described in the previous description are mostly caused by human activities so that the Baros mangrove area is damaged and not well maintained. This is based on the lack of awareness and educational support facilities that can arouse people's sense to protect and contribute to the environment. based on research from the World Bank in 2018, Indonesia's Human Capital Index (HCI) is ranked 87 out of 157 countries. Indonesia's HCI value is 0.53 behind several Southeast Asian countries. HCI is basically a measure of the condition of knowledge, skills and health to be able to support HR productivity. The low quality of human resources can affect the development and development of conservation areas and eco-edu tourism. Therefore, it is necessary to improve the quality of human resources by providing supporting facilities for activities that can provide knowledge and make people care about the environment.

Several variables are utilized to explain pro-environmental behavior in the theory of planned behavior (TPB), including attitudes toward conduct, subjective standards, perceptions of behavior control, and intents (Macovei, 2015). There is one aspect that may be used to raise environmental awareness and concern, as well as establish pro-environmental behavior, and that is psychological management, which can be accomplished by engaging with things that overlap.

Humans and the environment have a mutually beneficial and interdependent interaction. The environment is one of the most significant aspects of human life. Human behavior toward the environment will be influenced by continuous interactions between humans and the environment. The attitude and behavior of humans themselves influence whether the situation of an environment is good or harmful. The quality of human life will be influenced by how humans treat their environment. (Arman, 2021) factors that affect the decline in public awareness and concern for the environment, such as lack of knowledge and education, even though according to Sukmadinata (2003) "In an environment, it includes the physical environment, intellectual social, and values". To respond to this, an effort is needed to generate motivation and interaction between space users with nature and with buildings in order to increase the value of the conservation area. Other than that, Interacting with nature has been proven to increase your short and long term memory and improve the attention span.

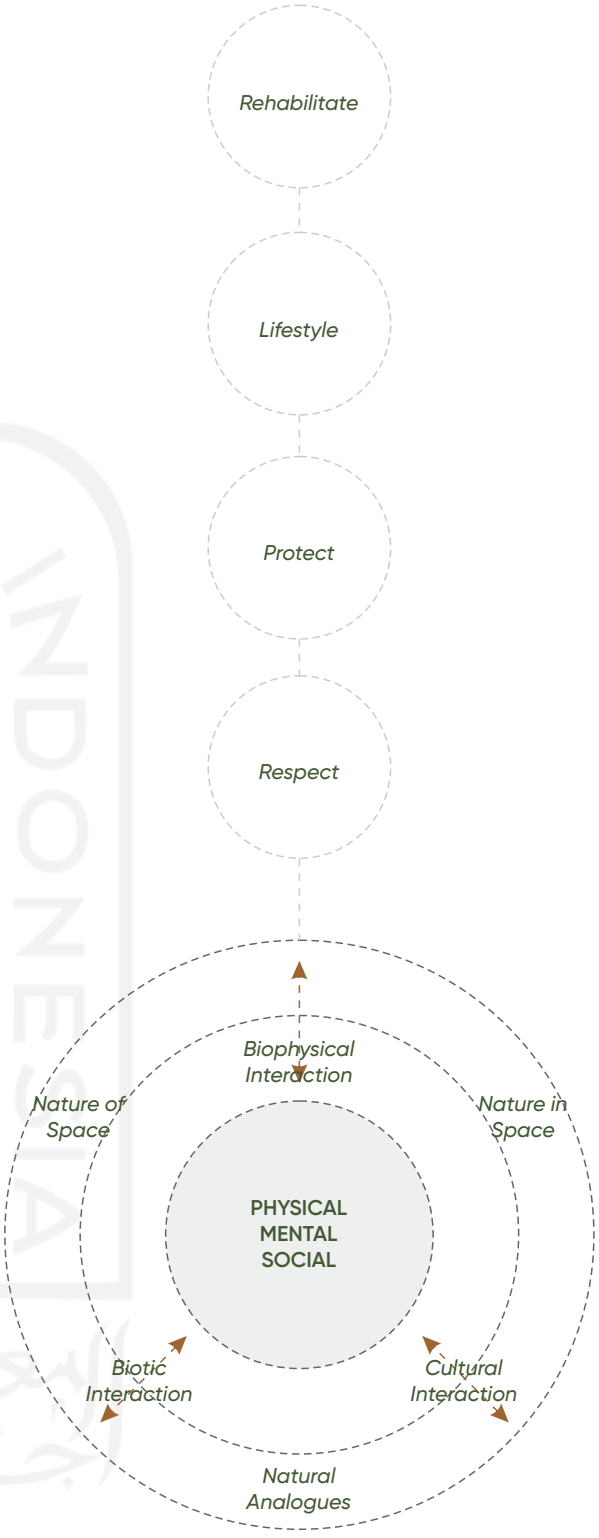


Figure 74. Increasing People Awareness with Nature
Source: Author
(proccessed on 30 March 2022)

PROBLEM MIND MAPPING

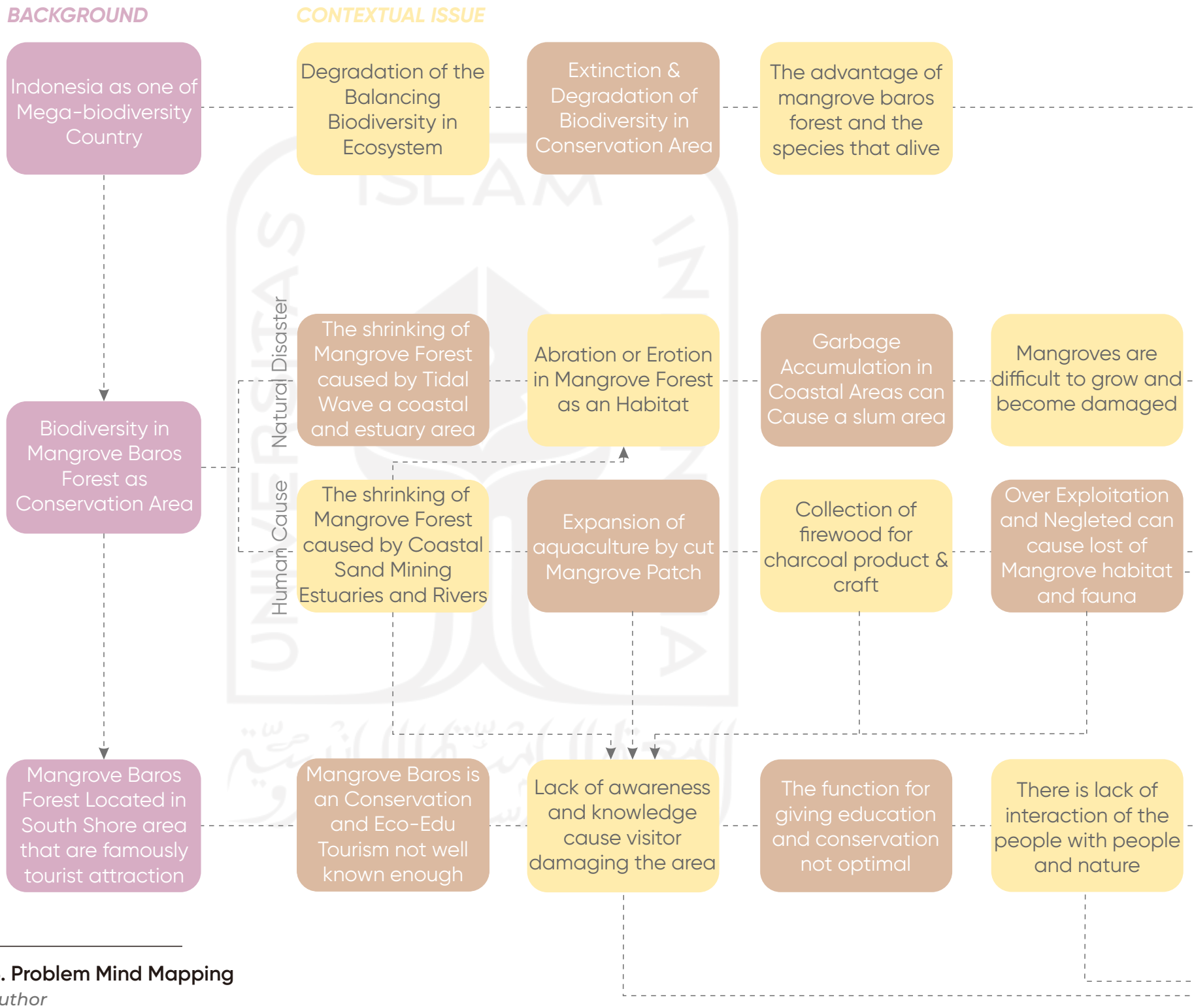
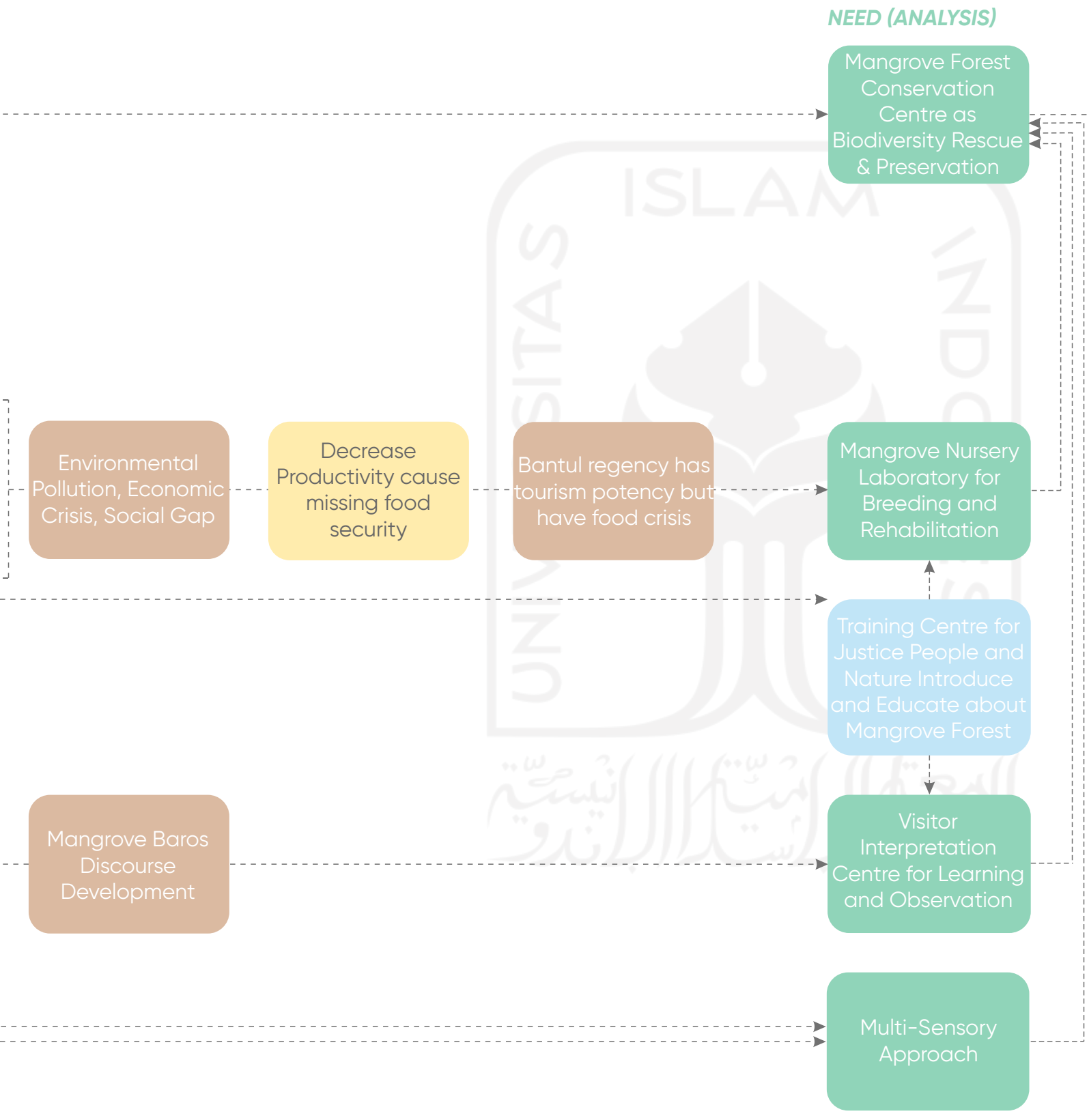


Figure 75. Problem Mind Mapping
Source: Author
(proccessed on 30 March 2022)


NEED (ANALYSIS)
SYNTHETIS
Mangrove Forest Conservation Centre as Biodiversity Rescue & Preservation
Design of Conservation Centre Mangrove Forest Sanctuary as a trestle for Nurturing Biodiversity in Mangrove Baros Forest Eco-Edu Tourism with Multi-Sensory Approach by Trasversing Coastal Corridor
Environmental Pollution, Economic Crisis, Social Gap
Decrease Productivity cause missing food security
Bantul regency has tourism potency but have food crisis
Mangrove Nursery Laboratory for Breeding and Rehabilitation
Training Centre for Justice People and Nature Introduce and Educate about Mangrove Forest
Mangrove Baros Discourse Development
Visitor Interpretation Centre for Learning and Observation
Multi-Sensory Approach

PROBLEM FORMULATION

Figure 76. Problem Formulation
Source: Author
(proccessed on 30 March 2022)

NON-ARCHITECTURAL ISSUE

Extinction & Degradation of Biodiversity in Conservation Area

The advantage of mangrove baros as big forest and the species that alive

The Shrinking of Mangrove Forest Caused by Human or Nature Environment

Decrease Productivity of Mangrove can Damage Food Chain and Security

ARCHITECTURAL ISSUE

Still carried out by a local way so that breeding, spawning, nursery hasn't been maximized

The sustainability function of conservation and tourism building and area isn't optimal

Limitation human knowledge and awareness to protect and empower biodiversity

There is lack of interaction of the people with people and nature

CONTEXTUAL ISSUE

Dynamic ecosystem because it was located in the coastal area means changes

Soft muddy soil conditions and high salinity and pH content on the coastal character

The climate weather is hot, dry, strong winds velocity, and frequent of sea storm

Access and circulation in rural areas that are rarely touched and not well organized

DESIGN FRAMEWORK OF THINKING

Figure 77. Design Framework of Thinking
Source: Author
(proccessed on 30 March 2022)

GENERAL PROBLEM QUESTION

How to design Conservation Centre Mangrove Forest Sanctuary as a trestle for Nurturing Biodiversity in Mangrove Baros Forest Eco-Edu Tourism with Multi-Sensory Approach by Trasversing Coastal Corridor?

SPECIFIC PROBLEM QUESTION

1. How to design space programming in order to highlight the integration between community activity for mangrove nursery laboratory, conservation centre, and interpretation centre?
2. How to implement a multi-sensory based approach in the design of mangrove conservation in Baros Village, Bantul by paying attention to environmental aspect and ecosystem?
3. How to design the building function, mass, and spatial planning based on the activity of the building by transformable existing building more optimal?
4. How to treat a site so that it can adapt to the climate and dynamic condition of a merged coastal estuary?
5. How to increase people awareness and knowledge about biodiversity in mangrove forest by making interaction of the people with people and nature?

LITERATURE STUDY
SPECIAL BUILDING CATEGORY

- Conservation Centre Typology
- Interpretation Centre Typology
- Mangrove Nursery Laboratory Typology
- Multi-sensory Based Approach

SYNTHESIS

Designing Conservation Centre Mangrove Forest Sanctuary as a trestle for Nurturing Biodiversity that integrates mangrove conservation through nursery community activity and interpretation centre, in Mangrove Baros Forest Eco-Edu Tourism with Multi-Sensory Approach by Trasversing Coastal Corridor and increasing interaction to make the building function optimal and minimizing bad impact in response to the coastal site condition.

DESIGN METHOD

Choosing Issue a
Indicator & Para

Emphatize

Gathering the data, information, problem, and contextual issues to formulate a background and design concept, including :
Non-architectural Problem
(Degradation & Extinction of Biodiversity in Conservation Area, The Shrinking of Mangrove Forest because Illegal Sand Minning and Abration, Lack education & Awareness in Eco-Edu Tourism Mangrove Baros Forest)
Architectural Problem
(Conservation Centre, Mangrove Nursery Centre, Interpretation Centre, Multi-Sensory, and Site)

Define

Making Site Analysis based on the data and information review that will be contributed to be converted into final design, including :

Site Issues, Surrounding, Climate Study
Variable on Building & Approach Study
Parameter on Building & Approach Study
Indicator on Building & Approach Study
Room Programming and Property Size Study
Advanced Technology Study
Conservation Centre, Mangrove Nursery Centre, Interpretation Centre, Multi-Sensory Precedent

Schemat

Situation Plan, Site Pla
Elevation, Infrastructure

Prototype

Multi-sensory Design Simulation
(Windflow, Velux, Rhino Grashoper, Space Syntax)
Experience Walktrough Study

Final Output

Final Schematic Design

Evaluation

Building performance & Multi-Sensory

Figure 78. Design Method
Source: Author
(proccessed on 30 March 2022)

nd site based on
ameter Analysis

Syntesis

Formulation of design strategy by making responses to the final design, including :

Typology Study
Space Requirement
Room Programming
Property Size
Space Diagram
Zoning
Mass Configuration
Multi-Sensory Applications
Advanced Technology Applications

Ideate

Developed design ideas and concepts for Conservation Centre, Mangrove Nursery Centre, Interpretation Centre

Design concept of Multi-Sensory Approach

Strategy on variables, parameters, indicators, and sub-parameters

Site Applications

Basic Mass and Generate Form

ic Design

an, Floor Plan, Section,
Plan, and Structure Plan

Design Report

DATA COLLECTION & ANALYSIS

Data Collection Method

Primary Data Collection 01
Primary data collection method obtains data directly from the source by direct observation of the design location. Observations were made by visiting the Mangrove Baros Forest Conservation and Eco-Edu Tourism and conducting interviews with sources K2KB regarding site condition, activity data and the current condition of the Mangrove Baros Forest Conservation and Eco-Edu Tourism.

Secondary Data Collection 02
Secondary data collection methods are carried out by searching for sources and theories that are relevant to the typology of the Conservation Centre, Mangrove Nursery Centre typology, The Interpretation Centre typology, and the multi-sensory approach that supports and will be applied in the design.

Data Analysis & Design Stage

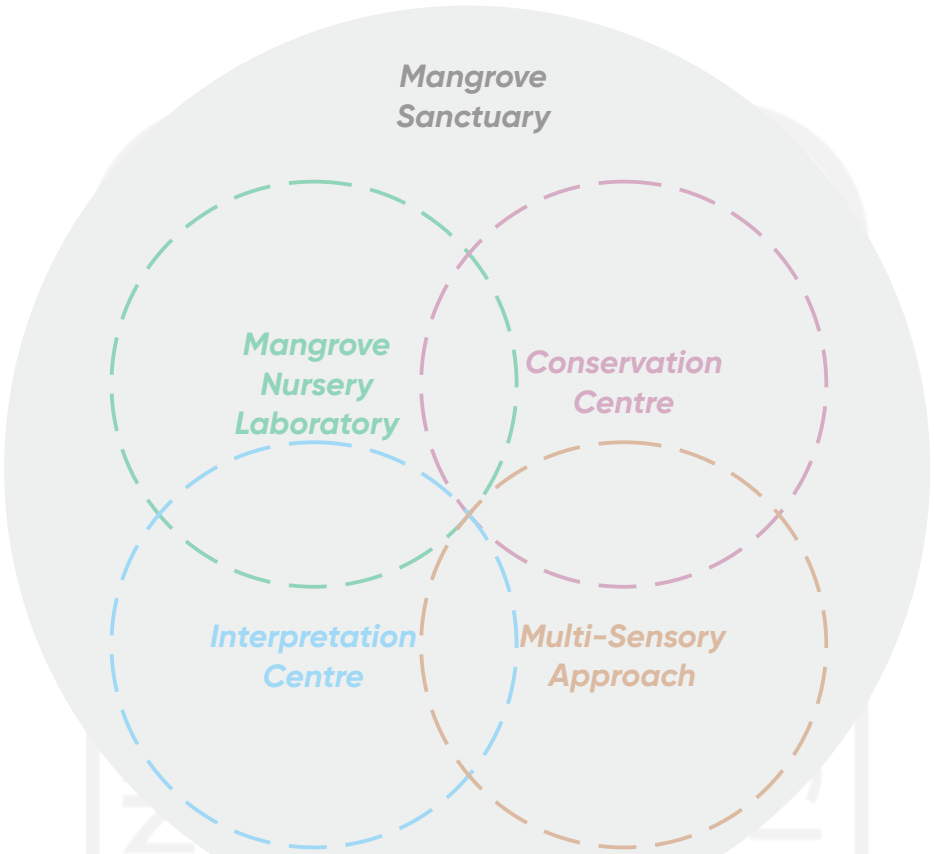
Building Typology Analysis 01
This process is carried out related to analyzing the spatial requirements needed in Special Typology Type: Conservation Centre, Mangrove Nursery Laboratory, and Interpretation Centre. The spatial requirements that need to analyzed:
1. Building Layout & Envelope
2. Space Requirements
3. Public and Private Zoning
4. Space Connectivity
5. Interior Design

Site Analysis 02
Site analysis is carried out by observing the condition of the local area of South Shore and Mangrove Baros on the site. The data analyzed were in the form of:
1. Building Codes and Regulation
2. Site Analysis
3. Regional Climate Data Analysis

Design Development and Evaluation 03
The stages of the design process answer the analysis of problems, data and programs. The development adapts to the building typology and the multi-sensory approach as a strategy in determining the schematic design. Design evaluation will be conducted with the performance of the perception and building technology test on the related user.

DESIGN AIMS & DREAMS

Figure 79. Design Aims & Dreams
Source: Author (proccessed on 30 March 2022)



The collected data is then analyzed according to context and ideas regarding design boundaries. Data analysis covers aspects, among others:

1. Architectural aspects: This aspect is expected to overcome problems, especially problems in activities not optimal function and exploitation in mangrove baros conservation according to the context and proposed theories and ideas.
2. Social Aspect: How the design can respond environment that has a social connection to the building. So that humans, buildings and the environment can interact with each other continuous with each other.
3. Environmental Aspects: Length is expected and can provide a good response and improve conditions that there is.

DESIGN CHALLENGE

1. Mangrove forest is a dynamic ecosystem, which means that it changes according to high wave conditions
2. Physical damage to mangroves in structure and natural composition caused by abrasion
3. Sand mining and abrasion activities that result in land subsidence
4. Accumulation of garbage in coastal areas and estuaries from rivers in mangrove areas
5. Pay attention to the balance of ecosystems and or local biodiversity by uniting several populations that can build a symbiotic mutualism
6. Soft soil conditions and high salt content on the coastal character
7. Ecosystem utilization and conversion control
8. Mangroves with the principle of sustainability (no net loss)
9. Mangroves are difficult to grow because of the high salinity and pH of the soil
10. Big vortex and tend to be stormy and high wave
11. Solar thermal and wind velocity condition
12. Avoid damaging human hands (boundary interaction)
13. Slope slightly of coastal and type of land
14. Access to the site
15. Changes in land use result in an increase in the need for water in the dry season and in the rainy season
16. A lot of water is wasted into the sea
17. Excessive because the land absorbs rainwater
18. Reduced, so that the method of conserving resources
19. Incoming and available water in the estuary must be managed well
20. Blurry boundary or guarding so that there are no illegal sand mining activities
21. Minimize the clearing of land for development to avoid deforestation and maximize green areas
22. Seasoning in growth
23. Pay attention to boundary interactions between habitats, fauna (wildlife and marine species), and flora

RESULT EXPECTED (DESIGN HYPOTHESIS)

The design hypothesis that obtained are the design of mangrove conservation centre in Baros Eco-edu Tourism is designed to focus on maintaining the activities of the mangrove nursery planting laboratory community in Bantul who planting and proccess their mangrove independently in maintaining the damaging biodiversity and as a food chain. This conservation centre also presents an interpretation building to stimulate people interaction and education between and about people and nature as well as people and socio-cultural community by considering the ecological, educational, and recreational potential of Mangrove Baros that are located in the southshore sea area as tourism potency so that it can trigger the development of Mangrove plantation in terms of natural prevention, knowl edge, interests, and culture. This expected to create more sustainable and optimal in order preserving the function and nature.

The site area that located in coastal and estuary area with sloped envi ronment, make the design of conservation centre should not intimidating the nature and have to adapt with the nature especially climate. Multi-sensory approach applied in conservation centre design to maintain the relationship between human and nature also building with nature as well as people with building.

Later, the design will be evaluate by using several software which is suitable with the concept and describe the space experience using video rendering and perspective drawing. The hands-on experience will be presented in the form of a 3D mock-up model.

The design of the Mangrove Sanctuary Conservation Center is limited by the following criteria:

1. The design focuses on the design of the conservation center in the nursery laboratory and interpretation center.
2. The design approach uses the multi-sensory concept.
3. Solving design problems based on the architectural aspects of the problem formulation which is then processed into terms and conditions until the final design.

DESIGN ORIGINALITY, EXELLENCY, & NOVELTY

Conservation, Nursery, and Interpretation Centre. The design in architecture, always using approaches where the approach can adapts to the goals and desire to achieve a building. Use approach to multi-sensory in which the user can have the experience to learn with objects seen, smell, touch, hear, and felt. This is also can be use to increaing the knowledge whithin built an interaction for the people, building, and environment. The approach used in designing a building by looking at other designs that do the same approach, then imitate the same strategy conducted. Here are some of the designs of some students who use Multi-sensory approach.

The importance of assessing an area needs to be done, to determine the strategies that will be applied, so that the approach to be achieved can not only be applied but can also have an impact on the community at the design location. Strategies and design research offered for the future can still be developed according to the context of the location and other factors as well as technology that continues to develop.

Mangrove Conservation Center at Baros Beach Bantul with a Symbiotic Architectural Approach: Eduventure Treehouse

Type : Undergraduate Thesis (S1)
Writer : Rifka Assifa Prasetyacita, Kurnia Widiastuti, S.T., M.T.
Typology : Conservation Centre
Approach : Symbiotic and Eduventure Treehouse
University : Universitas Gadjah Mada
Year : 2019

The design of the Mangrove Conservation Center is an effort to facilitate conservation, education, and recreation activities in the Mangrove Forest area on Baros Beach, Bantul Regency. The procurement of this facility specifically deals with Mangrove plants and the biotic-abiotic environment that composes the Mangrove ecosystem. Symbiosis in architecture as an approach in design is used to unite two different things into something new and have a good impact on both parties and can achieve the expected prospects and feasibility as well as to synergize the building mass as the main activity with the surrounding environment as a supporting activity.

Baros Mangrove Conservation Area For Supporting Educational Tourism

Type : Undergraduate Thesis (S1)
Writer : Arum Laksita Sari
Typology : Conservation Area & Educational Space
Approach : Educational Tourism
University : Universitas Muhammadiyah Yogyakarta
Year : 2017

The arrangement of the "Baros Mangrove Conservation Area For Supporting Educational Tourism" The results show that the government and the surrounding community support the area where he lives is used as a tourism-based mangrove conservation area education. So far, the zoning of the Baros mangrove conservation area has not implemented zoning mangrove areas, so that research conducted by field surveys recommend core zone, buffer zone, agricultural development zone, zone rehabilitation, tourism service zones, pond areas, and clicker tourism areas.

Design Of Nguter Jamu Factory In Sukoharjo A Multisensory Spatial Experience

Type : Undergraduate Thesis (S1)
Writer : M. Naufal Rizqita, Putu Ayu Pramanasari A.
Typology : Jamu Factory & Interpretation Centre
Approach : Multi-sensory
University : Universitas Islam Indonesia
Year : 2021

In the design is used to integrated edu-recreational jamu factory where it incorporate villager union to engage as stakeholder. To encourage visitor curiosity the spatial arrangement is consider to bringing particular human senses with jamu as receptor stimulation. User can touch the herb vegetation, see and hear the herb being pounded, and smell and taste the jamu itself. The building could be a beneficial catalyst for neighbourhood jamu production in Nguter, Sukoharjo, and as a educational and recreational facility to introduce jamu towards wider community.

Wildlife Conservation and Mangrove Interpretation Centre, Sundarban National Park, Asia Pacific

Type : Undergraduate Thesis (S1)
Writer : Farjana Rahman
Typology : Conservation Area & Interpretation Centre
Approach : Sustainability
University : Ahsanullah University of Science & Technology
Year : 2015

The project is designed to achieve the development of a sustainable management and biodiversity conservation system for all resources in the project area. The objective of the center is to enhance the visitor's experience and to increase the visitor's commitment to the conservation of the SRF. The center will disseminate updated information on the SRF ecosystem, conservation concerns, local culture and appropriate conduct for visitors. The project aims at creating new possibilities and alternatives for leisure and nature enjoyment while raising public education and environmental awareness of the visitors of the Sundarban.

02

“MANGROVE CONSERVATION

If there are no mangroves, then the sea will have no meaning. It's like a tree with no roots, for the mangroves are the roots of the sea!

- Mad-Ha Ranwasii, 1992 -

SITE CONTEXT STUDY & ANALYSIS
DESIGN THEMES STUDY & ANALYSIS
CONCEPT AND BUILDING FUNCTION
PRECEDENTS STUDY & ANALYSIS
MAP OF DESIGN PROBLEMS AND CONFLICT

INVESTIGATE BY LEARNING THE ISSUES

Learning from things that already exist and some theories related to the problems surrounding the object being raised accompanied by an analysis that will load the concept in the design.

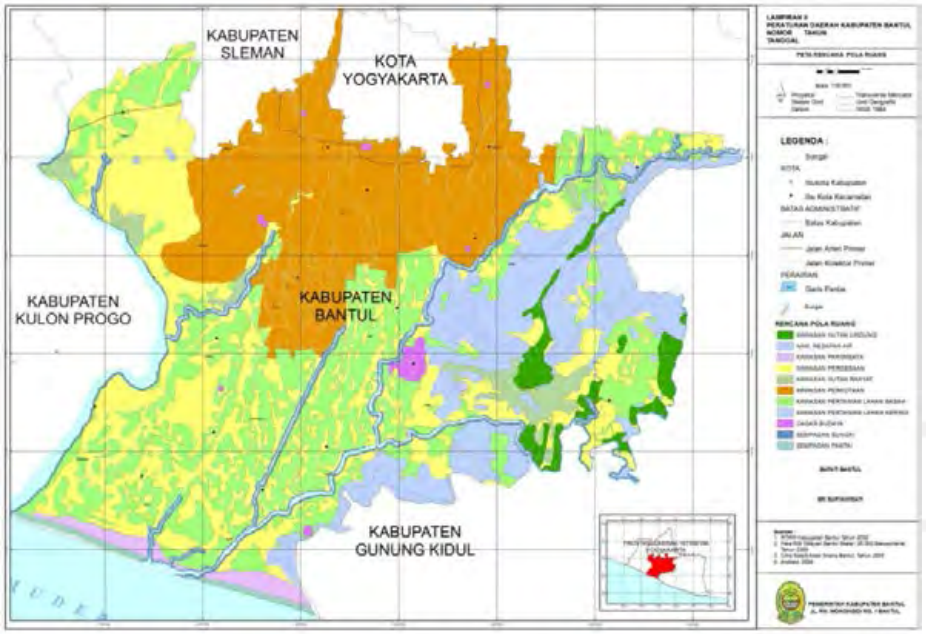
Figure 80. River Estuary and Baros Coastal Area
Source: Author
(Taken on 15 March 2022)

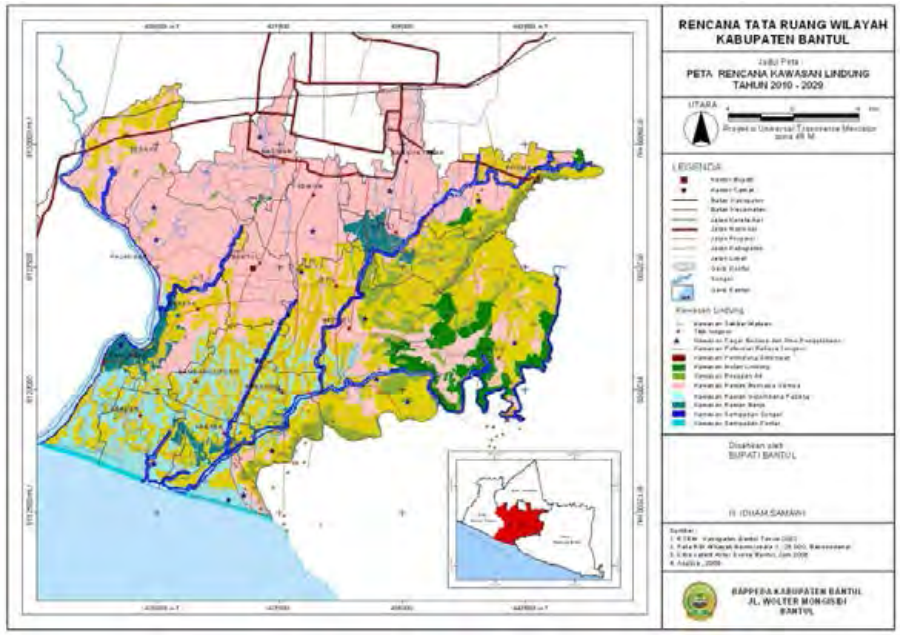
01

SITE PROFILE: HISTORICAL BACKGROUND, REGULATION, FUTURE PLANNING, & DISCOURSE DEVELOPMENT

Existence of the Bantul Regent's Decree Number 284 of 2014 about Reserves Coastal Park Conservation Area in Bantul Regency is in favour of this conservation area. Where is the management carried out by the provincial government? This is in accordance with Law Number 23 2014 concerning Regional Government, which states that the provincial government is responsible for the implementation of area management important and regional ecosystem value buffer areas of nature reserves and nature conservation areas.

Initially, Forest Conservation Mangrove Baros was pioneered by an NGO Niche with the local community, who were concerned about the condition of the south coast of Java Island, which is prone to abrasion and high levels of salt brought by very strong sea breezes, despite the presence of land fertile agriculture on the north side of the coast. Mangroves were not planted for the first time until 2003. It is intended that by creating this mangrove ecosystem, the neighboring community would be able to be more productive in agricultural management, as well as create a location to grow and





raise endemic flora and fauna mangrove, which will be utilized as a research places. Furthermore, in 2006, this mangrove conservation activity bestowed by the Youth Family Baros (KP2B).

Ecotourism area in a mangrove forest Baros is a recently created educational tourism destination on the seaside.Previously, there has never been an educational tourism area along the coast in the form of forest ecotourism regions or mangroves in DIY, particularly in Bantul. This region was once covered with mangroves, but no one was in charge of it. This location is located in the Opak River's estuary and is administratively part of the Dusun regency. area Baros, Tirtohargo Village, Kretek District, Bantul Regency Geographically, it is located at 08o 00' 28.6"S 110o 16' 59.4"E and is 18.8 kilometers from Bantul.

The designation of mangroves in Baros Hamlet as a Conservation Area Reserve for Coastal Parks, Bantul Regency, strengthens the position of the Baros mangroves as a conservation area that needs to be protected with all of its physical, biological, and economic functions and benefits that can improve the community's welfare, particularly in the Baros mangroves' immediate vicinity. Until date, the growth of Baros mangroves has increased year after year, owing to the extension of land cover and accompanying infrastructure. According to Cahyawati (2013), the mangrove vegetation in Baros Hamlet was 3.5 ha in 2012 and grew to 7 ha in 2017. (Tirtohargo Village, 2017). The existence of government program operations, both central and regional, as well as private sector CSR (Corporate Social Responsibility) in the context of managing and growing the Baros mangrove ecosystem, necessitates the creation of new areas. Management and development projects for mangrove protection zones that ignore ecological functions may endanger the existence of mangroves, resulting in its own set of issues in the future. According to Kalitouw (2015), mangrove ecosystems are extremely vulnerable to destruction if they are not properly maintained, preserved, and managed. To avoid these issues, it is vital to evaluate the usage of mangrove ecosystems in Baros Hamlet, not just for economic reasons, but also for ecological reasons.

Figure 81. RTRW Bantul
Source: BAPPEDA BANTUL (Taken on 15 March 2022)

REGIONAL REGULATION CONCERNING SPATIAL PLAN FOR THE REGENCY OF BANTUL 2010 – 2030

SC-1 Nature Reserve Zone (Reserve of culture and science)

CHAPTER I General Provisions Article 1

- A nature reserve area is an area with certain characteristics, both on land and in waters, which has the main function as an area for preserving plant and animal diversity and their ecosystem, which also functions as an area for a life support system.
- Nature conservation areas are areas with certain characteristics, both on land and in waters, which have the function of protecting life support systems, preserving the diversity of plant and animal species, as well as the sustainable use of biological natural resources and their ecosystems.
- Cultivation area is an area designated with the main function to be cultivated on the basis of the conditions and potential of natural resources, human resources, and artificial resources with the aim of making them more useful and providing results for human needs.

CHAPTER III Principles, Objectives, Policies and Strategies of Regency Spatial Planning

Part One Principles Part Three Policies and Strategies for Regional Spatial Planning Article 8

(2) The strategy for maintaining and realizing the preservation of environmental functions in the context of maintaining the environmental carrying capacity as referred to in

Paragraph (1) letter a includes:

a. establish protected areas in land space, water space, and air space including space inside the earth;
b. restore and improve the function of protected areas, especially in mountains, watersheds, coastal areas, which have declined due to the development of cultivation activities in the context of realizing and maintaining the balance of regional ecosystems;
c. maintain the area of the protected forest area and the area that provides protection to its subordinate areas, namely water catchment areas;
d. controlling activities in local protected areas and nature reserves so as not to disturb and damage the protected area functions; and
e. prevent cultivation activities along the river that can disturb or damage the quality and quantity of water as well as the morphology of rivers, beaches that can disrupt or damage the natural conditions of the coast, especially in the Parangtritis sand dune area and around the springs.

Part Two Regency Protected Areas Article 41 Regency Protected Areas as referred to in Article 40
paragraph (1) letter a includes:
a. protected forest area;
b. an area that provides protection to its subordinate areas;
c. local protected areas;
d. natural reserves, nature conservation, and cultural conservation areas;
e. disaster-prone areas.

Paragraph (2) Zoning regulations for protected areas against nature reserves
a. Permitted for land reforestation activities;
b. Permitted for research, education, and nature tourism activities;
c. Prohibited for other activities;
d. Construction of buildings is limited only to support research activities, education, and nature tourism;
e. Provisions prohibiting the construction of other buildings;
f. Permitted to be limited in the use of natural resources; and
g. Prohibited from planting flora and releasing animals that are not are flora and fauna endemic to the area.

Paragraph (4) Areas of Nature Reserve, Nature Conservation and Cultural Conservation Article 50 (2) The coastal area of mangrove forest covers an area of approximately 12 (twelve) hectares in the Gadingsari area, Srigading Village, Sanden District, Poncosari Village, Srandakan District, and Tirtohargo Village, Kretek District.

Wetland Agricultural Designated Area

Part Three, District Cultivation Area,
Paragraph (2) Agricultural Designated Area Article 54
(2) Wetland agricultural areas in the Regency are planned to be less than more than 13,324 hectares or 26.29% of the total area of the Regency Bantul is focused mainly on the central and southern parts, but its distribution is found in all sub-districts in Bantul Regency except Kasihan District is only a small part of the area.

Land Ownership Status
Sultan Ground

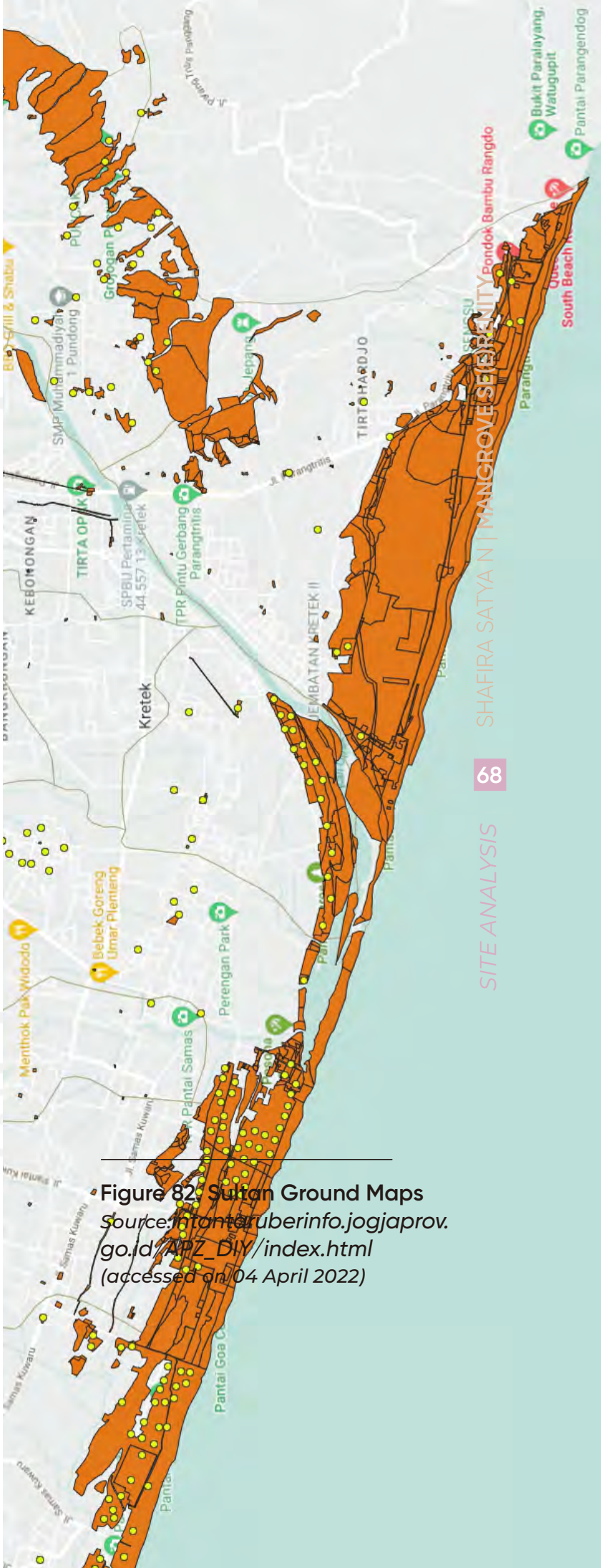


Figure 82. Sultan Ground Maps
Source:intantaruberinfo.jogjaprov.go.id/APZ_DIY/index.html (accessed on 04 April 2022)

REGIONAL REGULATION CONCERNING SPATIAL PLAN FOR THE REGENCY OF BANTUL 2010 – 2030

PS-1 Local Protected Area (River Border Zone)

Watershed area, hereinafter abbreviated as DAS, is a certain land area which is a unit with its tributaries which functions to accommodate, store and drain water from rainfall to lakes or seas naturally, where the land boundary is a topographical separator and a natural boundary. in the sea to water areas affected by land activities.morphology of rivers, beaches that can disrupt or damage the natural conditions of the coast, especially in the Parangtritis sand dune area and around the springs.

CHAPTER V District Space Pattern Plan
Part One, General Paragraph (3), Local Protected Area, Article 46

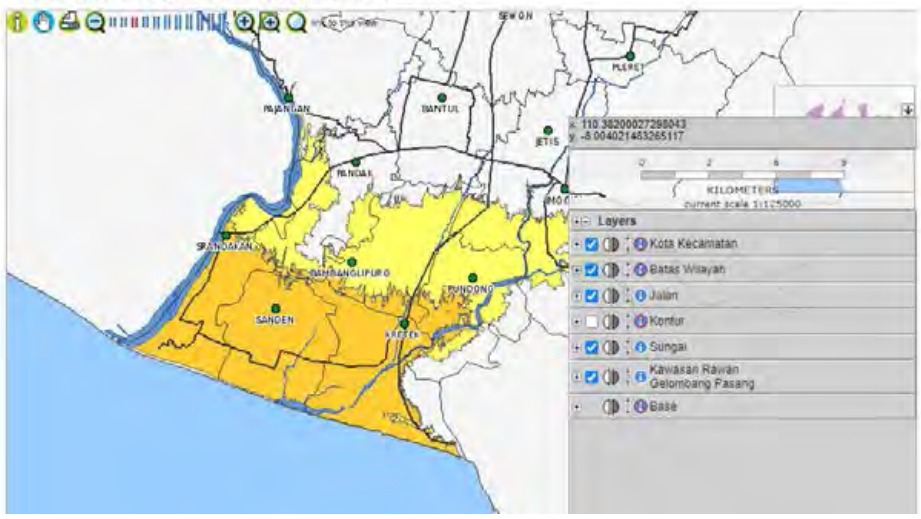
(1) The river border area in the Regency as referred to in Article 45 is planned for an area of approximately 2,805 (two thousand eight hundred five) hectares or 5.53% (five point five three percent) of the total area of Bantul Regency or 58% (fifty eight percent) percent) of the watershed area in Bantul Regency with the distribution on the left and right of the major rivers including the Opak River, Oyo River, and Progo River; Small rivers include the Krusuk River, Timoho River, Contentg River, Kramat River, Bedog River, Winongo River, Bulus River, Code River, Belik River, Gadjahwong River, Kedung Semerangan River, Tambakbayan River, Yellow River, Buntung River, Gawe River, Sungai Kenteng, Plilan River, Boar River, and Kedungmiri River.
(5) The borderline for unbanked rivers outside urban areas is set at a minimum of 100 (one hundred) meters, while for small rivers it is at least 50 (fifty) meters from the riverbank at the time of determination.
(8) For rivers that are affected by sea tides, the demarcation line is set at least 100 (one hundred) meters from the river bank, and functions as a green line.

PS-3 Coastal Border Zone

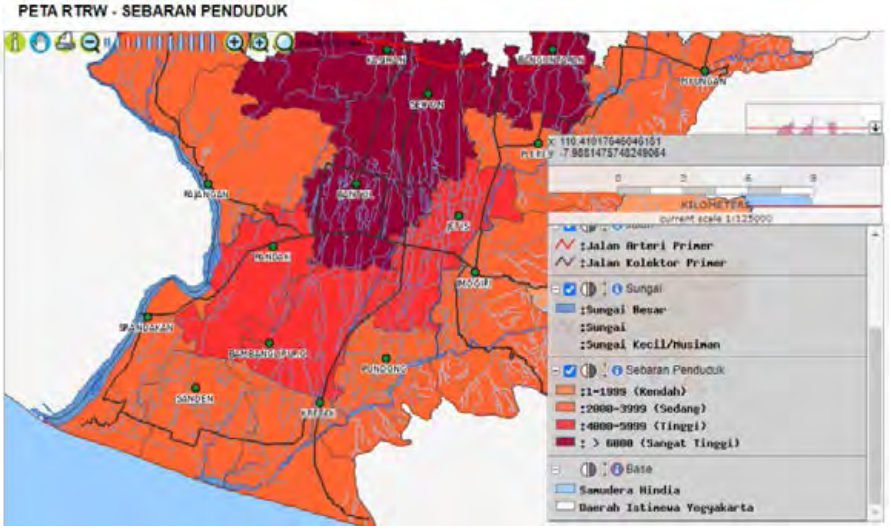
Part One, General Paragraph (3), Local Protected Area, Article 47

The coastal border area as referred to in Article 45 is in the coastal area/southern part of Bantul Regency which includes an area along the coastline with a minimum width of 100 (one hundred) meters from the highest tide towards the mainland and a length of 13.5 (thirteen point five). km is planned for an area of approximately 123 (one hundred and twenty three) hectares or 0.24% (zero point two four percent) of the total area of Bantul Regency spread over 3 (three) sub-districts, namely Poncosari Village, Srandakan District, Gadingsari Village, Srigading Village, District Sanden and Tirtohargo Village, Parangtritis Village, Kretek District.

PETA RTRW - DAERAH RAWAN GELOMBANG PASANG



PETA RTRW - SEBARAN PENDUDUK



REGIONAL REGULATION CONCERNING SPATIAL PLAN FOR THE REGENCY OF BANTUL 2010 – 2030

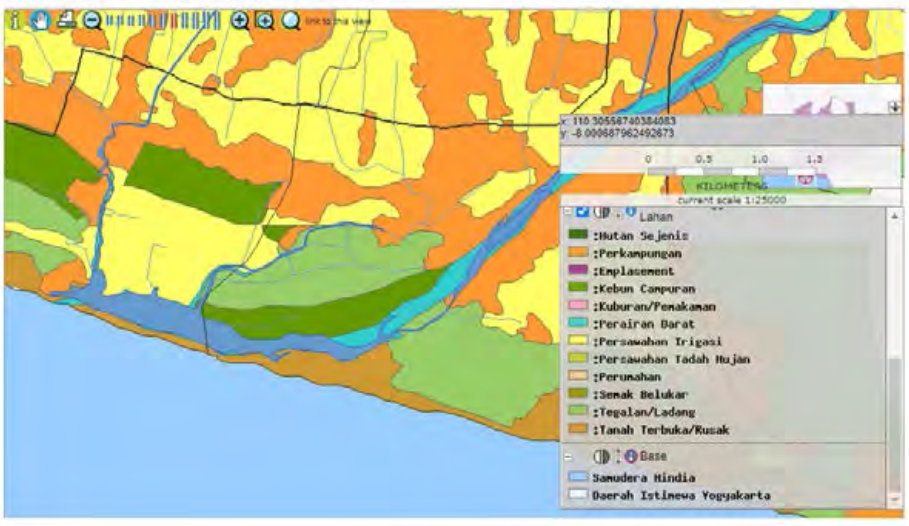
PL-13 Tourism Zone

(3) Areas designated for natural tourism in the Regency are located in:
a. Parangtritis Beach Area (Parangtritis, Parangkusumo, Depok);
b. Samas Beach area (Samas Beach, Pandansari, Patehan);
c. Pandansimo Beach Area (Kuwaru, Pandansimo);
d. Cerme Cave Complex in Selopamioro Village, Imogiri District;
e. Japanese Cave in Seloharjo Village, Pundong District;
f. Samas Agrotourism in Srigading Village, Sanden District; and
g. Dlingo Agrotourism in Mangunan Village, Dlingo District.

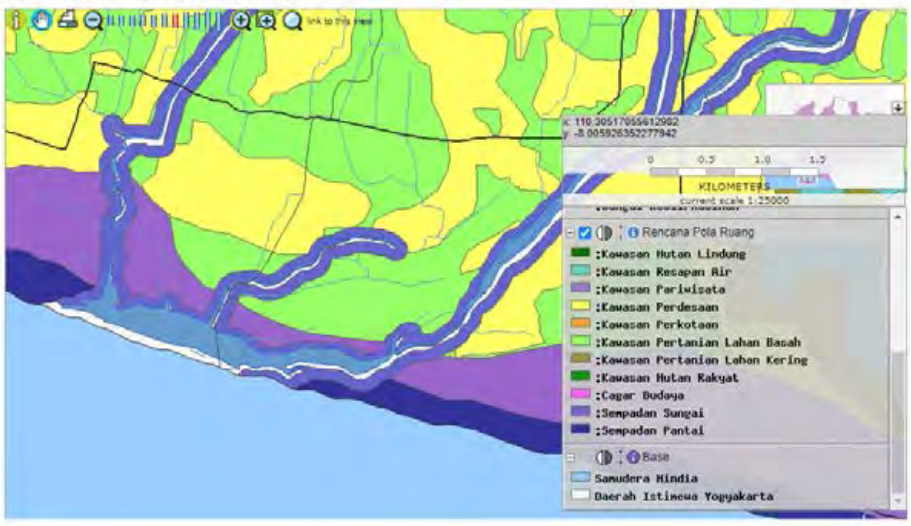
Article 80, Zoning regulations for designated tourism areas are drawn up taking into account:
a. utilization of the natural and cultural potential of the community in accordance with the carrying capacity and capacity of the environment;
b. protection of ancient cultural heritage sites;
c. restrictions on building construction to support tourism activities by fulfilling the building requirements in accordance with the detailed spatial plan;
d. provisions for restrictions and prohibitions on buildings other than to support tourism activities;
e. the construction of a building with a residential function can be permitted by fulfilling the building requirements in accordance with a detailed spatial plan and not disturbing the landscape of a tourism attraction; and
f. permitted the development of commercial activities in accordance with the scale of tourism attractiveness.

Figure 83. RTRW Map of Tidal-Prone Areas
Figure 84. RTRW Map of Population Distribution
Figure 85. RTRW Map Land Use
Figure 86. RTRW Map Spatial Plan Organization
Source:sipetarung.bantulkab.go.id kewilayahan.bantulkab.go.id/rtrw.php?mod=16 (accessed on 04 April 2022)

PETA RTRW - RENCANA PENGGUNAAN LAHAN



PETA RTRW - RENCANA POLA RUANG



REGIONAL REGULATION CONCERNING SPATIAL PLAN FOR THE REGENCY OF BANTUL 2010 – 2030

PL-13 *CHAPTER VIII, Provisions for Controlling The Use of Regional Space*

General Provisions for Zoning Regulations on Regency Spatial Patterns, Paragraph 2, The second part, Article 81

General Provisions for Zoning Regulations on Regional Spatial Structures, Zoning regulations for designated residential areas are drawn up by:

a. Fulfillment of building requirements in accordance with detailed spatial plans;
b. For the designation area for urban settlements, the building height is allowed to be more than 3 (three) floors, the intensity of the building is medium to high density, the building envelope is determined and the architectural theme is determined;
c. The KDB for urban settlements is permitted a maximum of 70% (seventy percent) and follows the existing detailed spatial plan;
d. For the designated urban settlement area, the building height is permitted to be more than 3 (three) floors, the intensity of the building is of medium to high density;
e. KDB for rural settlements is permitted a maximum of 50% (fifty percent) and follows the existing detailed spatial plan;
f. Limitation of functions and other designations that have an unfavorable impact on settlements in accordance with the detailed spatial plan;
g. Setting the volume of green open space in accordance with the detailed spatial plan;
h. Permitted the development of public facilities and social facilities according to their scale;
i. Determination of the type and conditions of permitted use of the building.

REGIONAL REGULATIONS OF BANTUL REGENCY LEVEL II BANTUL NUMBER 2 YEAR 1995

a. A maximum of 8 floors (maximum KLB: 8 x KDB) with a maximum building height of 36 m and a minimum of 24 m from the ground floor
b. Building border line at least 4 m from the road ass
c. Minimum road width 3 m
d. Green basic coefficient at least 10%

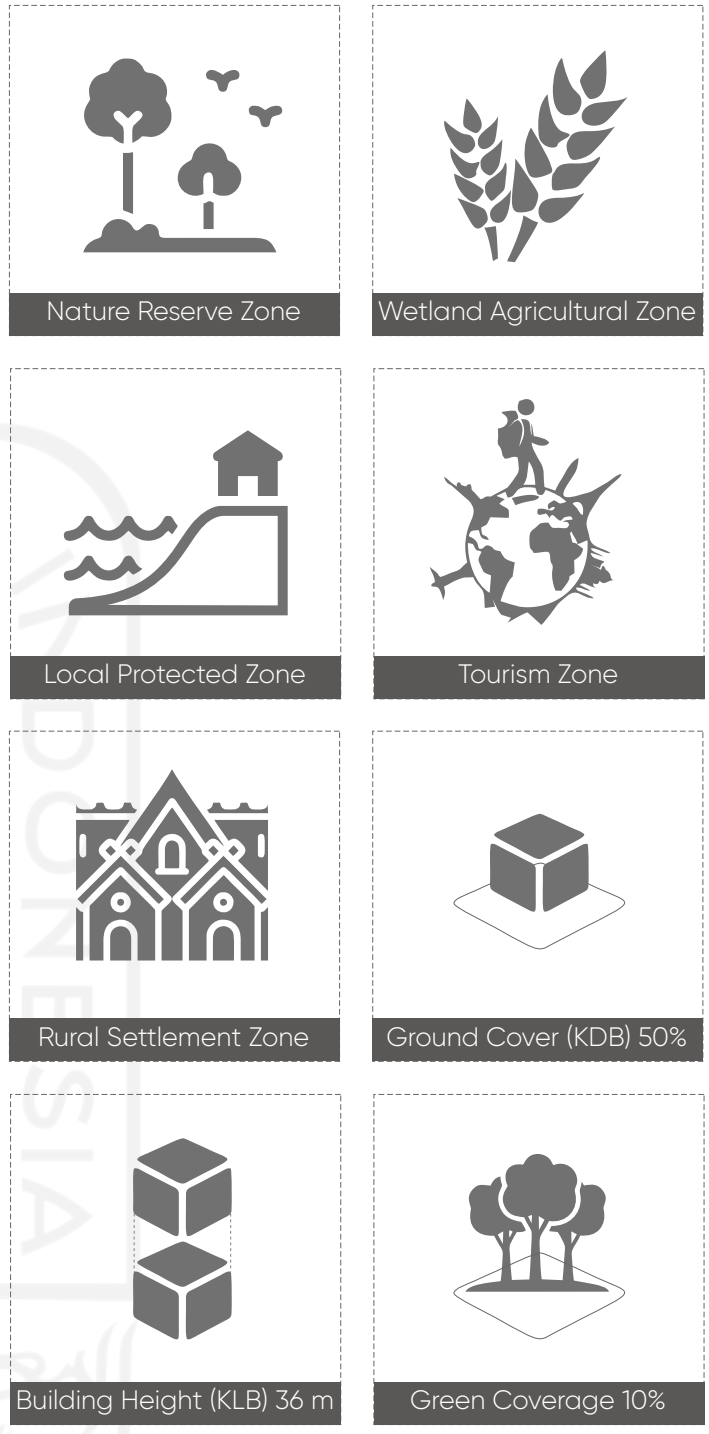
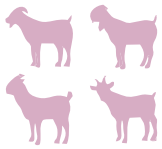


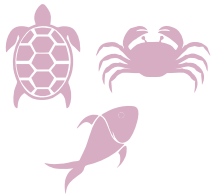
Figure 87. Visualization of Bantul Region Government Regulations
Source: Author
(proccessed on 09 April 2022)

Figure 88. Visualization Baros Mangrove Filling Components
Source: Author
(proccessed on 10 April 2022)


Community


Tourism


Land Animal


Water Animal


Air Animal


Gallery


Settlement


River


Coastal


Estuary


Mosque

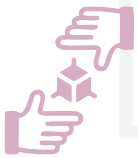

Agriculture


Fish & Shrimp Pond


MCK (Toilet)


Angkringan


Grocery store


Viewpoint


Food Stalls


Assembly Hall


Bridge


Home industry

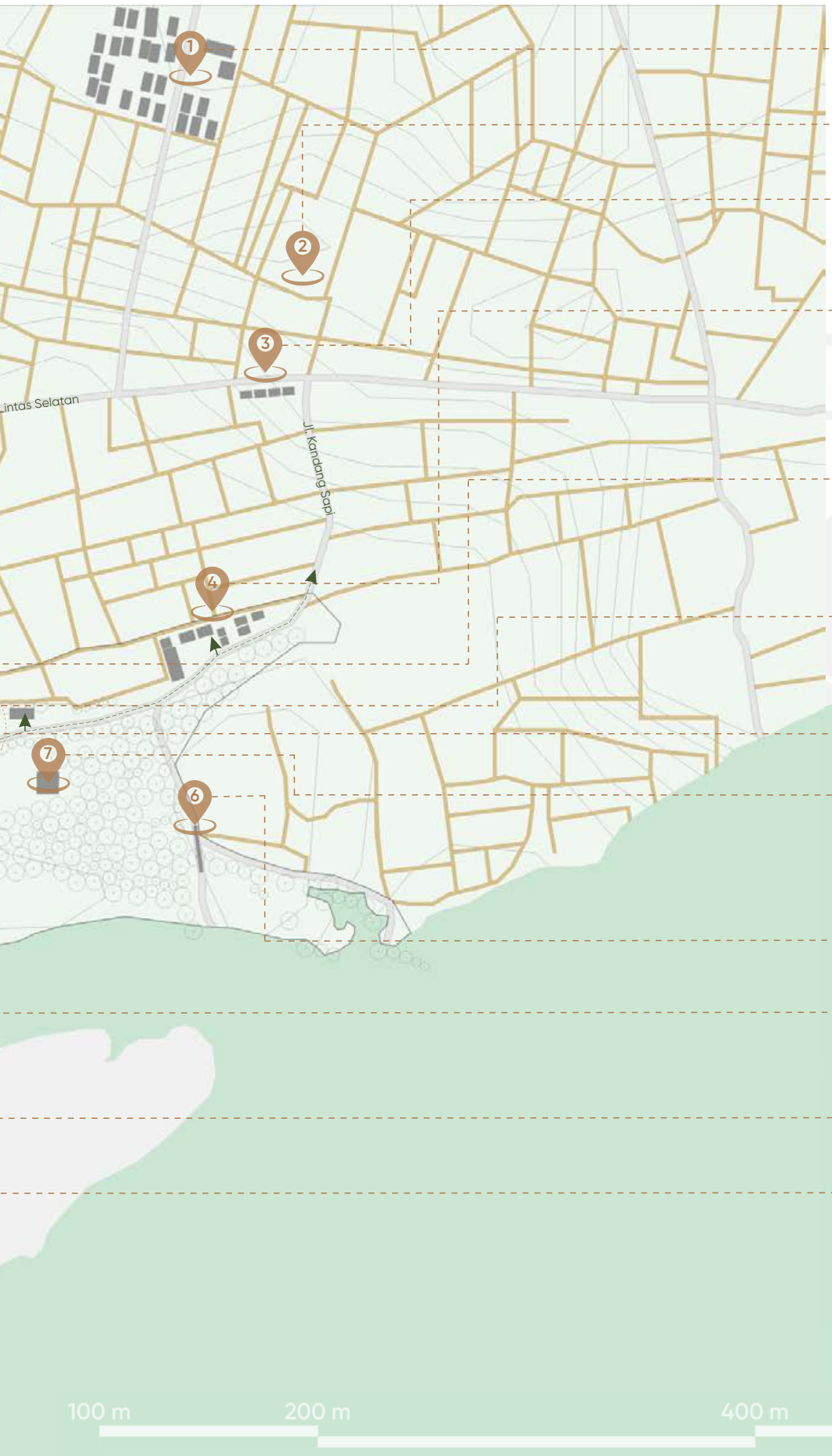

Gampling


Nursery


Mangrove


Signance


Opak River
Jl. Samas
Jl. Lintas Selatan
Jl. Lintas Selatan
Opak Estuary
Baros Beach
Site 1
Site 2
Site 3
5
8
9
10
11
12



Baros Village

Agricultural Cultivation

Icon Mangrove Baros, Car & Bus Parking Area, Gampling, & UMKM

Motorcycle & Bicycle Parking Area, Toilet, Ticketing, Information Centre, Product Seller, Mushola, Toilet

Gathering Space (Ballroom), Discussion Space, Warehouse, Gajebo, Fishpond, Toilet

Rhizopora sp. & Avinnecia sp. Nursery (Pembibitan)

Bridge

(Bruguiera gymnorrhiza, Ceriops tagal, & Sonneratia alba Nursery (Pembibitan)

Bridge

Viewing Post (Bamboo Mecusuar), Port, Nursery (Penyapihan)

Local Hybrid Engineering

Mangrove Release

Total Area 3ha

Figure 89. Visualization Baros Mangrove Existing Site Plan
Source: Author
(proccessed on 10 April 2022)

The site was maximize the 'linear' circulation. Where the people can passing through with experiencing the mangrove baros place like a journey. Beside of that, the area also integrates the conservation, community, tourism, and context really well.

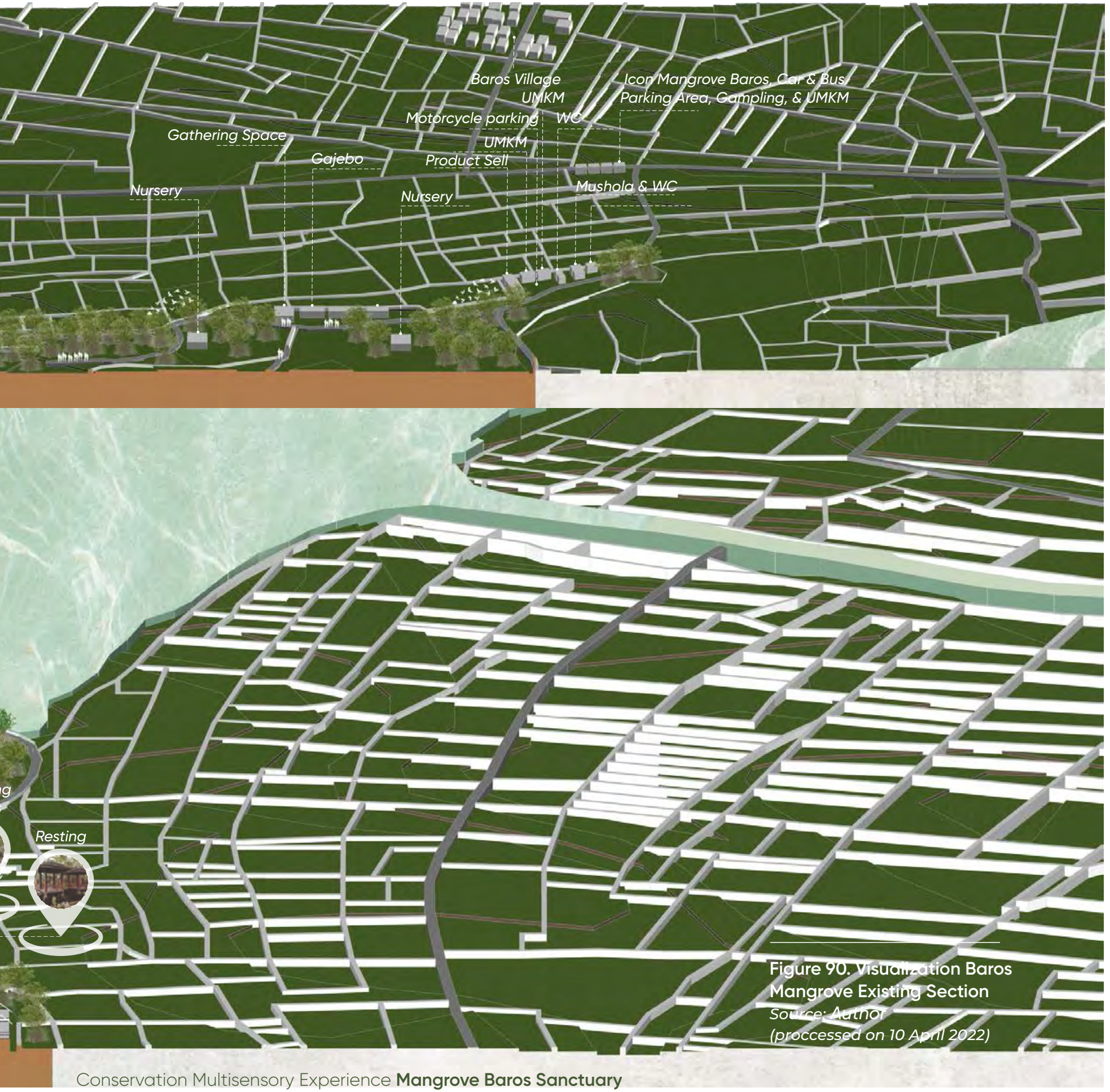


Figure 90. Visualization Baros Mangrove Existing Section
Source: Author
(proccessed on 10 April 2022)

Figure 91. Existing Condition and Surrounding
Source: Author
(taked on 15 February 2022)

02

PEOPLE BEHIND A STAGE: A ROLE OF AN ACTORS IN MANGROVE BAROS FOREST

SHAFIRA SATYANI | MANGROVE SE(E)RENITY

Figure 92. Community KP2B Pemuda Pemudi in Baros Village
Source: instagram.com (accessed on 20 March 2022)

Figure 93. Government
Source: instagram.com (accessed on 20 March 2022)

Figure 94. Government
Source: skalgubbar.com (accessed on 20 March 2022)

Figure 95. Stakeholder Visualization
Source: google.com (accessed on 16 May 2022)

Mangrove Conservation and Development Baros requires cooperative roles from all parties involved. In order to overcome numerous difficulties, active cooperation amongst players is required in the conservation of the Baros Mangroves. A shared aim must exist among some of the agencies involved.Conservation Mangrove Baros appears to be the result of a collaboration of players, notably the government, the private sector, and the general public. The government's role is to operate as a facilitator, with the private sector acting as a partner in the development of Baros Mangrove Conservation, as well as the community and KP2B acting as primary conservation players. However, in practice, collaboration between government and non-government agencies in the development of Mangrove Conservation Baros is not ideal because overlapping interests still exist. Some parties carry out their programs without taking into account the programs of other parties. The collaboration amongst the various stakeholders is not yet ideal. The lack of trust between actors, a lack of awareness, and a general lack of cooperation characterize the development of Baros Mangrove Conservation (Arianti. D, Satlita, L. 2018). From these problems, it can be concluded that Collaborative Governance that takes place in Development of Baros Mangrove Conservation in Tirtohargo Village, District The kretek of Bantul Regency is not yet optimal. The author conducted an interview with the head of the KP2B management on March 15, 2022 with Mas Cholis. For visitors who come on average

are a group of students or government agencies who hold joint training to conduct mangrove nurseries. It is very rare for tourists to only take vacations, most of them want to get education and know the procedures for planting mangrove seedlings on the Baros coast.

As time passes, around the year 2010, education improves and local community involvement grows, the Forest Area Mangrove Baros prepares to become an educational tourism attraction. The Baros Youth Youth Group was then founded as the Manager of the Baros Mangrove Forest Area (KP2B). KP2B has been formally constituted by multiple institutions based on Notarial Deed Number: 04 Date 06 May 2011. KP2B was founded as a measure of environmental conservation, particularly for coastal land and Muara Opak and its environtment.

Mangrove forest area management Baros is carried out independently by KP2B with empowerment in work groups public. The role of KP2B in management Baros mangrove forest ecotourism area as an initiator and reinforcement working group institutions. KP2B as pioneers and movers overshadow the five working groups, namely: POKJA Avicenia, POKJA Mino Tirtohargo, POKJA Andini Sustainable-Works of Manunggal, POKJA GAPOKTAN-KWT Mangrove, POKJA POCLASAR. KP2B collaborates by empowering the community is an effort to build awareness together for the development of ecotourism Baros Mangrove Forest Area.

Head of Yogyakarta KSDA Center, M. Wahyudi conveyed about the role of KSDA Hall in KEE Management (Essential Ecosystem Area) with the presence of endemic fauna and is a habitat for water birds and migratory birds, including the Java Lathe, Javan plover, Javanese Trinil, Semak Trinil, and Rice Kareo. Located in the Carnation Room of LPP Garden Yogyakarta, this activity was attended by related parties such as the Ministry of Environment and Forestry (Directorate for Management of Essential Ecosystems, BPKH Region XI Yogyakarta), DIY Government Agencies (Department of Environment and Forestry, Department of Marine Affairs and Fisheries, Department of Land and Spatial Planning). , Department of Tourism), Bantul Regency Government Agencies (Bappeda, Department of Agriculture, Food, Marine and Fisheries, Department of Tourism), Academics (Faculty of Forestry UGM, Instiper Yogyakarta), NGOs (Walhi Yogyakarta, Kutilang Indonesia and Damar Foundation), and the Trihargo Village Government and Baros Youth Family.


Community (KP2B)


Community (BKSDA)


Sultan (Owner)


Government


Fisheries


Farmer


Local Visitors & Tourist


Group student/institution


Neighborhood


Merchants (UMKM)

STAKEHOLDERS

Formal Boundaries	How can the design adjust the context in the area according to seasonal climate, site topography (abrasion), human behaviour, predator, and garbage accumulation?	How to produce design and form that res the environment with conservation, edu- and multi-sensory based solution?
	Contextual Approach	***Responsible Design Solution***
Pragmatis Boundaries	How to Apply the available technologies to the proposed design?	How to create a desgn with technoly tha affordable to the community that then a be developed as a statement of the futu
	Availability of Tchnology	***Affordable Technology***
Symbolic Boundaries	How the design can change the perception and behaviour of the surrounding and outside communities toward the region?	How are the design can provide benefits functionaly, aesthetically, socially, enviro culturaly, and economicaly?
	Change the Perception	***Get the I ncome and Benefit***
Radical Boundaries	How to design with limited communication, knowledge, and feelings in the region?	How to implement an architecturally mult sensory, educational-tourism, and conse based design that integrates with vast a land with the context of irregular and diff
	Limited of Knowledge & Boundaries	***Limited Land***

Table 1. Stakeholder
Source: Author
(proccessed on 16 June 2022)

Designer/Architect

Architect as a designers have a purpose and benefit in the form of proposals design ideas in solving the problems of threatened biodiversity and lack of people awareness with nature in mangrove baros forest conservation & Eco-edutourism

Client

The clients are people that life in the Mangro as a community and neighboor and a people come cross the Bantul as a visitor and tourist involved to the discussion for planting mangr have integrated activities conservation & edu

pond to ourism,	How to accomodate a wide variety of heterogenous user functions and activities as a concise design?	How to adjust the function and form of design with the rules or plans that have been made by the government?
	Multi-functional Approach	***According to Regulation***
t is so can re?	What kind of technology that can be used, suitable, and user-frienly to the design?	How to adapt the technology to the rules or plans that have been made by government with local capabilities?
	User-Friendly Building	***Local Capabilities Approach***
n term of nmentaly,	How the design can improve regional values as well as overall user and functional value?	How the design can adjust the image that is or have been proclaimed by the government as a conservation and tourism area?
	Increase the Value	***Match with Image and Linkage***
i- vation nd wet use?	How to make the design respond to the history and make clinging to the interactions, educational, and memory of the users in the region?	How the buildings adapt to local norms and cultures that already apply to the design areas?
	Memory, Interaction, Education, Historical Values	***Culture and Norm value***

ve Baros e that to get ove that cation

User

Users are people who are the village community of Baros and visitors who are not residents such as tourists and traders that have integrated activities conservation & education

Legislator

Government that have the authority to create regulations that restrict to the society and the design

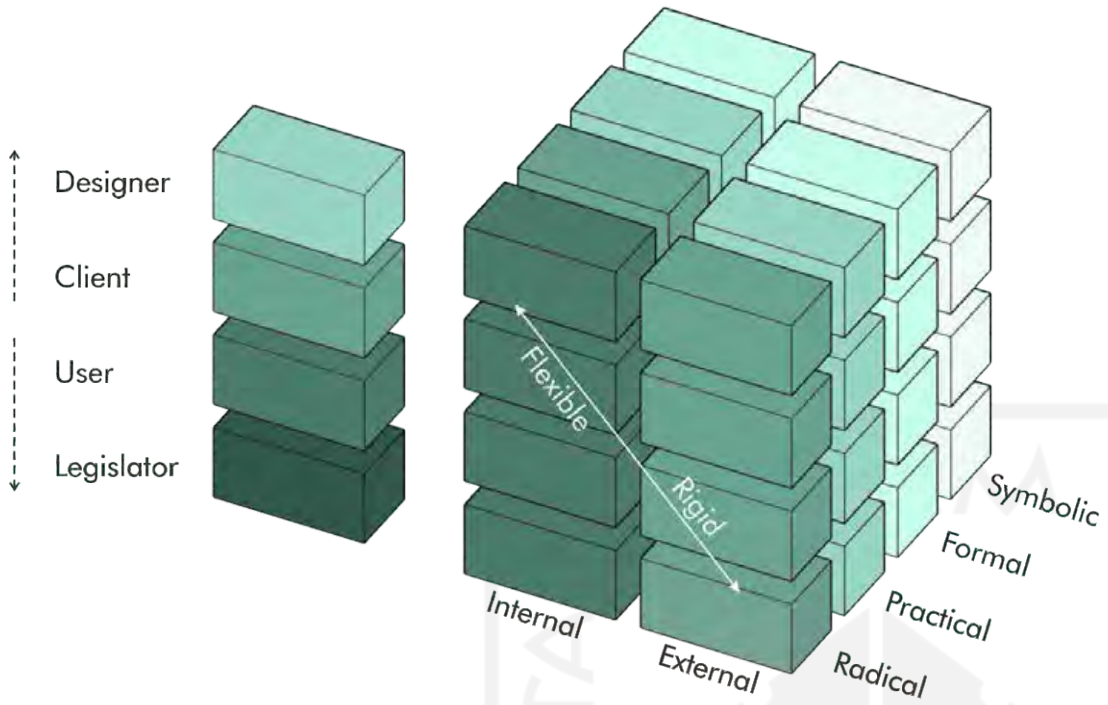


Figure 96. Stakeholder Diagram
Source: author
(proccessed on 16 May 2022)

Bryan Lawson (2005) describes how problems in design relate to constraints in various aspects in his book entitled How Designer Think. Limitations in designing are divided into 2 groups, namely intangible and tangible. Intangible constraints are limitations in the design with ambiguous nature, based on feelings, perceptions, and cannot be assessed objectively, such as symbolic boundaries and radical boundaries. Meanwhile, the tangible limit is a limitation in the design that is related to real things, visually visible, and can be assessed objectively, for example, such as formal boundaries and pragmatic boundaries.

Formal boundaries are related to function and visuals, such as the shape, color, and texture of the design. On the other hand, pragmatic boundaries will be related to technological, technical, building techniques, and design mechanisms. Symbolic boundaries are related to identities that can be used to force the community through the image and linkage that has been built. Meanwhile, the radical limit relates to the philosophical values that are fundamental and important in the region and society.

In terms of the division of actors, they are divided into 4. Architects who design works according to the needs and desires of users and clients. Designers need input from other parties for consideration so that the design is more mature. Client as project owner and material provider. The user is the one who will use the plan. The legislator is the one who issues the rules for drafting. The designer will do the framing that will raise the issue and concentrate.

"There is an eco-print training from mangrove leaves as a natural textile dye and the highlight is the api-api mangrove type (Avinnecia sp.) because produces a green color because it is rare In this case it is not damaging usually 1 kg of leaves are used along with the twigs, picking themselves into 3 liters of dye within a period of 1 month"

"However, the growth of mang Baros is difficult and rather slow, due to inappropriate pH, salinity, others. In a period of 3 years the only that much. About 8 me

"A post levy will be created and is needed. It is in the development stage on an empty bamboo area that will be used as a parking area and a post levy for data collection"

"Arrivals in groups using buses or cars wil be parked at the icon location which is then gradually passed using public transportation or can walk even though it quite far"

INTERVIEW RESULT WITH HEAD OF KP2B *"Mas Cholis"*

Figure 97. Interview Result with Head of KP2B "Mas Cholis"
Source: author
(proccessed on 16 May 2022)

"Facilities that, not yet optimal, are desired and needed. There is a plan but there is no supporting effort and design"

"In community nurseries, they already have and provide space by using bambbo structure and paranet, but it is still limited. Some of them sometimes have to transport existing seeds from residents homes because they need sunlighting arrangements"

"Gallery Cultivation, displaying prototypes of anything in mangroves, such as a museum but not too formal and can be used to display products that can convey and give identity that mangrove baros has a wealth of nature and culture of the surrounding community. In addition, the simulation of abrasion as has been designed in Japan as a depiction of evacuation. An aquarium is made in which there are mangroves and there is a tidal wave, visitors can immediately feel it"

"The education hall for joint workshops and holding craft-making activities will be designed close to the prayer room (on a former pool that is no longer in use)"

"To get to the mangrove planting and the beach, you can use a boat or you have to walk at the river location (west pole)"

"Waves and abrasion often occur in areas near the mouth of the Opak river, after the river has just been on the beach"

"Materials using bamboo in existing buildings do not last long"

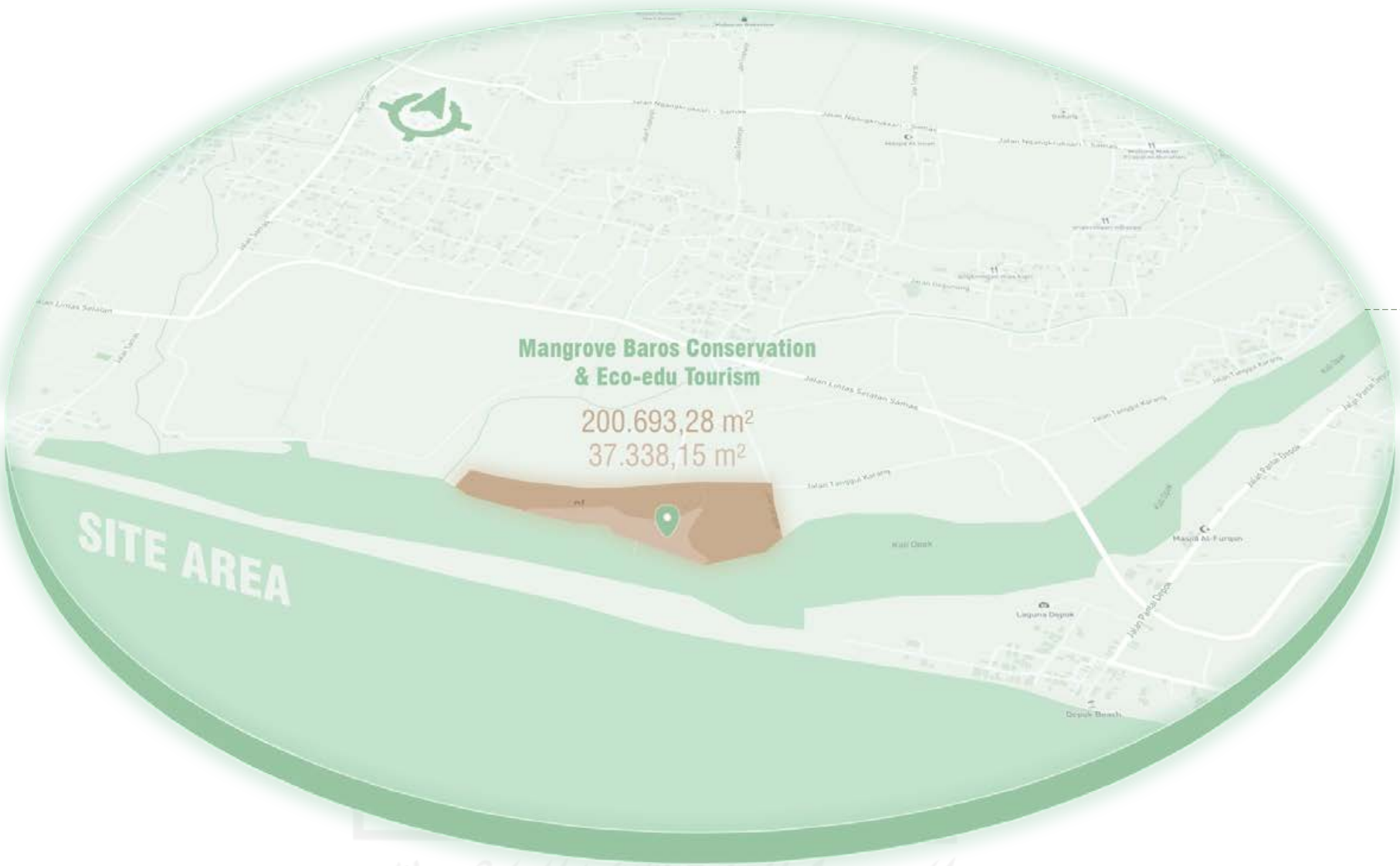
"The issue of waste must be raised and addressed so that waste does not enter the mangrove area, especially the planting area or recycling efforts can be made. Currently, there are APO pagers but they do not last long, only 3-4 years are destroyed and then become garbage. Maybe a building or solution can be made. Garbage is not only plastic, there are big bamboo, pillows, mattresses"

"Marketing and people who come mostly from school children and agencies who come together. In the form of packages of residents and families there are also but less often. Usually there are 50-200 people who come in one visit which are then divided into several groups"

SITE ANALYSIS TOPOGRAPHY

INHERENT ANALYSIS

Figure 98. Topography Analysis
Source: author
(proccessed on 16 May 2022)



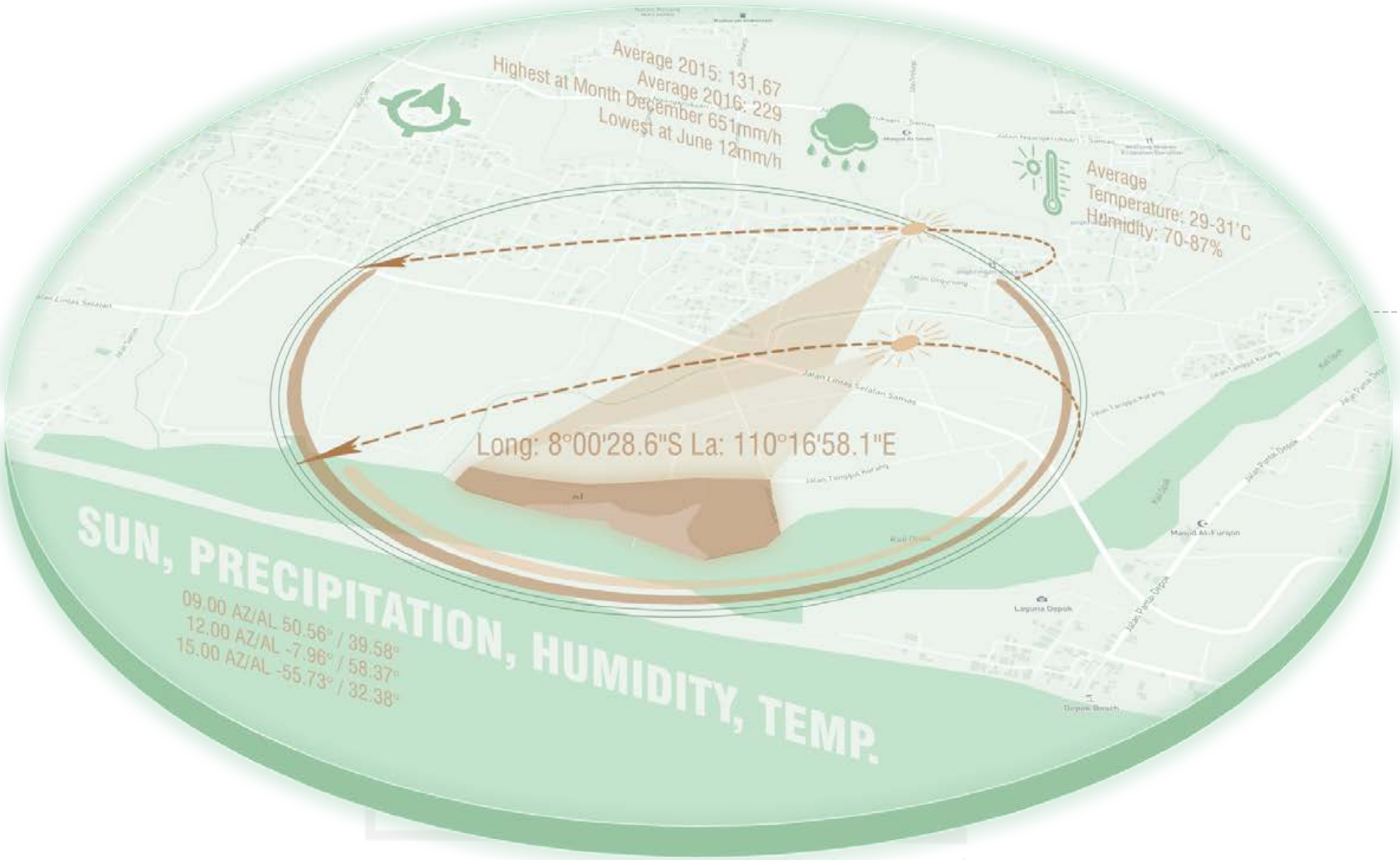
the topography is between agricultural areas, ponds, rivers, and the sea has different land elevations. The shape of the lip of the soil can change. The slope of this contour is at 35 degrees, which means it is not too gentle but not too steep. The shape of the site tends to be irregular and elongated facing the shoreline flanking the estuary. On the contour of the site there is a river flow which is also used as artificial irrigation and a mangrove planting area so that the water supply and when the tide is under control. Topographical conditions can affect culture and human activities in it. In addition, the contour rise can also be used as an anticipation of tidal waves. This site has muddy soil with high intensity of pH and salinity. The site also contain 2 kind of water, land water and brakish water.

Baros Conservation Mangrove is located in Baros Village, Kretek District, Bantul Regency, Yogyakarta Special Region Province. Currently, it is a tourism-based conservation area with the ownership of the sultan's land which is then given to the village to manage it. Overall, it has a land area of 10ha which then experienced shrinkage due to abrasion and erosion that occurred naturally as well as illegal mining activities of sand mining and shrinking to 3ha. This results in a decrease in land surface and a decrease in land area due to an increase in sea level. The condition of the site with natural characteristics is exacerbated by its location between the estuary and the coastal area, namely the confluence of the shoreline and the river so that it is vulnerable to rising waves and garbage.

SITE ANALYSIS CLIMATE

INHERENT ANALYSIS

Figure 99. Climate Analysis
Source: Author
(proccessed on 16 May 2022)



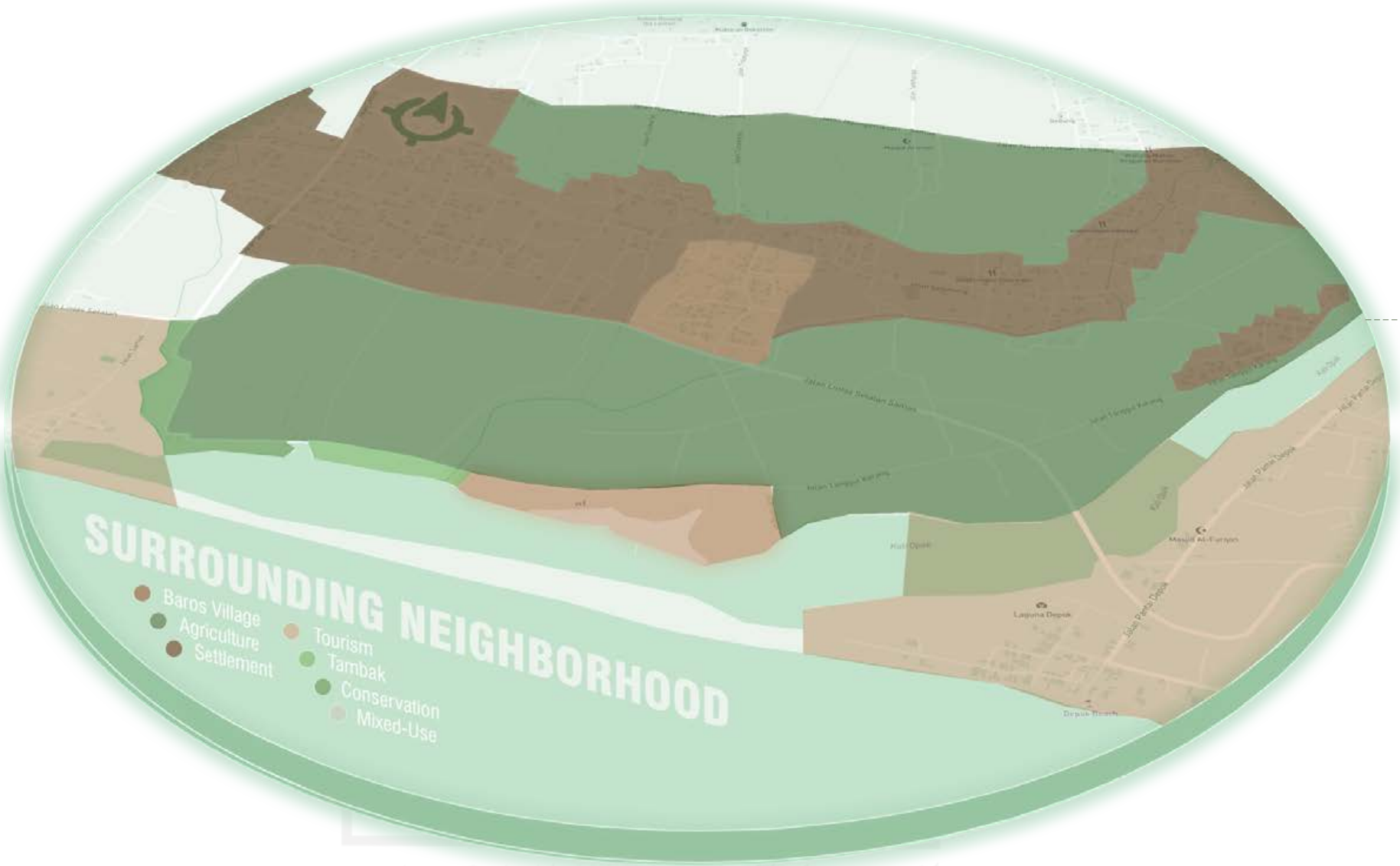
Rainfall on the site is very influential later on the rise in water levels. In addition, it will be very necessary for irrigation during the nursery process to treatment because the main breeding of mangroves apart from fertilizer is from water. Water is also needed so that mangroves do not die as a means of irrigation which requires fresh water and brackish water. Rainwater can be temporarily stored before the dry season. The data shows that the highest rainfall in December is 651 mm/hours, which includes more than normal and the lowest is 12mm/hours, which will cause a long drought. As for the wind data obtained from the website meteoblue and BMKG on an annual basis and on average. The wind with the highest velocity moves from the southeast to the south. It is important to develop a comfortable humidity design and maximize natural ventilation.

Solar data is obtained from the Andrew Smash website daily to yearly according to the critical date, month, and hour. In this case, the authors took samples on the 22nd in June and December which is the time to the critical angle of the fall of sunlight so that it will greatly affect the design. The data shows that the north direction of the site is tilted less than 45 degrees and more than 45 degrees during the day. Then the sun appears from the east side of the site and sets from the west side of the site. The eastern and western solar radiation needs to be anticipated so that the room remains in a comfortable condition and has an optimal temperature for breeding mangroves. The temperature at the site shows the number 29-31 degrees which is better reduced to 25 degrees. High humidity needs to be anticipated so that plants don't die easily.

SITE ANALYSIS SURROUNDING CONDITION

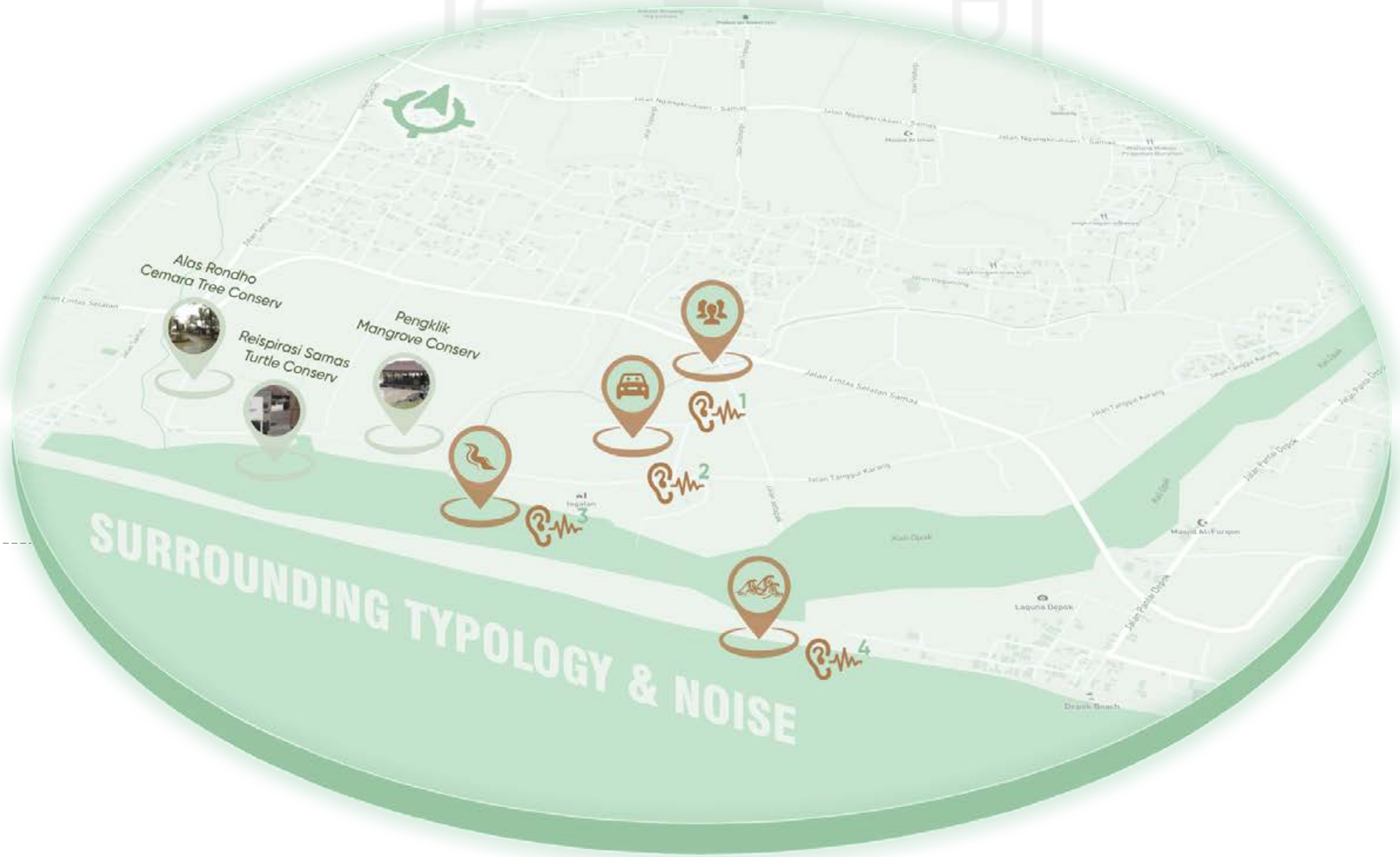
INHERENT ANALYSIS

Figure 100. Surrounding Condition
Source: Author
(proccessed on 16 May 2022)



The typology of surrounding buildings that have the same function, namely conservation, includes turtle, mangrove, and sea pine tree. This affects the formation of a design building typology. Alas rondho, a building with a joglo roof made of tile that responds to contours, semi-outdoor. Samas Respiration, has hatchling ponds with open buildings. Clicker, with amphibious floating structure. For the noise, come from river, sea, vehicle, and people.

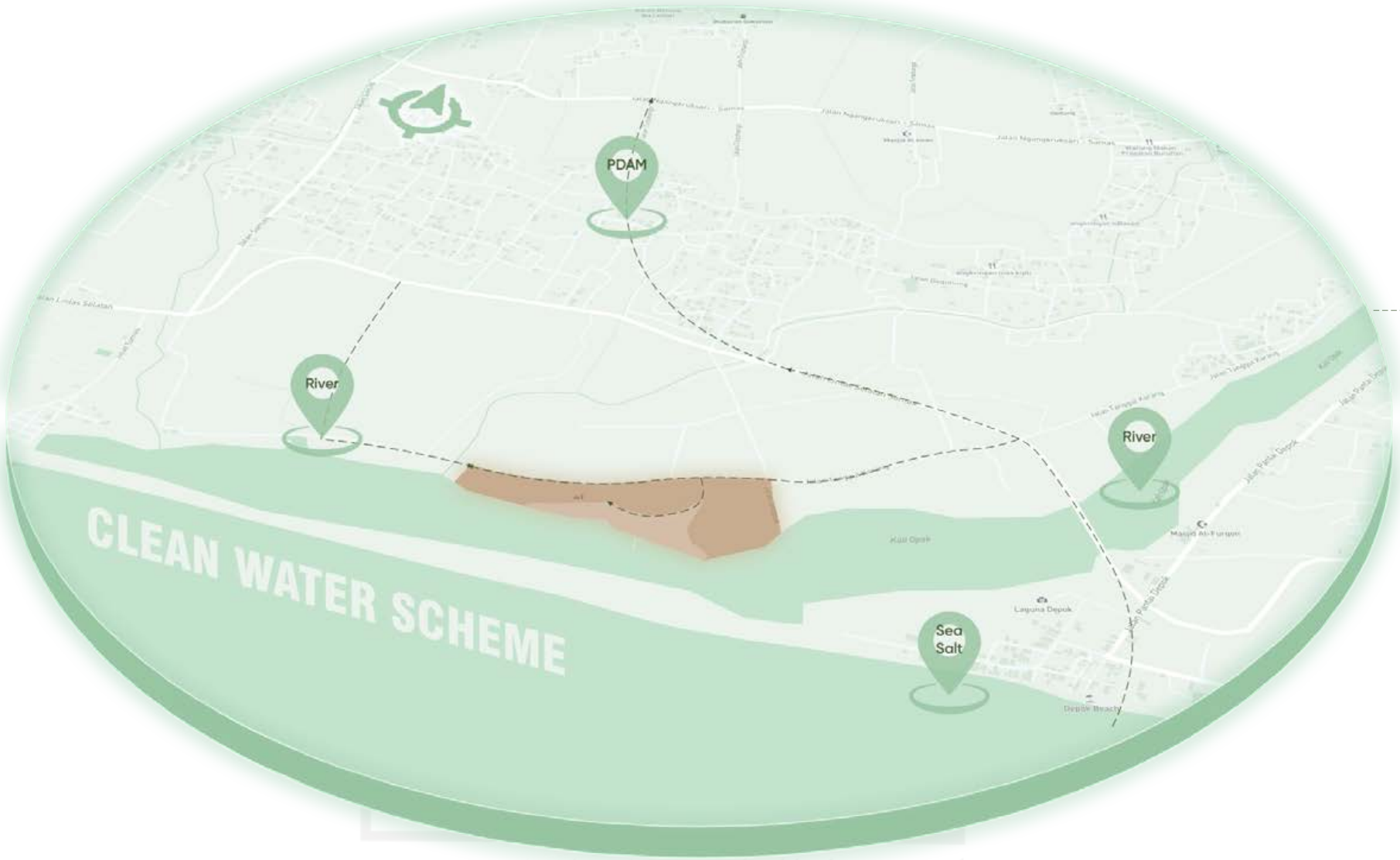
The Baros area is designated as a conservation area based on eco-edu tourism, which is surrounded by facilities and zones including agriculture, rural areas, settlements, tourism, fish and shrimp ponds, conservation areas, and mix-use as a means of trade and recreation. Existing facilities are included in the tenuous density. These zones are interconnected to support each other. Baros mangroves are directly connected to the Baros village community.



SITE ANALYSIS CIRCULATION

INHERENT ANALYSIS

Figure 101. Circulation
Source: Author
(proccessed on 16 May 2022)



In the access and circulation section of the site, there is only one main entrance which has been paved with a block. However, the site can also be reached through roads in the surrounding rice fields. Some of the roads are still natural, only covered with dirt and sometimes if there is a puddle it will be muddy. Vehicle lanes for motorbikes and cars are still inadequate so visitors are required to walk. In addition, there is a waterway boats to get to the planting and recreation.

Water sources in the Baros mangrove site area for eco-edu tourism conservation come from various sources, including brackish water used for irrigation for mangrove planting and then processed into fresh water from the sea and estuaries. In addition, drinking water comes from Baros village with PDAM water as a source. The need for irrigation especially during summer and drought. To overcome this, during the rainy season should be accommodated for future supplies.

03

THE SUSTAINABILITY OF BUILT ENVIRONMENT EXISTING BUILDING FUNCTION MANGROVE NURSERY PROCESS, SCHEME, AGE

Figure 102. Mangrove Nursery in Mangrove Baros Conservation and Eco-Edu Tourism
Source: Head of P2KB
(Taken on 04 April 2022)

Figure 103. Mangrove Nursery Predator
Source: id.pinterest.com/pin
(Accessed 11 April 2022)

According to the interview with KP2B, the soil conditions at the site have poor pH and salinity in the growth of mangrove plants in the nursery process, so that it is delayed and takes longer. The soil in the Baros mangrove conservation area, in Tirtohargo Village, has sandy, loamy and clay soil types. Based on the results of previous research by (Sari, Arum L. 2017) the eastern, southern and western parts of the core zone of the mangrove conservation area have a pH above 7. In the eastern part the average pH 7.44, the south 7.69 and the west 7.62. The pH standard for mangrove plants ranges from 7-8 so that the pH conditions in the Baros mangrove conservation area are in accordance with the pH standard for mangrove plants. Alkaline pH is a pH that is suitable for mangrove plant conditions. the eastern part has a salinity of 0.52 mmhos/cm, the south is 0.55 mmhos/cm and the west is 0.76 mmhos/cm. The salt water environment is very necessary for the stability of the mangrove ecosystem. Salinity is an important factor in the growth of mangroves. Mangroves can thrive in areas with a salinity of 10-30 ppt (o/oo) or 10,000-30,000 ppm. According to Candra Syah, (2011) mangrove species (Avicennia sp.) can grow in high water salinity, which is more than 30o/oo. So it will be need a building that can be used as a mangrove planting area is needed with measurable soil criteria conditions. Natural conditions at the site that have a coastal character with abrasion problems cause the need for buildings that can anticipate and protect the problem of rising water so that the mangroves can stay alive when the waves come. Presence of predators such as birds and sea crabs can damage plants, so it requires buildings that have

shade and do not come into direct contact with water. The need for optimal temperature for the fertility of mangrove plants, but still getting light levels according to the criteria (not exposed to direct light and there is shading). So far there has been shade using paranet because there is no design and low cost. However, this protection function is not optimal and a wall that can adapt to abrasion/rise in sea water is needed.

"restoration" is any activity that aims to restore an ecosystem to its original condition (whether pristine or not) (Lewis 1990b), while the definition of "rehabilitation" is any activity (including restoration and habitat formation) that aims to change a damaged ecosystem to an alternative that is more balanced.

In the rehabilitation of baros mangroves, it is not necessary to always use mangroves (major and minor mangroves) to be planted because the beach conditions are sandy, so mangrove associations are used. Mangrove Rehabilitation Steps :
1. Planning of community precondition assessment.
2. Implementation of rehabilitation monitoring and evaluation.
3. Publication.

There are several stages in planting mangroves, namely:

Fruit Collection (Propagule)
In collecting fruit, from collecting to sorting, it should be done by involving the community. Thus they will understand what kind of fruit is worth planting. After flowering and pollination occurs, most Mangroves produce seeds or fruit stems that known as propagules. This propagule then plunges its roots into the mud and use its food reserves to grow quickly become a sapling.
1. Mangroves come from the local area, are ripe and of good quality.
2. Place protected from the sun.
3. Maximum storage time is 10 days.
4. For seeding, the location and soaking is approximately 20-40 times/month.
5. Ready to be sown in nursery beds.

Fruits/seeds of various types of mangroves that grow :
1) Brugeira gymnorrhiza; 2) Rhizophora mucronata; 3) B. paviflora; 4) Avicennia marina (a) new shoots, (b) extension of plumele, 5) Aegiceras corniculatum (a) fruit, (b) young fruit and fruit which have sprouted. (MacNae 1968).

Fruit Planting
polybag measuring 15 x 20 cm. Then put in the mud as much as 2/3 parts of the polybag. In each polybag, one mangrove seed (fruit) was added. Do the treatment until the seeds are 3-4 months old.

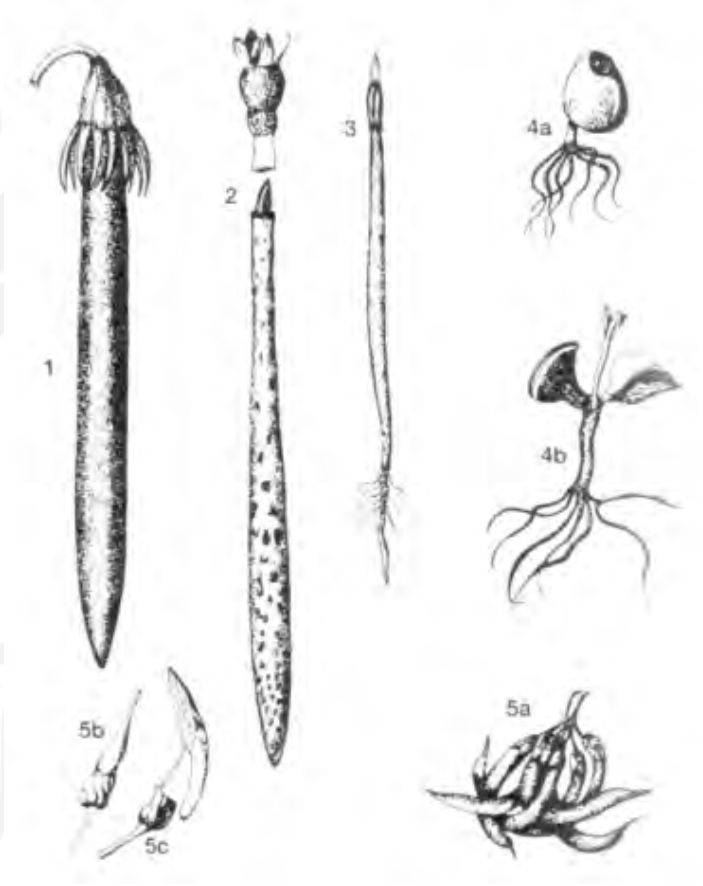


Figure 104. Mangrove Fruit Collection (Propagule)
Source: Brown, Benyamin. (2006). Petunjuk Teknis Rehabilitasi Restorasi Mangrove. Mangrove Action Project dan Yayasan Akar Rumput Laut (proccessed on 12 April 2022)

There are four sources of mangrove seeds, namely:

1. Create a seedbed from the nearest seed source.
2. Direct planting of mangrove seeds.
3. Planting mangrove seedlings that have grown in nature.
4. Distribution of seeds in the rehabilitation area during high tide.

Nursery 1 (Pembibitan)

The existence of a nursery will be beneficial, especially if the planting is carried out at a time when the peak season for fruiting is not carried out or when plants are replanted. In addition, planting through seeded fruit will produce a high percentage of growth. Seedlings to be planted must be available one day before planting.

1. Selection of nursery location

   The nursery location is cultivated as close as possible to the planting location and should be submerged in high tide at least 20 times/month to prevent watering of seedlings.

2. Construction of nursery places and beds

   Of the area determined for the nursery, about 70% is used for nursery beds, the remaining 30% is used for inspection roads, waterways, work huts and other light buildings. The size of the nursery depends on the need for the number of fruits to be planted. The material for the nursery can use bamboo. The roof/shade can use palm leaves or reeds with a height of between 1-2 meters. Nursery beds are made with various sizes according to needs, but generally measuring 5 x 1 m. With beds measuring 5 x 1 meter, it can contain approximately 1200 plastic bags (polybags) measuring 15 x 20 cm, where each bag contains one seed.

   1. The beds are made of strong bamboo.
   2. The size of the bed is adjusted to the needs.
   3. Generally measuring 1×5 m or 1×10 m with a height of 1.5 – 2 m.
   4. The beds are given light shade from palm leaves, coconut, palm fiber, thatch, reeds or the like.

Nursery 2 (Persemaian)

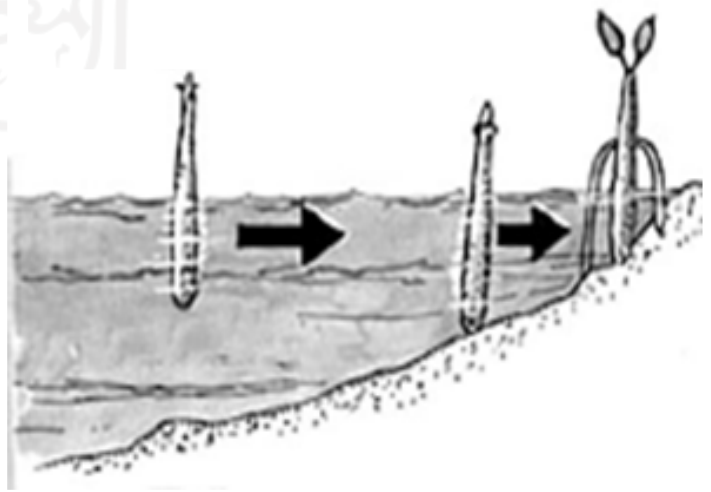
1. Sown

   The nursery area is spacious and flat, close to the planting site, submerged at high tide with a frequency of 20-40 times/month so it does not require watering. The fruit is sown directly into plastic bags or into used mineral water bottles (bottom with holes) containing soil media. Especially for mangroves and saplings, they should be stored in the shade and covered with wet sacks for 5-7 days. Leaves appear after 20 days, after 2-3 months the seeds are ready to be planted.

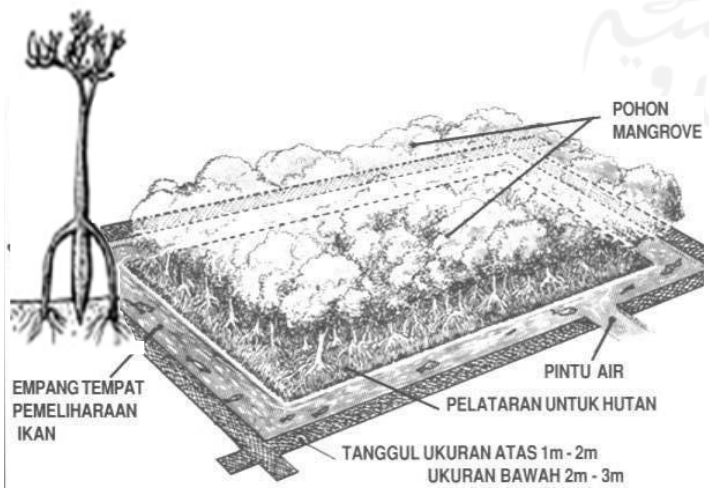
1. Seedling

   After the mangrove or tumu seedlings are about 3-4 months old, the seedlings are ready to be planted in the field. While the seeds of fire or prepat are ready to be planted after about 5 - 6 months. If the community group has been formed, nursery activities can be carried out and continued by the group.

Entering the Water *Floating Upright*



Digging Into The Ground



Fruit Propagule Treatment (Propagul)

1. Mangroves come from the local area, are ripe and of good quality.
2. Place protected from the sun.
3. Maximum storage time is 10 days.
4. For seeding, the location and soaking is approximately 20-40 times/month.
5. Ready to be sown in nursery beds.

To protect plants from human disturbance can be done in several ways:
1. Intensive approach, and rule-making and enforcement
2. Widen the spacing
3. Notice board
4. Playing Spacing and Partitioning architecturally

Mangrove Planting Technique

1. Direct use of seeds/fruits, success rate 20%.
2. Indirectly Using seeds from nursery beds, the success rate is 80%.

Planting

1. Supporting factors for success, tidal conditions, wave season and suitability of plant species with their environment.
2. Determination of spacing, Planting distance depends on the location and purpose of planting. Planting on the seafront with the aim of protecting the beach from abrasion or as a green line, the spacing is 1 x 1 meter. The number of rows of plants depends on the condition of the coast, but try to do as much as possible.
3. Equipment Preparation
4. Group Division
5. Planting Implementation

Monitoring

a. Observe the growing mangrove species. Check the source of the seedlings. The growth time. Parameters: tiller density, stalk diameter, volume and tiller height, and annual growth rate. Growth characters including stalk structure, shoots, fruit and resistance to pest attack.
b. Record the failure rate Explain the reason why the failure occurred. The level of accumulation of waste Mark the source of the waste and the steps taken to minimize the problem.
c. Adjust the optimal density level puppies
h. Density level, whether due to natural growth or planting. Observe the growth too.
i. Estimate restoration costs Estimated costs include land preparation, seed collection, nursery, planting and so on.
j. Observe the effects of mangrove use This is part of a long-term restoration activity. The character of the mangrove ecosystem rehabilitated. In the form of observing flora, fauna and the physical environment of the ecosystem new mangroves and their comparison with the condition healthy and undisturbed mangrove growth.

Community Empowerment in Mangrove Rehabilitation

1. Planning
   a. Survey
   b. Booking
2. Implementation
   a. Socialization.
   b. Training and counseling.
   c. Environmental education
   d. Development of alternative livelihoods.
   e. Mangrove planting.
   f. Maintenance.
   g. Mangrove tourism (ecotourism).
3. Monitoring and Evaluation
   a. Weeding and embroidery.
   b. Thinning.
   c. Plant Protection.

Mangrove Life Requirements

1. Tropical and subtropical 32° N – 38° South Latitude.
2. Tropical, full sun.
3. Temperature above 22°C.
4. High rainfall (2500 – 3000 mm/year).
5. In a protected area.
6. The mud-flat is wide and far away.
7. Deltaic.
8. The difference between high and low tide is far.

APO

In a location that has high waves, a breakwater (read: Apo-apo), if needed, must be built before mangrove planting is carried out, to protect mangrove seedlings from scouring sea waves. Mangroves can only "function", after approximately five years.

Hama Mangrove 3W-1M

a. Wideng (Crab).
b. Wedhus (Goat).
c. Wong (People).
d. Manuk (Bird).

Factors Affecting Mangroves

1. Climate.
   a. Tropical, full sun.
   b. Temperature above 22°C.
   c. High rainfall (2500 – 3000 mm/yr).

2. Beach Shapes
   a. Protected.
   b. Extensive mudflat.
   c. Delta.

3. Physical and Chemical Gradients
   a. The difference between the highs and lows is far.
   b. Salinity.
   c. Soil nutrients (mud thickness).

4. Propagule Spread
   a. Through the water
   b. The connection with the ups and downs
   c. The size of the propagule is also thought to have an effect

Mangrove Spread Affected

1. Salinity.
2. Soil nutrients through water.
3. Relation to ebb and flow.
4. Propagule size.
5. Pre-dispersal usually by insects.
6. Post-dispersal by crab.
7. Competition between species, individuals and zoning.

Mangrove Planting System

1. Daily banjar system, planting using seeds or using seeds.
2. Intercropping/wanamina system, the principle is the same as the daily banjar system. The difference is that ponds and waterways are made for the cultivation of fish resources (Silvofishery culture).
3. Spaced clump system.

Figure 105. Pembibitan Nursery 1
Source: tekape.co/mengunjungi-nursery-pt-vale-mampu-hasilkan-bibit-tanaman-hingga-700-000-per-tahun/
(proccessed on 13 April 2022)

Figure 106. Persemaian Nursery 2
Source:luhgedewahyunibali.blogspot.com/
(proccessed on 13 April 2022)

Figure 107. Mangrove Life Cycle
Source:kuliahkelautan.blogspot.com/2012/10/ilmu-kelautan-hutan-bakau-mangrove
(proccessed on 13 April 2022)

Figure 108. Mangrove Planting Daily Banjar System
Source:dlh.bulelengkab.go.id/informasi/detail/artikel/60-pentingnya-hutan-mangrove-bagi-lingkungan-hidup
(proccessed on 13 April 2022)

Figure 109. Mangrove Planting Intercropping/Wanamina System (Silvofishery Culture)
Source: docplayer.info/49253359-Kajian-potensi-mangrove-dalam-pengembangan-silvofishery-di-kabupaten-tulang-bawang-propinsi-lampung-yudha-miasto.html
(proccessed on 13 April 2022)

Figure 110. Spaced Clumb System (Bendeng & Pot)
Source:mangrovemagz.com/2017/03/04/cara-membibitkan-enam-jenis-mangrove/
(proccessed on 13 April 2022)

Figure 111. Mangrove Cultivation Intalation Building
Source: kkp.go.id/djprl/artikel/25356-lindungi-pesisir-aceh-kkp-salurkan-500-ribu-bibit-mangrove (proccessed on 13 April 2022)

Conservation Multisensory Experience **Mangrove Baros Sanctuary**

According to "Mangrove Nursery Guidelines" published by JICA, Hachinhoe, Hideki et. Al., "Manual Persemaian Mangrove" Departemen Kehutanan dan Perkebunan RI & Japan International Cooperation Agency (1998)

Spesies	Jenis Biji/ Benih	Musim Biji/Buah	Tanda Kematangan	Biji yang di Pilih	Maksimal hari penyimpanan biji
R. mucronata	Buah bertangkai	S,O,N,D	Tangkai kuning dan buah hijau	Panjang buah > 50 cm	10
R. apiculata	Buah bertangkai	D,J,F,M,A	Tangkai kemerahan	Panjang buah> 20 cm Diameter: > 14mm	5
B. gymnorrhiza	Buah bertangkai	M,J,J,A,S,O,N,D	Buah coklat-kemerahan atau hijau-kemerahan.	Panjang buah > 20 cm	10
C. tagal	Buah bertangkai	A,S	Tangkai kuning Buah hijau-kecoklatan	Panjang buah> 20 cm	10
S. alba	Buah	A,M,J, & S,O	Terapung di air	Buah> 40 mm	5
A. marina	Biji kecil bertangkai	D,J,F	Kulit kekuningan	Berat biji> 1.5 g	10
X. granatum	Buah	S,O,N	Coklat kekuningan, Terapung di air.	Berat biji > 30 g	10

Spesies	Pembenihan	Naungan	Penyiraman	Pengendalian Hama	Catatan
R. mucronata	Tanam ± 7 cm dari permukaan tanah	30%	saat pasang	serangga ulat bulu	
R. apiculata	Tanam ± 5 cm dari permukaan tanah	30%	saat pasang	-	
B. gymnorrhiza	Tanam ± 5 cm dari permukaan tanah	15%	saat pasang	-	Jangan lepaskan tangkainya
C. tagal	Tanam ± 5 cm dari permukaan tanah	30%	saat pasang	-	
S. alba	Tancapkan buah sedikit ke permukaan tanah	30%	2 kali sehari	tikus, kepiting, ulat bulu	Jaring kawat untuk menahan biji, tambahkan kotoran ternak 30% ke media tanah.
A. marina	Letakkan pada permukaan tanah	30%	sekali sehari	kepiting, ulat bulu	
X. granatum	Letakkan pada permukaan tanah	30%	sekali sehari	kepiting	

Remember, the mangrove forest is not a flat floor. There are topographical forms unique settings that regulate inundation depth, duration and frequency of inundation water. Understand the normal topography of adjacent mangrove forests before carry out restoration work. Pros and cons of natural regeneration:

Advantages (+)

1. Lower implementation costs
2. Lower labor and machine costs
3. Less disturbance to soil conditions
4. Better seedling growth
5. The origin of the seeds is easy to know

Weakness (-)

1. The substitute species may not be the same as the original
2. The absence of a mother tree can result in a shortage of seeds
3. Growth can be disrupted by waves
4. Attack of predatory pests (such as crabs, snails etc.)
5. No control over spacing, stock and composition of seeds

While in the nursery, the seedlings are watered regularly in the morning and evening. Watering during the day is best avoided because it can cause the seeds to languish/stress, where one of the symptoms is the leaves be curly. After a few months (3-4 months), watering and shading should be reduced gradually. This is intended to prepare the seeds to be able to grow and adapt with the actual conditions at the planting site. The process of preparing these seeds is known as hardening off.

Figure 112. Persemaian Pasang Surut (Mangrove)
Source: wetlands.or.id (proccessed on 13 April 2022)

Figure 113. Persemaian Darat (Land Plantation)
Source: wetlands.or.id (proccessed on 13 April 2022)

Built a Nursery Laboratory for Persemaian According to (Green Coast Wetland International I, 2016)

1. What is needed?

Wood of various sizes, for the construction of beds
Nails of various sizes
shade roof and partition
carpentry tools
Labor

Where the best place to located the persemaian proccess?

Mangrove nurseries need a location affected by the tides. As for the types of coastal plants, the location suitable is a dry location, no experiencing flooding.

a. Persemaian Pasang-Surut criteria
   Location : Low place, Flat topography, Free from strong winds, Close to the planting site, Easy to reach location, Close to the workforce, Close to media sources, Exposed to the tides of the sea, Free from waves direct.
   Water Sources : Tidal water, Salinity less than 30 per mill
   Media : Mud, sandy mud, sand muddy
b. Persemaian in the land (coastal plantation) criteria
   Location : Low place, Flat topography, Free from strong winds, Close to the planting site, Easy to reach location, Close to the workforce, Close to media sources, No ups and downs (puddle) sea water, Free from flood
   Water Sources : Freshwater, Comes from a river or well
   Media : Soil, sand, compost

What should we have in persemaian?

a. Bed, Beds are insulated places, of a certain size, and function to accommodate seeds and seedlings keep it until it is ready to plant. Weaning beds are ideally equipped with shade.
b. Shade, Shade serves to protect the seeds from direct sunlight. Therefore, the seeds will grow well. However, if the seeds are to be planted, this shade should be reduced/removed.
c. Warehouse, The warehouse functions to store the necessary tools and materials such as fertilizers, polybags, carts push etc

2. What is needed in planting/germinating seeds?

a. Polybags are plastic bags made specifically to accommodate media and seeds. This plastic bag generally black and have a small hole at the bottom. These polybag sizes vary.
b. For mangrove plants, the planting medium used is mud or sandy mud, preferably from around the parent tree. As for beach plants, the planting medium used should be a mixture of soil and sand with comparison (3:1). To increase the fertility of the media, the addition of manure is highly recommended.
c. Quality seeds.

3. How to get a good seed season to planting it?

Bakau (Rhizophora spp.)
September-November
Polybag 5-7cm

Tengal (Ceriops tagal)
August
Polybag 5cm

Tanjang (Bruguiera gymnorrhiza)
July-August
Polybag 5cm

Pedada/ Bogem (Sonneratia alba)
September-December
Bed/Polybag 1/3

Api-api (Avicennia marina)
January
Polybag 1/2

Built a Nursery Laboratory for Persemaian According to (Green Coast Wetland International II, 2016)

1. How to prepare before planting in the field?

a. Determination of Planting Location

Suitable planting locations are muddy and affected areas tide. One of the biological indicators is the presence of glodok fish or shoots. Whereas a suitable location for this type of beach plant is a sandy area, especially one that has been overgrown by several vines, such as galangal or katang-katang (Ipomea pas-caprae).

Mangrove Plants
Soil Condition : Muddy soil
Location : Location near the beach affected by the tides
Salinity : 7-15 ppt
Water Source : Brackish Water
Indicators : Found glodok fish / tembakul
Others : Close to SDM (HR), Free from livestock and other pests

Coastal Plants
Soil Condition : Sandy soil, not exposed to tides
Location : On a coast that is free from tides (free from salt water), Planting starts from land, not from the beach
Salinity : Dry
Water Source : Fresh water
Indicator : Overgrown by galaran/katang-katang
Others : Close to SDM (HR), Free from livestock and other pests

b. How about planting location arrangement?

The status of land ownership must be clear and the demarcation of boundaries must involve government officials to avoid disputes that may arise in the future. Area measurement by knowing the area of the planting location, the number of seeds needed can be known. Determination of planting distance for mangrove plants the ideal spacing is 1 m x 1 m or 1m x 2m, while for beach plants, the width of the distance ideal planting is 5m x 5m. For those with a small distance ideally planting 3m x 3m or 4m x 4m.

c. Preparation of labor and division of tasks

To facilitate activities in the field, the members involved are divided into several groups such as Seed carrier group, Hole-making group, and Stag installation group.

2. How to transport the seeds from the nursery to the site planting?

Trucks, wheelbarrows, and boats and other means of transport.

3. How to plant mangrove seedlings in the field?

Coastal plants and mangroves have different planting times and procedures. For coastal plants, planting should be done in the rainy season, especially in the morning or evening. As for mangroves, planting time does not depend on the season, but should be done at low tide to make it easier for the seedlings to arrive at the planting site.

a. Make a hole with the help of a drill as deep as the height of the polybag.
b. Opening polybags (easier opening because the media used is muddy soil always wet).
c. Put the seeds in the planting hole that has been made and cover it again with mud.
d. Tie the seeds to the stake and throw the polybag in the trash.

4. How to caring for seeds after planting?

Plant maintenance aims to care for plants after planting so that they are successful in growing in high fields. Some of the activities that are commonly carried out in the maintenance of seedlings after planting include.

a. Sprinkling
   Watering is very necessary for coastal plants, especially for newly planted seedlings. As for mangrove plants, watering does not need to be carried out considering the location flooded plantings.
b. Embroidery
   The activity of replacing dead plants with new, healthy and lifelong seeds is carried out so that the percentage of growing in the field increased.
c. The fence in "eat" weed plants
   Weed and litter cleaning (if not cleaned, often there is a fence around it being a medium for vines, until seedlings of rehabilitation plants die covered with weeds).
d. Pest and disease control
   Tritip, mushrooms and crabs are common pests attack mangroves. As for plants beaches, livestock is a serious threat that needs to be controlled. Ussualy using paranet fence.

5. Approach in Selecting The Location

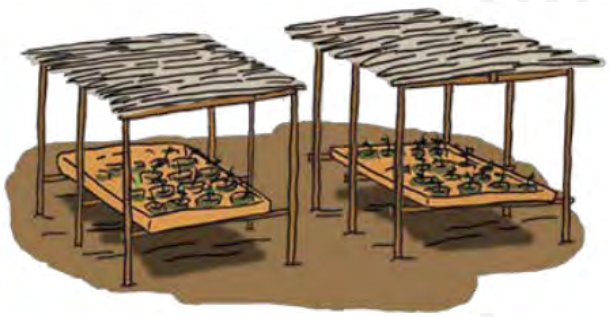
a. Select a location in the shade or slightly under the shade of trees.
b. Close to permanent water sources and free from flooding.
c. Free enough to be able to produce tree seedlings in large quantities needed and allows for future expansion.
d. Easy access by motorized vehicle to transport seeds and other materials.
e. Close to a suitable seedling medium (soil).
f. Choose a location that is not in a former grazing area or land agriculture affected by pests and diseases.
g. Sufficient water is available all year round with good quality.
h. Selected locations that have good topography, namely on flat land with sufficient area.

Figure 114. Planting Mangrove Seedlings in The Field Proccess
Source: wetlands.or.id (proccessed on 13 April 2022)

Media Creation and Seed Sowing

Soil Sifting

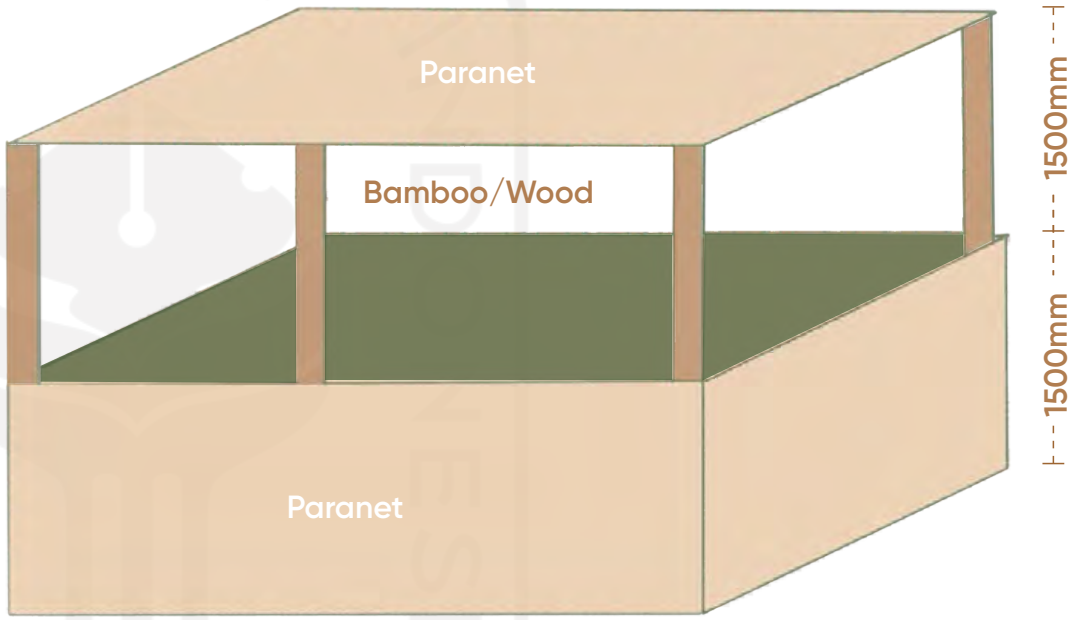
Seed Weaning



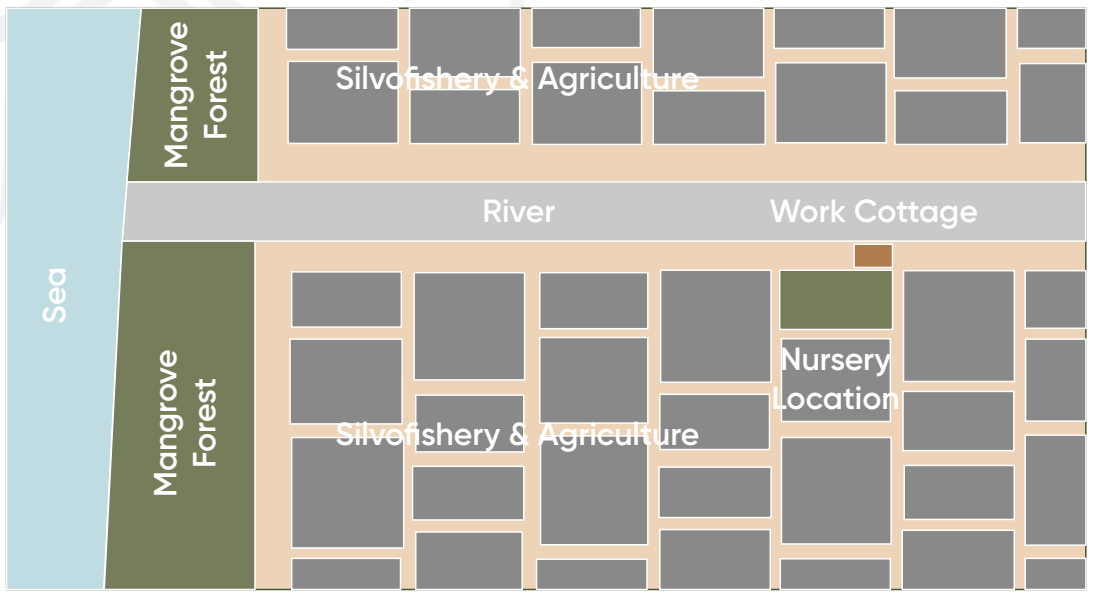
Covering (Sungkup)

Shade Making Existing

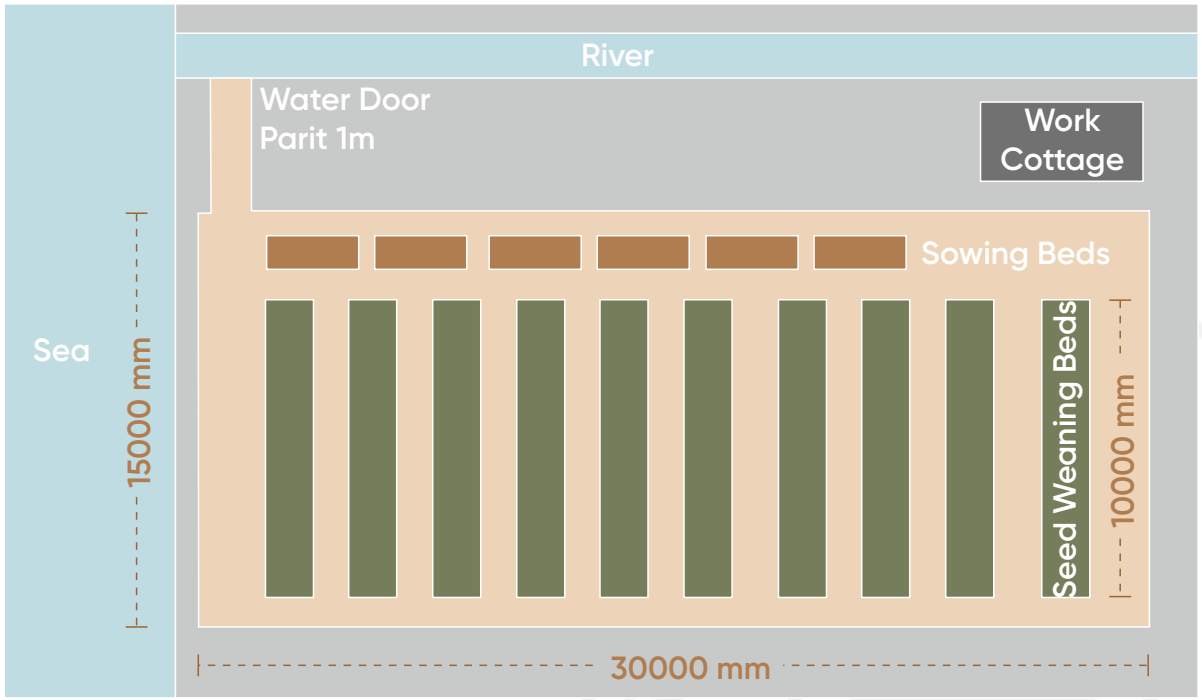
The purpose of creating shade is to lower the intensity of sunshine. Because of the paranet that provides shade, not all of the sunlight reaches the mangrove seedlings that have been planted in the beds. Shade can be kept on the seedlings until they are ready to be planted, which takes about 3-4 months or until the mangrove seedlings have 2-3 pairs of completely formed leaves. Paranet or palm leaves can be used as shade material in the nursery. The shade material is installed/arranged on top of a wood or bamboo shade roof. Shade can limit solar exposure by 50-60% or more, depending on your preferences. The seedlings are shaded until they are ready to be planted, which takes around 4 months. Shade height should be between 2.5 and 3 meters, or adjusted to avoid disturbing persons working in the nursery.



Situation Plan Existing Making



Nursery Plan Existing & Plan of the irrigation system in weaning beds on the ground floor naturally



Things to consider in planting are as follows:

a. Planting season

The timing of planting must be considered, especially regarding with the availability of water at the planting site. Better planting carried out at the beginning of the rainy season with due regard tide conditions. It is recommended not to carry out planting activities in the dry season, most likely the seeds will not grow properly because there is less or no water availability.

b. Total Plant Population

The plant population in one hectare is at least 1,000 plants, so the average planting distance is 3 x 3 m for all types of seeds mangroves.

c. Number of Plant Types

In one restoration plot of 2-4 ha, the number of tree species it is recommended that at least 50% of the forest ecosystem be planted nature near the restoration area in the same zoning.

- ***Sowing Beds,*** a place made and used for germinationseeds from seeds.
- ***Weaning Beds,*** places created and used for transplanting seedlings from sow beds.
- ***Cover (Sungkup),*** bamboo frame covered with transparent plastic, used forcover the freshly weaned/taken from nature and internal seedssow beds, to keep the humidity high.

Figure 115. *Shade Making Existing*
Source: Author
(proccessed on 15 April 2022)

Figure 116. *Situation Plan Existing Making*
Source: Author
(proccessed on 15 April 2022)

Figure 117. *Nursery Plan Existing & Water Irrigation*
Source: Author
(proccessed on 15 April 2022)

Figure 118. *Nursery Scheme*
Source: Panduan Pembibitan Program Reforestasi, 2010
(proccessed on 15 April 2022)

WHY MANGROVE NURSERY SHOULD HAVE A BUILDING?

Ecologically, the mangrove ecosystem plays an important role in as a life support system for various aquatic organisms and terrestrial organisms, both as a feeding ground, place of care (nursery ground), as well as a place to breed (spawning ground). But, according to the scientist there is a damage to mangrove plants occurs when planted in the field directly with the standard of living.

Figure 119. *Surrronding View in Baros*
Source: Author
(proccessed on 15 April 2022)

Figure 120. *Local People in Baros*
Source: Cholis, 2022
(proccessed on 15 April 2022)

Soil PH
Wind
Hidrology
Water Salinity
Precipitation
Lighting
Predator
Substrat Degradation
Abrasion
Temperature
Humidity
Garbage
Accessible
Location
Electrical

THERE IS AN EXISTING BUILDING BUT THE FUNCTION DOESN'T OPTIMAL YET

Conservation Multisensory Experience **Mangrove Baros Sanctuary**

Approach \ Life Cycle		Fruit (Propagule) -fertilisation-	Angiospermae Seed (Germinate) -hidrokori & antropokori-	Nursery I (Sowing/Pe -floating-
Natural		✓ Mangrove Adult Coastal/Estuary	✓ Water Surface Coastal/Estuary	- Coastal/Estuary/(I
Artificial		✓ Mangrove Adult Picked Coastal/Estuary	✓ Warehouse & Laboratory	✓ Beds/Polybag
Time	*N*	Mangrove species have a simultaneous fruiting season, namely in the middle to the end of the year ***Bakau (Rhizophora spp.)*** September-November (61 weeks) ***Tengal (Ceriops tagal)*** August (60 weeks) ***Tanjang (Bruguiera gymnorrhiza)*** July-August (36 weeks) ***Pedada/Bogem (Sonneratia alba)*** September-December (15 weeks) ***Api-api (Avicennia marina)*** January (61 weeks)	Approximately 2-3 weeks.The seeds once formed can be dispersed in two ways: 1. Viviparous, Seedlings are produced from the fruit while still on the tree. 2. Non-viviparious, Seeds geminate on the ground.	
	A		Duration: Storage 10 days.	Duration: Soaking 20-4 Treatment 3-4 month.
Proccess	*N*	Viviparian is germination in which the embryo emerges from the pericarp while still attached to the tree branch, sometimes lasting longer on the parent tree. ***Bruguiera, Ceriops, Rhizophora, Kandelia, Nypa*** Cryptovivivari is germination in which the embryo develops in the fruit, but is not sufficient to emerge from the pericarp. ***Aegialitis, Acanthus, Avicennia, Laguncularia, Pelliciera***	1. The mangrove seedlings falls from the three into the water 2. It is transported by waves and currents along the coast 3. Until it is stranded at an emerged location, like a sand bank or beach Many mangrove plants are viviparous, producing seeds that are fertilized on the tree. Young plants fall from the trees into the water, then float, and are dispersed by the flow of water (Lalli and Parsons, 1997).	1. Mangroves begin to fl the ground. 2. It needs to be emerge should be small while 3. Over time, the mangr survives. Viviparous production, t float. This is an excellen their seeds germinate w seedling to establish its exposed to salt water. V water and remains dorm water. The seedlings lie brackish water they turn easier for them to lodge

embibitan)	*Nursery II (Weaning/Persemaian) -straight to the bottom-*	*Mangrove (Release) -rooting-*	*Mangrove (Adult Polination) -(entomo&kiroptero)gami-*
Die)	- Coastal/Estuary/(Die)	- Coastal/Estuary/(Die)	- Coastal/Estuary/(Die)
	✓ Polybag	✓ Coastal/Estuary	✓ Coastal/Estuary
Duration: 1-3 Years		Duration: 4-5 Years	Duration: 5-10 Years
0 days and	Duration: 1-2 month.	When the water is receding (low tide) in the morning or evening (rainy season). Duration: 4-5 Years.	Duration: 5-10 Years
oat upright after that they can stick their roots into ed during enough time to grow its roots. The waves the roots are developing (or it will be toppled over). ove needs to withstand higher waves and storms to he fruits or seedlings of all mangrove plants can t dispersal mechanism for plants that live in water. hile still attached to the parent tree. Allows the salt secreting or salt excluding tissues before being When the propagule is mature it drops into the nant while it travels in an intriguing way in the sea horizontally and move quickly. On reaching vertically, roots down and leaf buds up, making it in the mud at a suitable, less salty site.		Mangroves can grow roots and have leaves. They usually grows in clusters according to where it perches.	Mangroves can preventing the big tidal waves and start to growing flower. When the flower is formed, there is a process of attachment of pollen to the stigma which will then undergo fertilization and form a new ovule. Mangroves are characterized by attractive flowers and pollen a. Entomogami: which attract insects such as bees and dragonflies to suck nectar and help pollinate them. b. Kiropterogami: Pollination is assisted by bats at night.

Approach \ Life Cycle		Fruit (Propagule) -fertilisation-	Angiospermae Seed (Germinate) -hidrokori & antropokori-	Nursery I (Sowing/Pe -floating-
	A	In collecting fruit, from collecting to sorting, it should be done by involving the community. Thus they will understand what kind of fruit is worth planting. After flowering and pollination occurs, most Mangroves produce seeds or fruit stems that known as propagules. This propagule then plunges its roots into the mud and use its food reserves to grow quickly become a sapling. 1. Mangroves come from the local area, are ripe and of good quality. 2. Place protected from the sun. 3. Maximum storage time is 10 days. 4. For seeding, the location and soaking is approximately 20-40 times/month. 5. Ready to be sown in nursery beds.	Polybag measuring 15 x 20 cm. Then put in the mud as much as 2/3 parts of the polybag. In each polybag, one mangrove seed (fruit) was added. Direct use of seeds/fruits, success rate 20%. Indirectly Using seeds from nursery beds, the success rate is 80%. Determination of spacing, Planting distance depends on the location and purpose of planting. Planting on the seafront with the aim of protecting the beach from abrasion or as a green line, the spacing is 1 x 1 meter. The number of rows of plants depends on the condition of the coast, but try to do as much as possible.	Seeds from germinate been stored for 10 transferred and sow containing polybags. 1. Selection of Sowing L 2. Construction of nur and beds of the area de the nursery, about 70% nursery beds, the rema used for inspectio waterways, work huts an buildings. The size of depends on the nee number of fruits to be p material for the nurse bamboo. The roof/sha palm leaves or reeds wit between 1-2 meters. N are made with var according to needs, bu measuring 5 x 1 m. measuring 5 x 1 meter, it approximately 1200 p (polybags) measuring 1 where each bag contain 1. The beds are made bamboo. 2. The size of the bed is the needs. 3. Generally measuring 1 m with a height of 1.5 - 4. The beds are given from palm leaves, co fiber, thatch, reeds or
Place	*N*	Mangrove Adult Coastal/Estuary	Water Surface Coastal/Estuary	Unreachable by tid
	A	Mangrove Adult Water or Ground Coastal/Estuary	Protected from the sun, submerged in water is approximately 20-40	a seedbed from the nea source, close as possible

embibitan)	*Nursery II (Weaning/Persemaian) -straight to the bottom-*	*Mangrove (Release) -rooting-*	*Mangrove (Adult Polination) -(ento&kiropte)mogami-*
that have days are n on beds ocation sery places termined for is used for ining 30% is on roads, d other light the nursery ed for the planted. The ry can use de can use n a height of ursery beds ious sizes ut generally With beds can contain astic bags 5 x 20 cm, s one seed. e of strong adjusted to ×5 m or 1×10 - 2 m. light shade conut, palm the like.	1. Sown The nursery area is spacious and flat, close to the planting site, submerged at high tide with a frequency of 20-40 times/month so it does not require watering. The fruit is sown directly into plastic bags or into used mineral water bottles (bottom with holes) containing soil media. Especially for mangroves and saplings, they should be stored in the shade and covered with wet sacks for 5-7 days. Leaves appear after 20 days, after 2-3 months the seeds are ready to be planted. 2. Seedling After the mangrove or tumu seedlings are about 3-4 months old, the seedlings are ready to be planted in the field. While the seeds of fire or prepat are ready to be planted after about 5 - 6 months. If the community group has been formed, nursery activities can be carried out and continued by the group. The weaning activity has to do step by step to make the plantation adapt the natural environment.	Mangroves that have been able to stand balanced and grow roots will be removed from the nursery places. a. Make a hole with the help of a drill as deep as the height of the polybag. b. Opening polybags (easier opening because the media used is muddy soil always wet). c. Put the seeds in the planting hole that has been made and cover it again with mud. d. Tie the seeds to the stake and throw the polybag in the trash. There are several monitoring activity: a. Observe the growing mangrove species. Check the source of the seedlings. The growth time. Parameters: tiller density, stalk diameter, volume and tiller height, and annual growth rate. Growth characters including stalk structure, shoots, fruit and resistance to pest attack. b. Record the failure rate Explain the reason why the failure occurred. The level of accumulation of waste Mark the source of the waste and the steps taken to minimize the problem. c. Sprinkling, Emboidery, Weed and litter cleaning, Pest & Disease Control	Mangroves can preventing the big tidal waves and start to growing flower. a. Estimate restoration costs Estimated costs include land preparation, seed collection, nursery, planting and so on. b. Observe the effects of mangrove use This is part of a long-term restoration activity. The character of the mangrove ecosystem rehabilitated. In the form of observing flora, fauna and the physical environment of the ecosystem new mangroves and their comparison with the condition healthy and undisturbed mangrove growth. c. Adjust the optimal density level puppies. Density level, whether due to natural growth or planting. Observe the growth too.
al wave, attached to the parent mangrove trees Ground Coastal/Estuary		Make new clusters Ground Coastal/Estuary	Tidal Waves Ground Coastal/Estuary
rest seed e to the	spacious and flat, close to the planting site, submerged at high	Make new clusters surrounded net, muddy soil, 7-15 ppt salinity, 7-8 pH,	Tidal Waves, Muddy Soil Ground Coastal/Estuary

Approach \ Life Cycle		Fruit (Propagule) -fertilisation-	Angiospermae Seed (Germinate) -hidrokori & antropokori-	Nursery I (Sowing/Pe -floating-
			times/month, ready to be sown in nursery beds with polybag 20x15cm	planting location, subm high tide at least 20 tim to prevent watering of s 70% is used for nursery b remaining 30% is used fo roads, waterways, work other light buildings, hav water but close to fresh of minimum temperature or terraced land
Threat	*N*	Rotten, Bird Predator	Tidal Wave, Crab Predator, Irregularity, Not define by zones	pH
	A	- (Problems in nature threat will be solved as a design challenge)	- (Problems in nature threat will be solved as a design challenge)	
Treatment	*N*	- (No treatment because it is happen naturally)	- (No treatment because it is happen naturally)	- (No treatment becaus happen naturally)
	A	Involving the community, Manager Room, Community Space	1. Multi-sensory Space Layout and distance for planting 2. Building Mass Plotting & Orientation Protected from sun 3. Room Programming: Storage, Laboratory, Soaking, Watertank 4. Water distribution 5. Accessible from the Mangrove release location 6. Technology: Structure, Material, Building Envelope, Temperature, Safety	1. Multi-sensory Space L Spatial Organization, distance for planting 2. Building Mass Plotting Orientation Maximize 3. Room Programming: E Polybag, Office 4. Water distribution 5. Technology: Structure Building Envelope, Ten Safety protected from crab, goat, abrasion, g 6. Defining zones 7. Roof 8. Site Respond
Terms & Condition	*N*	The fruit that have a seed will bloom according to their season per species	In 2-3 weeks the seeds will germinate fall into water and search the location	Growth bellow the ma canop
	A	1. Provide Community Space Room that can clash with the user's experience and enhancing	1. Grouping based on plant and fauna species. In addition, pay attention to the planting	1. Grouping based on pl fauna species. In addi attention to the planti

embibitan)	*Nursery II (Weaning/Persemaian) -straight to the bottom-*	*Mangrove (Release) -rooting-*	*Mangrove (Adult Polination) -(ento&kiropte)mogami-*
erged in es/month eedlings, eds, the r inspection nuts and ve brackish water, 25oC e, flat land	tide with a frequency of 20-40 times/month, containing soil media with polybag that place in the water, reach the controlled natural sunlight	Found glodok fish, Ground Coastal/Estuary	
, Salinity, Hidrology, 3W1M Predator, Temperature, Wind, Garbage, Soil Degradation, Abrasion			Pest, the growth size, environment, garbage
- (Problems in nature threat will be solved as a design challenge)			- (Problems in nature threat will be solved as a design challenge)
se it is	- (No treatment because it is happen naturally)	- (No treatment because it is happen naturally)	- (No treatment because it is happen naturally)
ayout, and & Sun Beds, Material, mperature, birds, garbage	1. Multi-sensory Space Layout, Spatial Organization, and distance for planting 2. Building Mass Plotting & Orientation Step by Step adapting the Sunlight 3. Room Programming: Beds, Polybag, Office, Soaking 4. Water distribution 5. Technology: Structure, Material, Building Envelope, Temperature, Safety protected from birds, crab, goat, abrasion, garbage 6. Defining zones 7. Roof 8. Site Respond	1. Located the polybag regularity 2. Observation the growing mangrove species 3. Sprinkling: Watering 4. Emboidery: The activity of replacing dead plants with new 5. Weed and litter cleaning 6. Pest & Disease Control in the coastal areas, the existing used paranet	1. Observation the mangrove effect for long-term (Evaluation) 2. Getting the data and estimated time and budget 3. Protect from the garbage
ngrove adult and protected from sunlight with the oy, proccessing the brakish water		Irregularity growth by the clusters and growing the leaf	Should can preventing from tidal waves and do regeneration by producing flower
ant and tion, pay ng	1. Grouping based on plant and fauna species. In addition, pay attention to the planting	1. Location of laying polybags and planting with medium waves, regularity, and defining the zones	1. Observation Tower 2. Garbage accumulation in one place that prevented before

Approach \ Life Cycle	Fruit (Propagule) -fertilisation-	Angiospermae Seed (Germinate) -hidrokori & antropokori-	Nursery I (Sowing/Pe -floating-
	knowledge with solutions that are compatible with the context in which it is located 2. Picking the fruit in the productive time (according to the type of plant) 2. Visualize these spaces by telling the stories, the scale, the sign, and the colors 3. Giving the connection for people and nature with blurry boundaries 4. Making the roof that can protected mangrove fruit from the bird	procedure. Starting from the preparation of seeds. 2. Building Mass Plotting Orientation Protected from sun Composition of storage and lab mass for seeds with long sides facing south and north 3. Put the storage room with a closed envelope that is protected from the sun 4. Pay attention to the distance of planting seeds from the mangrove release place 5. Using a structural system that can adapt to tidal waves (stilt housing system, rack and pinion, pile) 6. Using material which is resistant to alkaline pH and high salinity, is not easily corrosive and is able to adapt to waves 7. Making contoured land into terraces or flats 8. Large and airy mass composition 9. Give nursery ponds for the landscape and irrigation	procedure. With beds 5 x 1 meter, it can cont approximately 1200 pl (polybags) measuring where each bag conte seed. 2. Building Mass Plotting Orientation maximize sunlight 3. Put the storage room closed envelope that protected from the su 4. Pay attention to the d planting seeds from th mangrove release pla 5. Using a structural syst can adapt to tidal wa housing system, rack a pile) 6. Using lightweight mat are resistant to alkalin high salinity, is not eas corrosive and is able t waves 7. Making contoured lan terraces or flats 8. Giving the safety prot predator and garbag 9. Set the indoor temper minimum of 25oC 10. Have brackish water to fresh water in wate system 11. 70% is used for nurser remaining 30% is used inspection roads, wate 12. The height of nursery 13. Require the precento sunlight 60% 14. Vegetation that has canopy, low fence, an a muddy soil 15. Building envelope pre from the strong wind a with min 23oC of temp using warm lighting

embibitan)	*Nursery II (Weaning/Persemaian) -straight to the bottom-*	*Mangrove (Release) -rooting-*	*Mangrove (Adult Polination) -(ento&kiropte)mogami-*
measuring ain astic bags 15 x 20 cm, ains one natural with a s n istance of ne ce em that ves (stilt nd pinion, erials that e pH and ily o adapt to d into ection from e ature to a but close irrigation y beds, the for erways 1-2m ge of big d can life in eventing t night erature by	procedure. Near transplanting seedlings from sow beds and locate it in the brakish water with polybag. 2. Building Mass Plotting Adapting to the sunlight 3. Put the storage room with a closed envelope that is protected from the sun 4. Pay attention to the distance of planting seeds from the mangrove release place 5. Using a structural system that can adapt to tidal waves (stilt housing system, rack and pinion, pile) 6. Using lightweight materials that are resistant to alkaline pH and high salinity, is not easily corrosive and is able to adapt to waves 7. Making contoured land into terraces or flats 8. Giving the safety protection from predator and garbage 9. Set the indoor temperature to a minimum of 25oC 10. Have brackish water but close to fresh water in water irrigation system 11. 70% is used for nursery beds, the remaining 30% is used for inspection roads, waterways 12. The height of nursery 2,5m-3m 13. Require the precentage of sunlight 60% 14. Vegetation that has big canopy, low fence, and can life in a muddy soil 15. Building envelope preventing from the strong wind at night with min 23oC of temperature by using warm lighting	2. Observation Space 3. Doing automatic watering by flowing water to the planting site 4. Pest controlled 5. Fences and Signance by Protect young mangrove plants from boat traffic, fishing and gleaning activities, and domestic and wild animals. Engagement, mobilization and training empower local communities in mangrove rehabilitation.	entering the mangrove area

BUILDING TYPOLOGY STUDIES

SPECIAL PURPOSE TYPE

The word typology consists of type, which is derived from the word typos (Greek), which means impression, picture, shape, type or character of an object, while logy is the study of something. the shape, type or character of an object. Typology can also be interpreted as a concept that sorts out a group of objects based on the similarity of basic properties, as stated by Ching, FDK (1979), that there is a tendency to group elements in a position random, both based on the compactness of the layout, as well as the visual characteristics possessed. He expressed this when he found that almost all buildings in general always include elements that are repetitive nature such as columns and beams that are repeated following a certain modular.

Typology in architecture is a classification in architecture based on form, function, and style. According to Vitruvius in "The Ten Book of Architecture":

Building = utility (function) + firmitas (sturdiness)
Architecture = utility (function) + firmitas (sturdiness) + venustas (beauty)

There is several types of Typology in Architecture according to Raphael Moneo,1966:

Firmitas = Typology based on shape and space configuration (spatial structure)
Utility = Typology based on building function
Venustas = Typology based on images (images)/ based on style (architectural styles)

The government has categorized various types of buildings on the basis of different criteria depending on their usage, design and height, safety standards and other features, in this case the building has a special purpose typology. This is an all-encompassing category which includes assembly buildings, industrial buildings, wholesale establishments, hazardous buildings, hotels, hostels, and buildings with central air conditioning which are more than 15 meters in height and have a built-up area of more than 600 square meters.

This typology is further deepened in accordance with the firm's role as a conservation center, mangrove nursery laboratory, and interpretation center. Meanwhile, its function can be categorized as conservation, education, and recreational facilities.

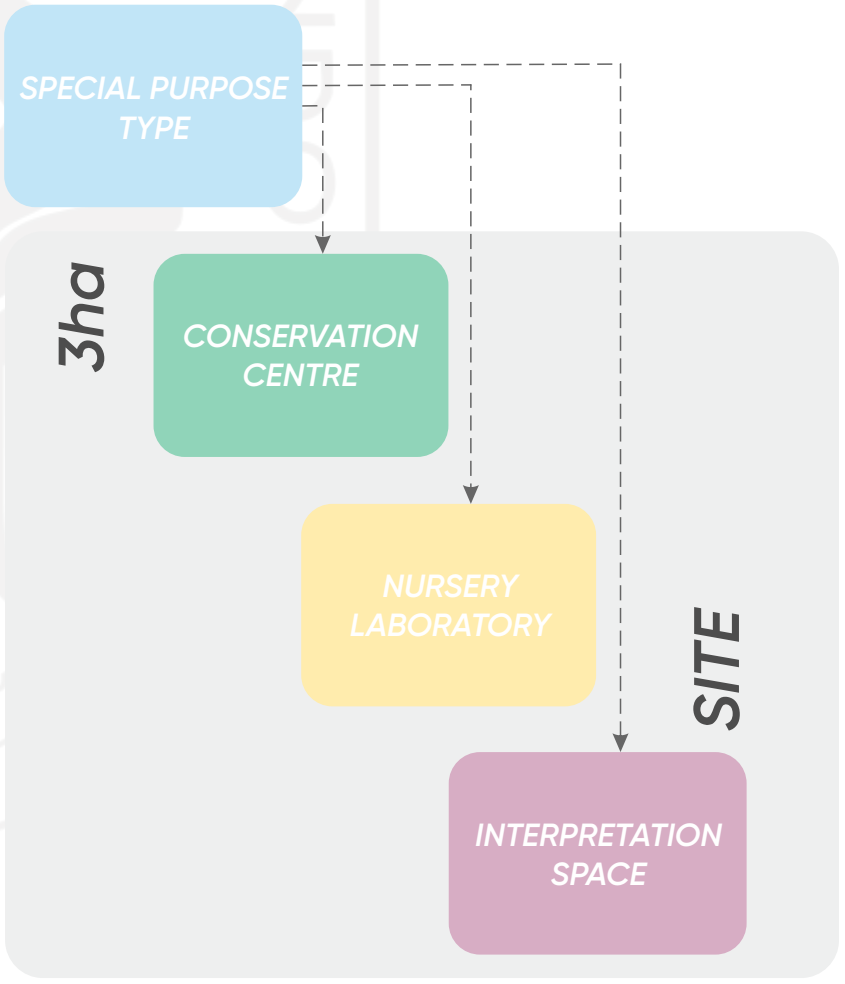


Figure 121. Typology Mapping
Source: Author
(proccessed on 15 April 2022)

CONSERVATION CENTRE

According to the definition from english dictionary Conservation is preservation or protection. Conservation which consists of the words con (together) and servare (keep/save) which has an understanding of efforts to maintain what we have (keep/save what you have), but wisely (wise use)., a Natural Resources Conservation Center is a forum/location for activities involving study, discovery, science development, and systematic observation of plants, animals, and ecosystems. Conservation is the maintenance and protection of something that is done regularly to prevent damage and destruction by means of preservation (Peter Salim and Yenny Salim, 1991). Conservation activities are always related to an area, the area itself has the meaning of an area with the main function of protection or cultivation (Law No. 32 of 2009).

The object's purpose as the core for developing conservation centre are:

1. Research
Provide services to research institutions or scientists in the areas of data and literature to support study, as well as a location/container for performing research.

2. Monitoring and Protecting
Monitoring and protecting conservation areas, as well as conducting research development and observation of living natural resources.

3. Rehabilitation
Provide a safe haven for captive animals, including confiscated and sick animals.

4. Education
Organizing nature conservation educational programs, scientific seminars, and serving as a venue for sharing knowledge regarding the protection of living natural resources

When referring to its meaning, conservation in rehabilitation and restoration was defined in several terms, as follows:

1. Natural Resources
Conservation is the use of natural resources to meet human needs in large quantities over a long period of time (American Dictionary).

2. Regenerations
Conservation is the allocation of natural resources over time (generations) that are socially optimal (Randall, 1982).

3. Infrastructure
Conservation is the management of air, water, soil, minerals to living organisms including humans so that an increased quality of human life can be achieved, while management activities include surveys, research, administration, preservation, education, utilization and training (IUCN, 1968).

4. Management
Conservation is the management of the use of the biosphere by humans so that it can provide or fulfill large and renewable benefits for future generations (WCS, 1980).

UNESCO in The role of Nature Conservation Center in UNESCO Designated Sites (2018) also analyzed challenges and opportunities to further expand the conservation centers role. Those opportunities are:

1. Integrating and Interfacing
These extinctions are irreversible and pose a serious threat to our health and wellbeing. Designation and management of protected areas is the cornerstone of biodiversity conservation. The conservation centre action as a meeting between people and nature. An integrated landscape approach to conservation planning plays a key role in ensuring suitable habitats for species.

It is also will providing socio-economic integration between community and visitor to support local development. Management of site resources to maintain these areas and/or should force relevant legal frameworks and may need to be re-aligned to account for climate change.

2. Networking and Connecting

In order to raise the awareness between people, nature, and surrounding. Interpretation, educational, and visitor management initiatives are all successful ways to bring these key audiences together and promote mutual respect and empathy as an efforts to preserve biodiversity must take into account not only the physical environment, but also social and economic systems that are well connected to biodiversity and ecosystem services. For protected areas to contribute effectively to a secure future for biodiversity, there is a need for measures to enhance the representativeness of networks, and to improve management effectiveness.

3. Growing and Inspiring

Growth in protected areas in many countries is helping to maintain options for the future, but sustainable use and management of territory outside protected areas remains a priority. Capacity building is a key factor in the successful avoidance and reduction of land degradation and informed restoration. It is can raising the awarenessand promoting as future site sustainable use and development.

In Law Number 23 of 1997,
conservation of natural resources

"management of non-renewable natural resources to ensure their wise use and renewable natural resources to ensure the continuity of their availability while maintaining and improving the quality of their values and diversity."

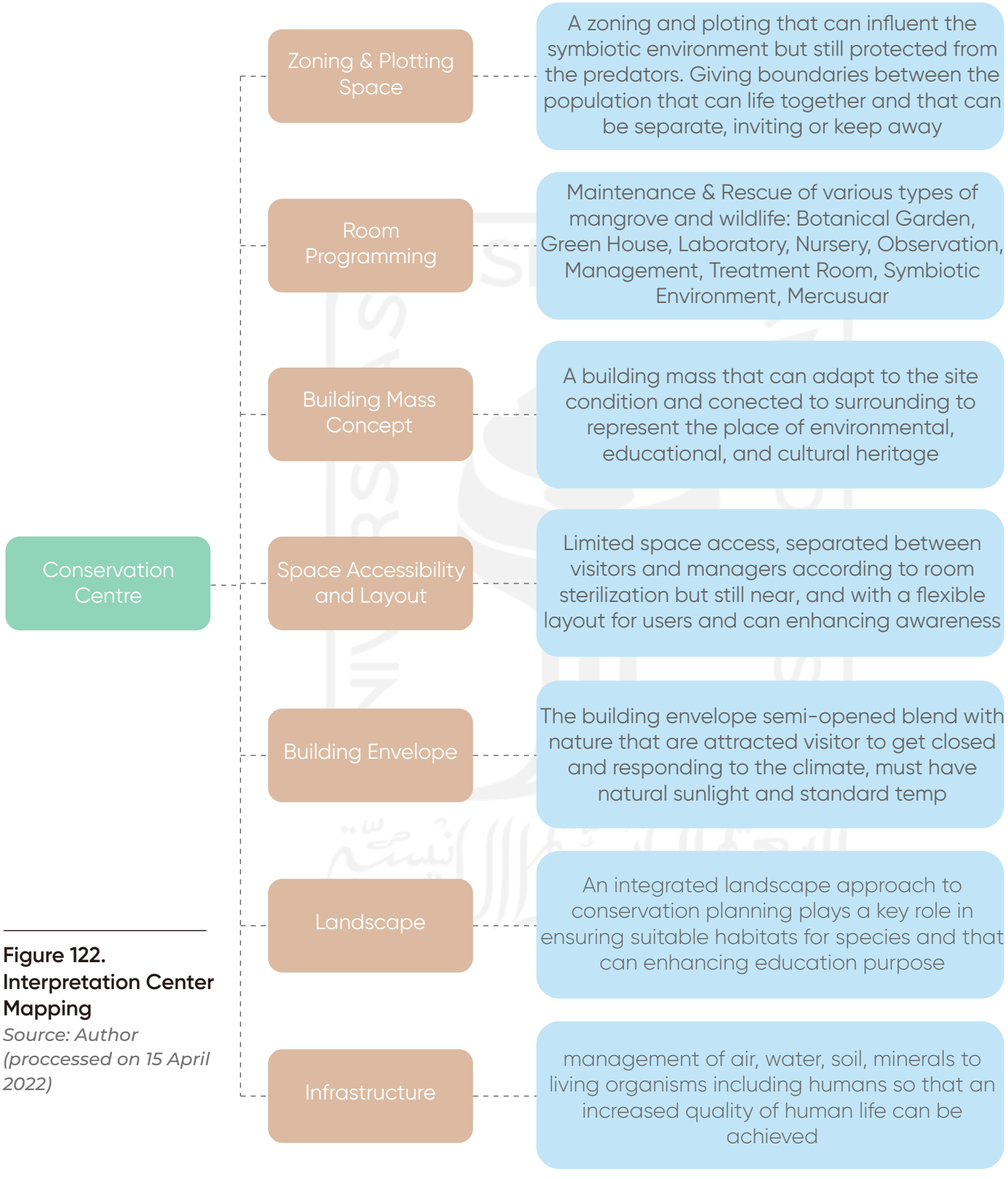


Figure 122. Interpretation Center Mapping
Source: Author (proccessed on 15 April 2022)

Sustainability Development Goals	*Space Programming*	*Research*	*Monito*
Integrating and Interfacing	Nursery Laboratory	✓	✓
	Botanical Garden	✓	✓
	Green House	✓	
	Observation Space	✓	✓
	Management Room		✓
	Treatment Room	✓	✓
Networking and Connecting	UMKM/retail		
	Souvenir Shop		
	Gampling		
	Port		
Growing and Inspiring	Gallery	✓	
	Interpretation	✓	
	Workshop	✓	

	Functionality					
ring	*Education*	*Rehabilitation*	*Natural Use*	*Infrastructure*	*Management*	*Interaction*
	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓
	✓					✓
	✓					✓
					✓	
		✓	✓			
						✓
						✓
						✓
						✓
	✓	✓				✓
	✓	✓				✓
	✓	✓				✓

Table 03. *SDG Space Programing Checklist*
Source: Author (proccessed on 15 April 2022)

INTERPRETATION space

INTERPRETATION MEANING

Interpretation is a conversation, interaction, or any communication that enriches the visitor experience, by making meaningful connections between the messages and the emotional-intellectual world of the visitor (Arboretum A., 2008).

INTERPRETATION CENTRE

A facility for disseminating information about a region's natural or cultural heritage is known as an interpretation center, interpretive center, or visitor interpretive center. Interpretation centers are a type of contemporary museum that are frequently connected to visitor centers or ecomuseums and situated near cultural, historic, or natural landmarks (Izquierdo Tugas, Pere; Juan Tresserras, Jordi; Matamala Mellin, Juan Carlos, eds. 2005).

To improve people's understanding of nature and heritage, interpretation centers employ a variety of communication techniques. The primary presentation style tends to be user-friendly and interactive, and frequently uses scenographic exhibitions and multimedia programs to enhance and stimulate the visitor's intellectual and emotional connection to heritage. Temporary displays focused on a particular feature of the site are common in interpretation centers. Interpretation centers are specialist institutions for explaining the value and meaning of legacy; they typically do not aim to collect, conserve, or research artifacts. They strive to inform and increase awareness. Research and other non-core tasks like conservation are typically handled by specialist, outside organizations.

In this case, in order to develop the human skill and raising awareness for the visitor, thus kind of facility is needed to support the activity while also give the experience to the user.

NATURE BASED INTERPRETATION CENTRE

Retrieved from Ashbaugh, Byron (1966), Nature centers frequently have paths running across their property, which is typically located inside a protected open space. Some contain unique gardens or an arboretum, while others are situated inside a state or municipal park. Their properties can be described as wildlife refuges and nature preserves. Small live animals, such fish, insects, rodents, or reptiles, are frequently on show in nature centers. There are frequently natural history museum exhibits and displays, as well as preserved mounted animals or nature dioramas. The majority of nature centers provide educational programs to the general public, as well as summer camp, after-school, and school group programs, and are staffed by naturalists who are either paid or volunteer. These educational initiatives instruct individuals about the scientific method, biology, and ecology in addition to nature protection.

According to (EDCCTS, 2015), to raise awareness and encourage biodiversity, conservation, and ecotourism, the nature interpretation center provides an interactive environment for environmental education and interpretation. Strong storytelling, multimedia, interactive activities, and immersive displays are used to provide the interpretation, producing a memorable experience and raising knowledge of the local biodiversity and ecosystem. Dioramas with a specific theme, interactive three-dimensional models, and exhibits for interaction-based exploration and learning.

SHAPING VISITOR EXPERIENCE

The element of design plays an extremely role in communicating the content of interpretation and shaping visitor experiences.

Griggs S. in "*Orienting Visitors Within A Thematic Display*" sumarized that the visitor's happiness, experience, mood, and ambience must be carefully considered when developing the center's design and interpretation center. Other than that, users should dictate element design and it should be modified based on their feedback, not merely designers who might not be able to foresee how these aspects will affect visitors.

Layered messages, ideas, and information in design methods help to shape the visitor experience and understanding, promoting tourist involvement with subjects including natural and cultural heritage, science, and social issues (Roberts T, 2014).

Two specific physical environment design dimensions are believed to be most influential in learning, spatial quality (through space, colour, light, noise, and materials), and integration of outdoors and the indoor environment (Moore G, Sugiyama T., 2007).

(Pearce, PL., 2006) There are several several criteria and parameters need to be taken into account:

1. Space planning
The best layout plan of a learning environment is 'modified open plan facilities'. Related to access to the proximity of spaces that accommodate the tasks they need to execute, access to people. The circulation of space should be considered for systematic traffic flow on a particular area to avoid a crowded situation. Crowded will create an uncomfortable feeling and safety.

2. Scaled furniture
Varieties of comfortable furniture, different zones and places to gather or be alone can provide different types of users with just what they need. Seating space is not a crucial element in interpretation centre, but most centre provides space for seating at specific area liked refresh area and waiting area. Convenient to form informal discussion spaces with the movable seats. People are attracted to this area by the striking colour and 'cool' atmosphere. The design of moveable storage units contributes to program flexibility.

3. Ceiling height
Read, Sugawara, and Brandt found that continuous bland ceilings had a negative impact, e behavior whereas dissimilarity ceiling height had a positive impact, creating different experiences and social exchange. When a person is in a space with a 10-foot ceiling, they will tend to think more freely, more abstractly, whereas a person in a room with an 8-foot ceiling will be more likely to focus on specifics.

4. Materials and furnishes
Should be an easy to maintain.

5. Lighting
Natural light and views are a significant preference. Operable windows are preferred even when the building is airconditioned, exterior windows promote engagement with the outside world. Windows that open into corridors or between rooms help people to see themselves as part of a larger community. Light can be shared from one room to the others by extending existing windows.

6. The selection of theme
The key stories or concepts are the definition of themes. The use of a single theme as the linking concept or one large idea which connects a set of facts, topics.

7. Colour
When applied in the interior space, can have a significant impact on the occupants of that space. Colour mixed with light will alter a person's perception of visual contrast. Visual contrast greatly influences people's notion (mood and behavior). The warm colours red, orange and yellow remind us of fire and sunlight, and so they create a sense of warmth. The cool colours blue and green remind us of water and plants, and so they create a feeling of coolness.

8. Temperature control
Temperature is a liability in climates where it is consistently too hot or too cold. Making it comfortable according to the standard temperature for 25 Degree Celcius. Where temperatures are predominantly too hot: Connect separate rooms and functions with covered breezeways, Maximize wall shading and induce ventilation, Provide shaded outdoor living areas such as porches, patios, and decks, Capitalize on cool nighttime temperatures, breezes, or ground temperatures. Where area temperatures are predominantly cold, Consolidate functions into the most compact configuration, Insulate thoroughly to minimize heat loss, Minimize air infiltration with barrier sheeting, weather stripping,sealants, and air lock entries, Minimize openings not oriented toward sun exposure, Avoid negative building pressurization to reduce pounds of force: required to open the door.

9. Ventilation
To control the circulation of ventilation, the pollutants out of the building, the selection furnishings and finish materials carefully, install and correctly maintain the most efficient filters based on the air-handling system capacities.

10. Acoustic
Noise is inhibiting effective work. Exposure to uncontrollable noise has a negative impact on cognitive development, reducing memory, language and reading skills. Locate service and maintenance functions away from public areas. Space interpretive stops so that natural or site-specific sounds dominate. Vegetation to baffle sound between public and private activities, and orient openings toward natural sounds such as the lapping of waves, babbling of streams, and rustling of leaves.

11. Texture
Actual, or tactile, texture can be felt. Two dimensional-design, actual texture is in the feel of the canvas or the surface of the paper. Texture can also be created by the thickness of the paint. The texture will change in interior surfaces because finish materials create interest, shadows, and visual variety within a space. Texture created from natural materials brings a merger of two of the elements. The texture can be felt with a human body part, rough, smooth, hard or soft. Textures have their most significant impact and effect when used in combination. The contrast of hard and soft, smooth and rough can inject a sense of drama and interest. Texture changes in interior surfaces or finish materials create interest, shadows, and visual variety within a space.

12. Use of art
The nature imagery, photographs of nature scenes, reduces anxiety and relaxes patients. Art is a diverse range of human activities in creating visual, auditory or performing artifacts (artworks), convey the artist's visionary or technical skill, with an aim to be appreciated for their beauty or emotional power.

13. Ergonomic
14. Universal design
15. Sustainability

16. Incorporation with nature
The material such as glass mirror and glass partition is one of the medium to connect with nature undirectly. The sense of nature also can bring a freshness and reduce stress to wellbeing. The connections between the inside-outside were vital and felt having a significant and exciting natural outdoor space was critical for people learning. An enhancing the outdoor experience especially the gardens produce colourful and sweet-smelling, and incorporated wind chimes and stepping stones for exploration.

17. Notices and signage
The access to the building should be through a single point of entry during normal hours of operation, additional required entry or exit doors should remain locked to the exterior, permitting exiting only.

18. Safety and security

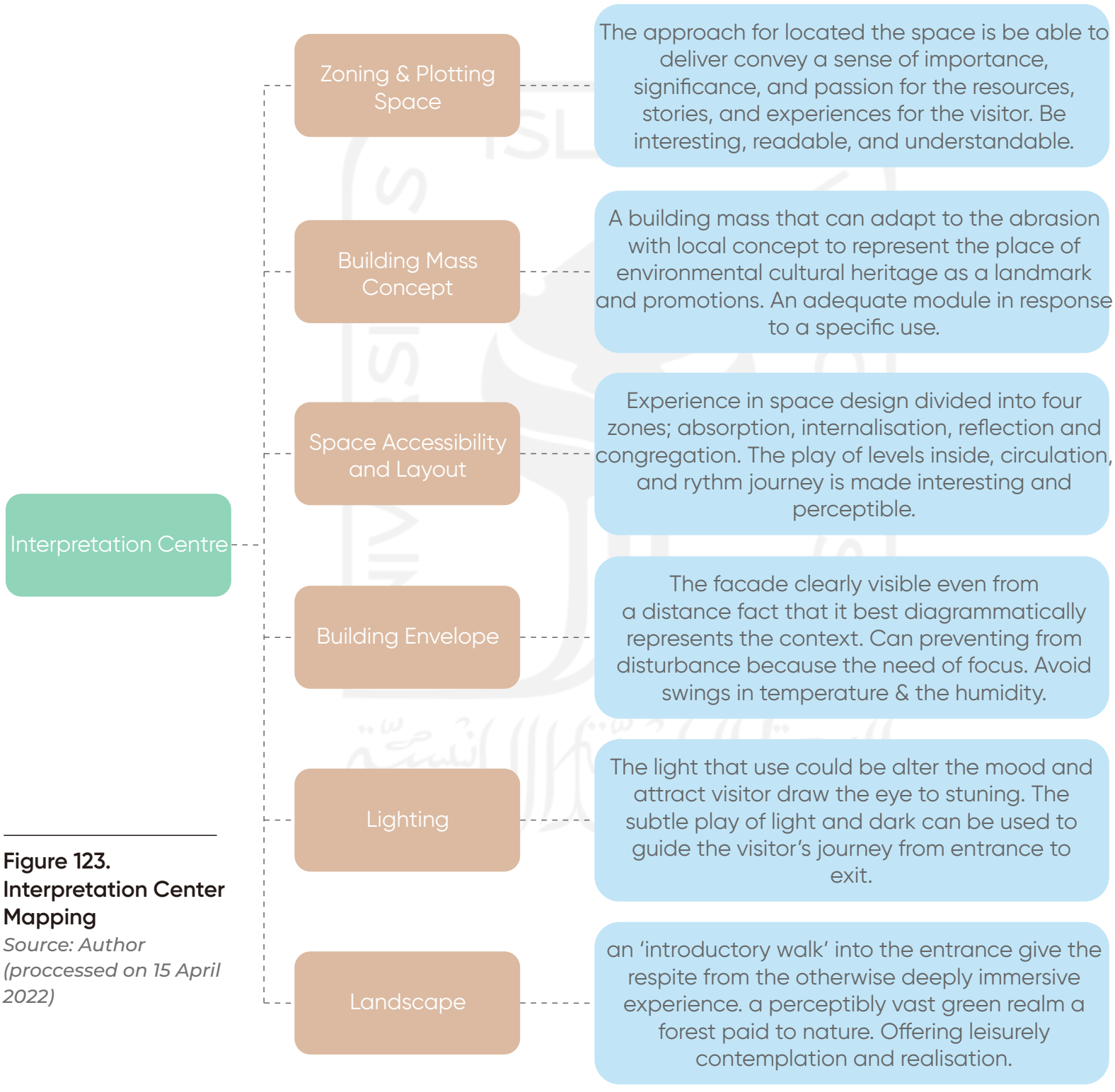
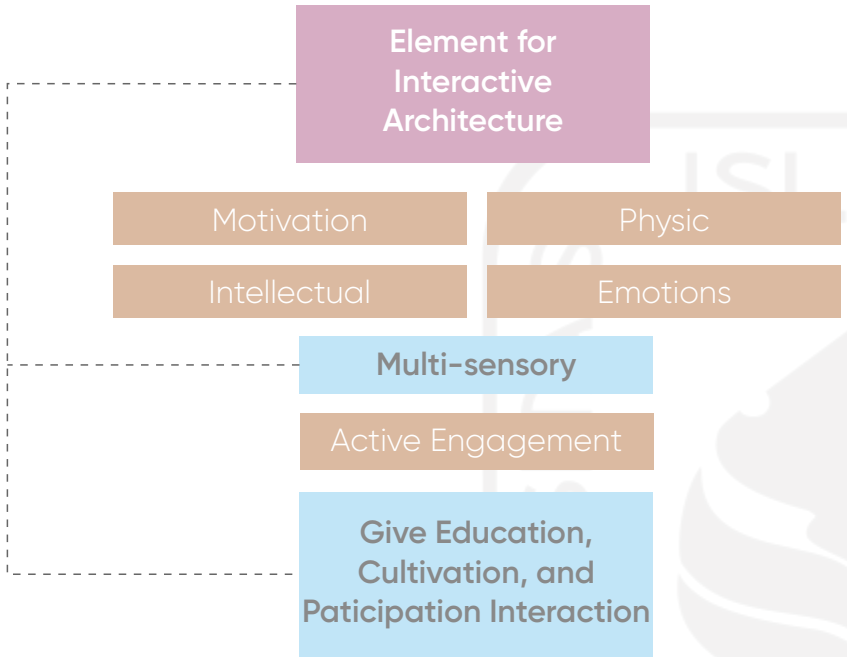


Figure 123.
Interpretation Center Mapping
Source: Author (proccessed on 15 April 2022)

MULTI-SENSORY approach



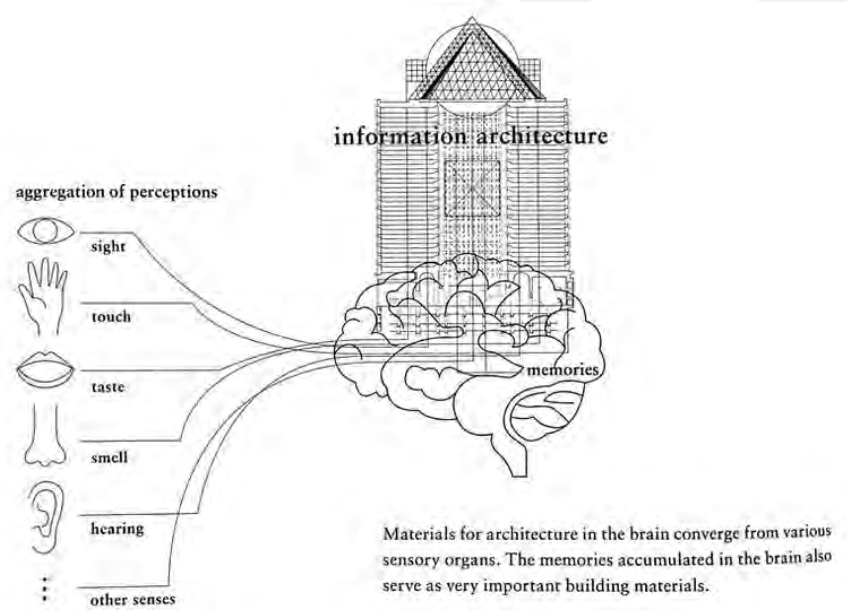


Figure 124. *Multi-sensory in Architecture*
Source: equimdesigns.com (proccessed on 27 June 2022)

ARCHITECTURE IN IMPACT ON HUMAN BEHAVIOUR

"*Spaces that trigger emotions alter the behavior of people. Architecture aims at influencing human behavior by space creations.*" –Justus Dahinden

In order to enhance the user experience, architecture must engage the user by arousing many senses. An architectural design should be an engaging experience that helps the user better understand the environment. there are 5 senses: Sense of vision, taste, smell, sound, and touch. The architect can lead users through the functional and aesthetically pleasing aspects of a space by organizing spatial sensory components. Their experience can also be served by it. (Spence, 2009)

1. Sense of Vision
The sense of vision has been placed at the top of the hierarchy since it is through vision that a user initially perceives elements like light, shadow, texture, color, size, weight, order, form, and sense of space, which may or may not thereafter excite other senses.

2. Sense of Auditory
A positive environment is greatly influenced by sound. One can understand the form, shape, and dimensions of the environment and have an immersive experience by using reverberation, echo, resonance, and other sound-related elements. Today, however, cultivating auditory senses is a way of life. While working, people enjoy listening to music and taking in the sounds of the natural environment. One way a designer might take into account the sensation of sound is by a thorough analysis of materials to comprehend their aural effect. Additionally, you can create a calm atmosphere by using different natural sounds. Unwanted sounds can be muffled by using natural sound barriers like trees. Since sound is omnidirectional, aural alterations brought on by varying ceiling heights can also awaken the senses.

3. Sense of Olfactory
As something that persists in our senses long after we leave a place, the smell creates a distinctive character that either makes the room welcoming or repulsive. Very few architects include the positive aspects of smell into their designs. Olfactory senses can give the consumer an outstanding sensory experience when combined with other inputs. Artificial fragrances can be introduced to an area effectively.

4. Sense of Tactility
The simplest approach to bring people into a room or object is through a tactile experience in architecture since it begs them to touch or utilize it. The texture and temperature of a place can be read by our skin. This creates a connection between the body and the environment that determines how livable or welcoming the location is. The simplest technique to stimulate touch is to provide a place excellent ventilation and sunlight. As soon as vision touches a texture, its influence is sensed. The sense of touch, such as using non-heating materials and hues, comfortable seating, textured materials like wood, and exposed brickwork.

5. Sense of Oral
According to Juhani Pallasmaa, the oral, olfactory, and visual senses are interconnected. In the same way that different odors in a location can be sublimely identified by our oral senses, different colors can be used metaphorically to inspire a certain character.

DESIGNING FOR THE MULTI-SENSORY MIND

How the human body interacts with space is extremely important, and the architect must work as a composer who orchestrates space into a synchronization for function and beauty through the senses. Conservation and Eco-Edutourism have two important meanings, as a behavior and as an industry. as behavior is the attitude of tourism actors and community, what should be done in the development of conservation and tourism in forest areas? by making the interactive environment.

Figure 125. *Designing for The Multi-Sensory User Mind*
Source: Author
(proccessed on 27 June 2022)

MULTI-SENSORY DESIGN NETWORK OF MEMORY

A Journal research by Sanford Inspire, 2017 retrieved that Information can be encoded in many parts of the brain through multisensory experiences. Greater memory retention, recall precision, and memory retrieval are all improved by several brain connections.

What would our constructed environment look like if structure and program were less important than sensory reaction, mood, and memory as fundamental design factors? In fact, those who take on the challenge of creating for the multisensory mind could do well to heed the advice of one observer who, in Advertising Age, recommended that the most successful new products appeal to as many senses as possible on both a rational and emotional level. (Neff, 2000, p. 22).

The importance of memory as a component of our existence in the environment has been repeatedly denied in this century, and by some, it is even now rather embarrassedly characterized as "nostalgia" and dismissed once more, according to Bloomer, K. C., and Moore, C. W. (1977) in the book "Body, Memory, and Architecture." We see it as a development of experience, not as a rejection of it.

In related to the site context of mangrove baros eco-edutourism can be shown from enhancing the nature element in the coastal and mangrove area, it can also come from the product of mangrove that are produce different smell in each type, the texture of wood, and can be stimulated the memoies of interactive learning by nature with community enhancement.

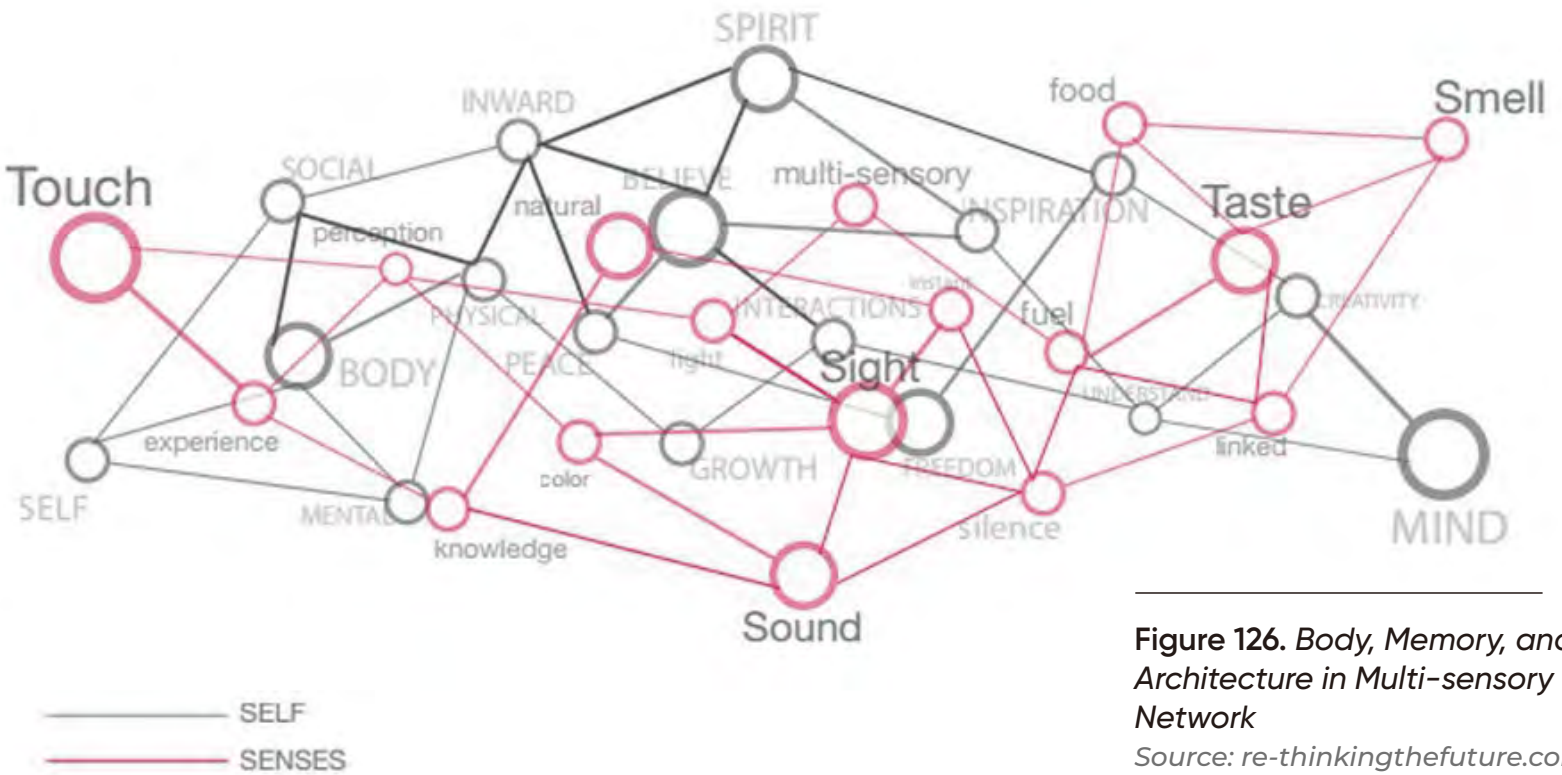


Figure 126. *Body, Memory, and Architecture in Multi-sensory Network*
Source: re-thinkingthefuture.com (proccessed on 27 June 2022)

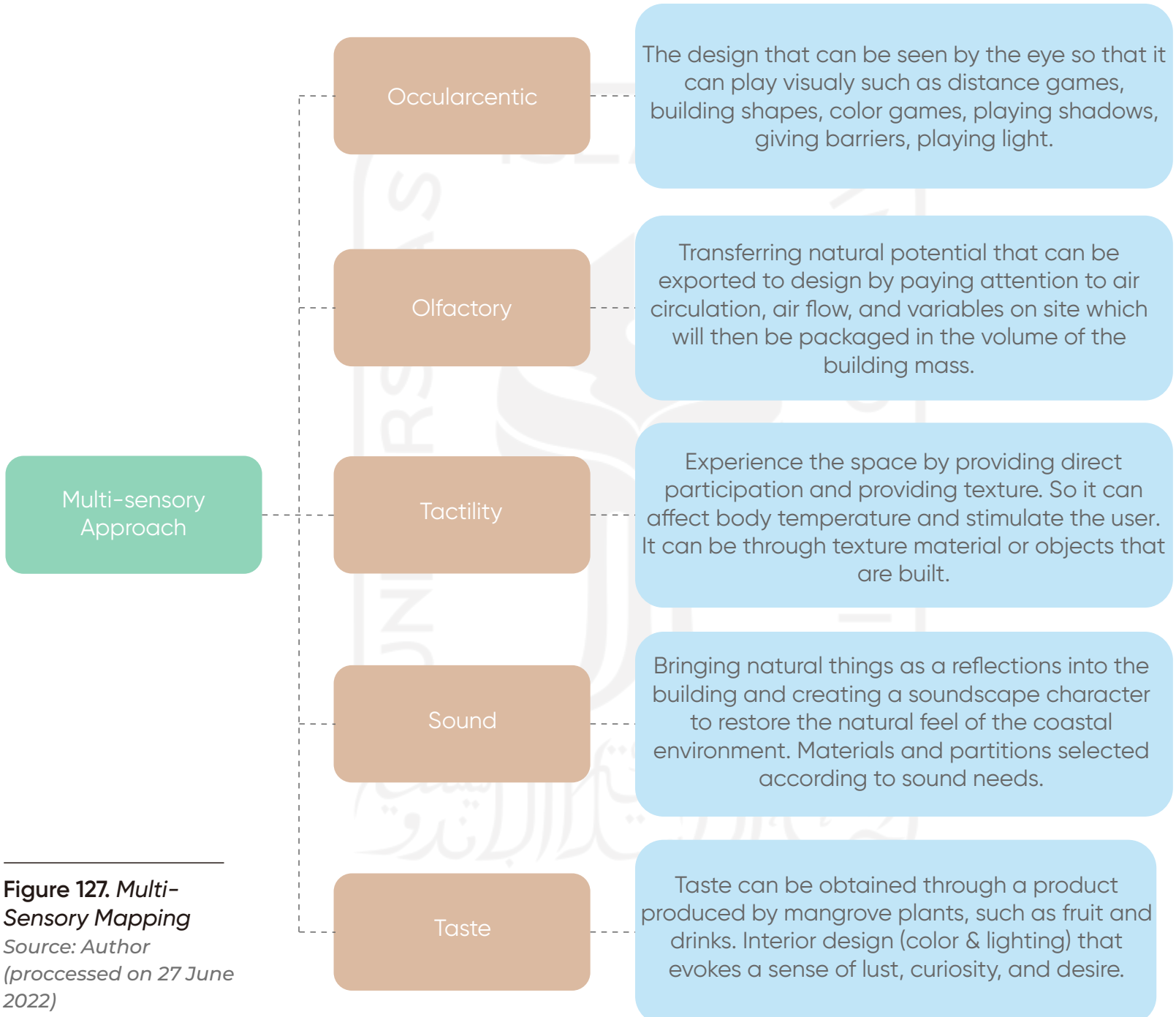


Figure 127. *Multi-Sensory Mapping*
Source: Author (proccessed on 27 June 2022)

SPECIAL ANALYSIS according to the problem

ACCESSIBILITY: the distance by building height & connection

MAINTAINING THE DISTANCE & BOUNDARY DEFINITION

"Distance as a subjective reality. I understand it in terms of space, time and myself"-George C. Criparacos's book, 1987.

From the book "Distance in Architecture" that wrote by george C. in 1987 discusses about how the distance relationship with humans, the environment, and buildings in terms of dimensions, architectonic elements and perception. Lastly, it concerns the semantics of distance, particularly from the philosophical point of view of Jean-Paul Sartre. The term "distance" is commonly used to describe the degree of separation between two things in space. This definition of 'distance,' on the other hand, just reveals a portion of the word's meaning. For example, depending on the context of a phrase, the term can have a range of various meanings. The word can be used to acknowledge a portion of time, as an interval between two events in time, simply as an expanse of space, as the quality of being spatially remote, and in many cases the word can be used to suggest remoteness in non-spatial relationships, in personal and emotional circumstances, or in cases of moral apathy, on another level its definition may suggest disparity "a social distance".

Distance is referred to as 'apostasi' in Greek. It is made up of two words: "apo" and "stasi." The basic word'stasi' means'static,' or 'to stop,' as in immobility or posture. The prefix 'apo' indicates from and is widely used to define opposites. It has 2 reasons, namely:

1. It sets up a relationship between position and distanceone is defined by the other which is its polarity, in space and in time: distance in such a context, cannot exist without position, while there would be no positions without distances
2. It defines itself as the opposite of being static. Distance, therefore, is dynamic.

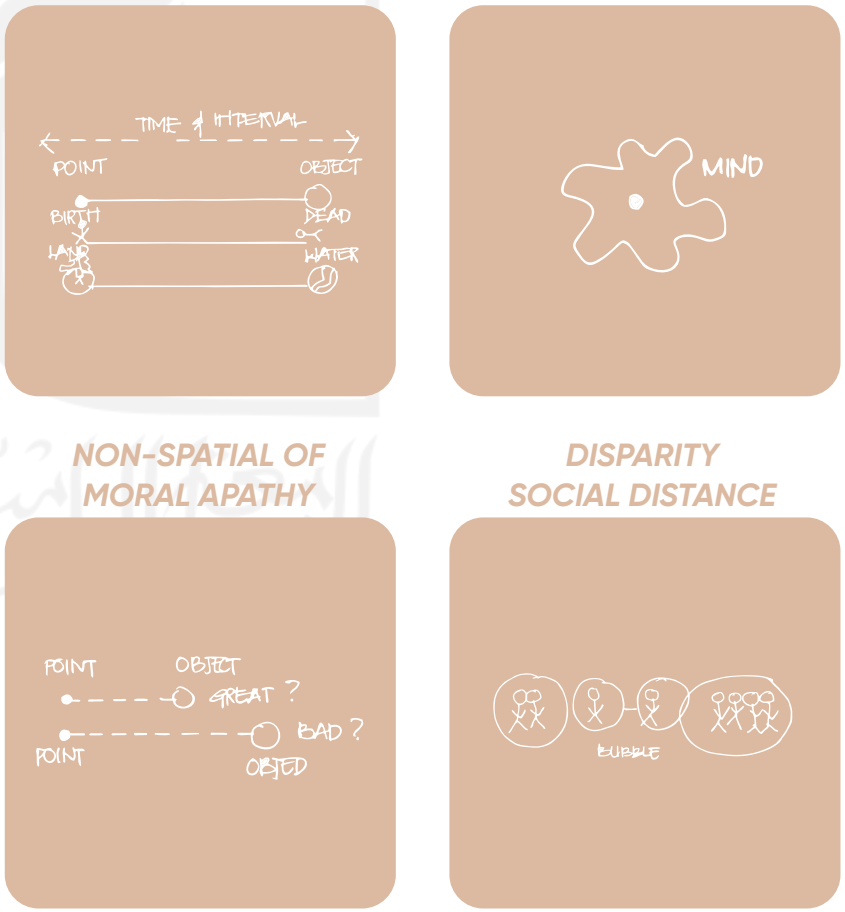


Figure 128. Maintain The Distance & Boundaru Definition
Source: Author (proccessed on 20 May 2022)

SOCIAL SOSIOLOGY OF DISTANCE

In The Hidden Dimension, the anthropologist Edward T. Hall examines human use of space in terms of distance. The fundamental thesis asserts that man's boundary does not begin and end with his skin. Categorizing distance in four zones: intimate, personal, social, and public ditances.

1. Intimate distance
Close Phase, the distance for love-making, wrestling, comforting. Far Phase, clear vision (15 degrees) includes a portion of the face, which is perceived as enlarged.

2. Personal distance
"consistently separating the members of non-contact species. It might be thought of as a small protective sphere or bubble that an organism maintains between itself and others"- Hediger.

Close phase, The three dimensional quality of objects is particularly pronounced. Objects have roundness substance and form unlike that perceived at any other distance. Surface textures are also vey prominent and are 2 clearly differentiated from each other. Far phase, This is arm's length distance.

3. Social distance
The line separating the far phase of personal distance from the close phase of social distance defines the boundaries of dominance. Nobody touches or expects to touch another person since intimate visual detail in the face is not noticed. Close Phase, communicating, discussion. Far phase, insulate or screen people from each other.

4. Public distance
"It is in the nature of animals, including man, to exhibit behavior which we call territoriality. In so doing,
they use the sense to distinguish between one space or distance and another. The specific distance chosen depends on the transaction; the relationship of the interacting individuals,how they feel, and what they are doing." Close Phase: (12' - 25'). Far Phase: (25' +). Thirty feet is the distance that is automatically set around important public figures.

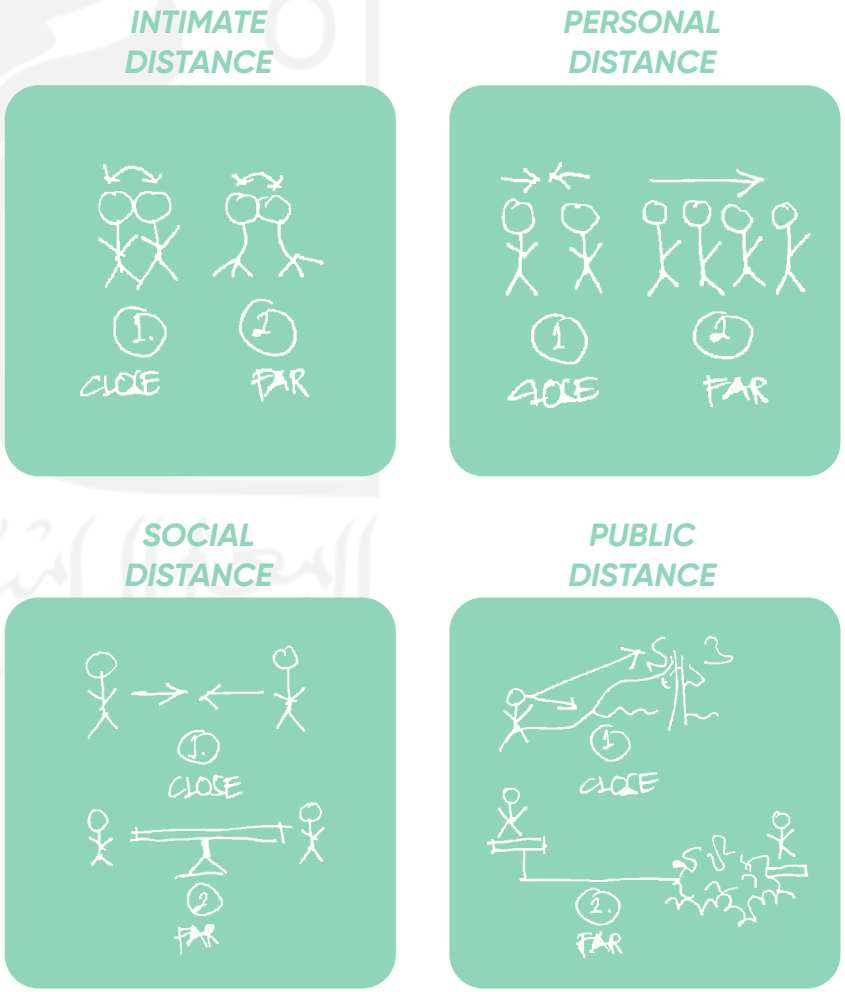


Figure 129. Social Sosiology of Distance
Source: Author (proccessed on 20 May 2022)

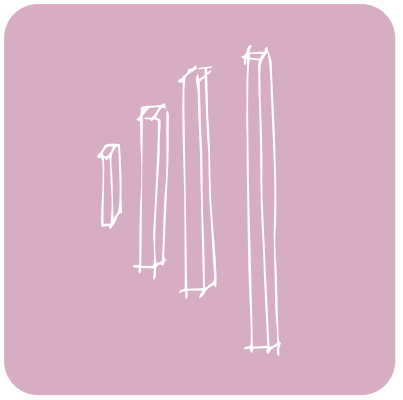
PERCEPTION AND DISTANCE

Perception and distance are inseparable, for one cannot exist without the other. It seems to, that a journey into the principlec of perception is unavoidable in the context of this exploration. In The Perception of the Visual World, James Gibson, dicusses these principles. In addition, Gyorgy Kepes in The Language of Vision considers the use of particular types in two-dimensional spatial representations. The principles examined such as.

TEXTURE

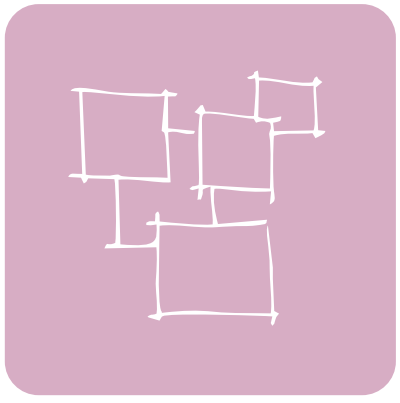
There exists a gradual increase in the desnsity of the texture of a surface as it recedes in the distance.

SIZE



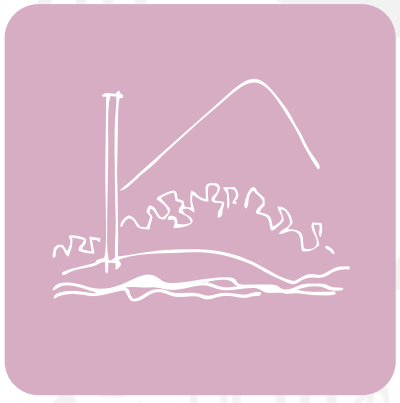
As objects move farther away they decrease in size.

OUTLINE



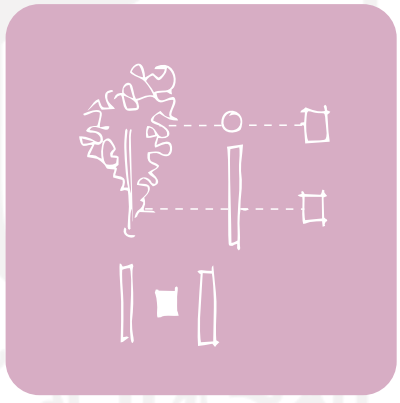
Object obscures another determines whether or not the one is seen as behind the other. Transitions of Light and Shade: Brightness is interpreted as an edge. Gradual transitions in this brightness are the principal means of one's perceiving molding or roundness of an object.

RATE OF MOTION



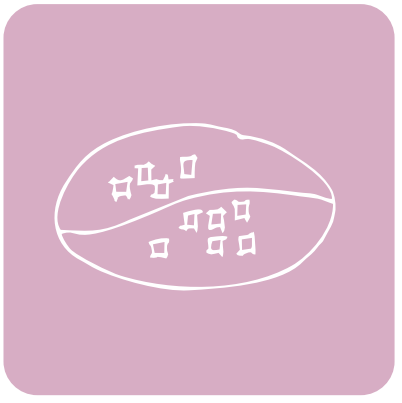
The differential movement of objects in the visual field, (as one of the most dependable means of sensing depth). Overlapping object do not shift positions relative to each other when the viewer changes position, they are perceived as either on the same plane/ far away.

DOUBLE IMAGERY



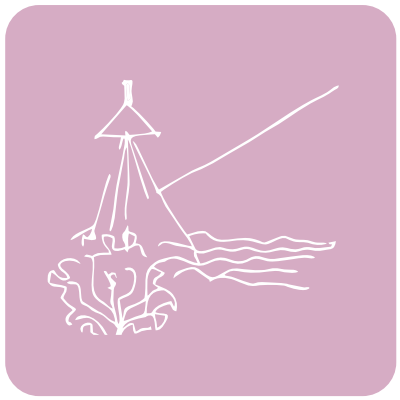
Everything between the viewer and a point in the distance will be seen as double. The closer the distance between the viewer and point, the greater the doubling effect. The gradient in this shift is a measure of distance. (a steep gradient = close distance while gradual = far distance).

AERIAL



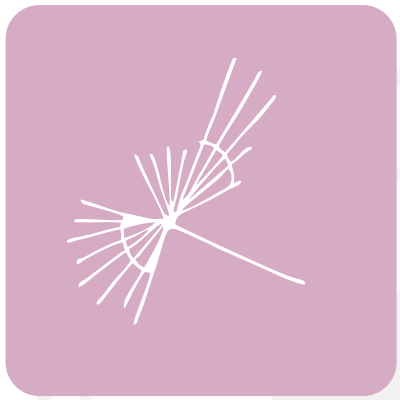
A reduced appearance in scale of an object-is not a reliable indicator of distance.

BLURY



When focusing on an object in the distance, the background is blurred.

LINEAR

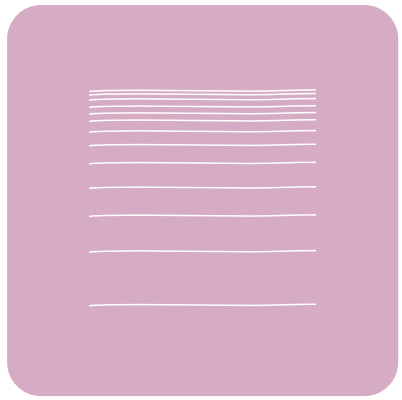


Parallel lines join at a single vanishing point at the horizon.

BINOCULAR

(Operatout of awareness) owes to the separation of the eyes, each projecting a different image.

SHIFT LINEAR SPACING

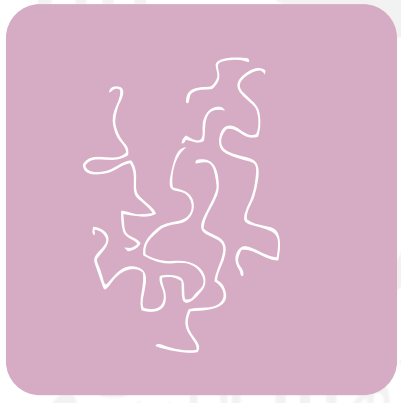


The rapid increase in linear spacing density. A valley seen over the edge of a cliff is perceived as more.

RELATIVE UPWARD VISUAL

On the deck of a ship the horizon - as distance approaches infinity - is seen as a line at eye level. The surface of a globe climbs from one's feet to eye level; the further from the ground the more pronounced is this effect. One looks down at objects that are close, and up at those far away.

MOTION



The closer one moves toward a stationary object, the faster it appears to move; objects moving at uniform speed appear to be moving slower as distance increases.

Figure 130. Sosiology, Perception, and Type of Distance
Source: George C. Criparacos, 1987 (proccessed on 20 May 2022)

TWO TYPES OF DISTANCE

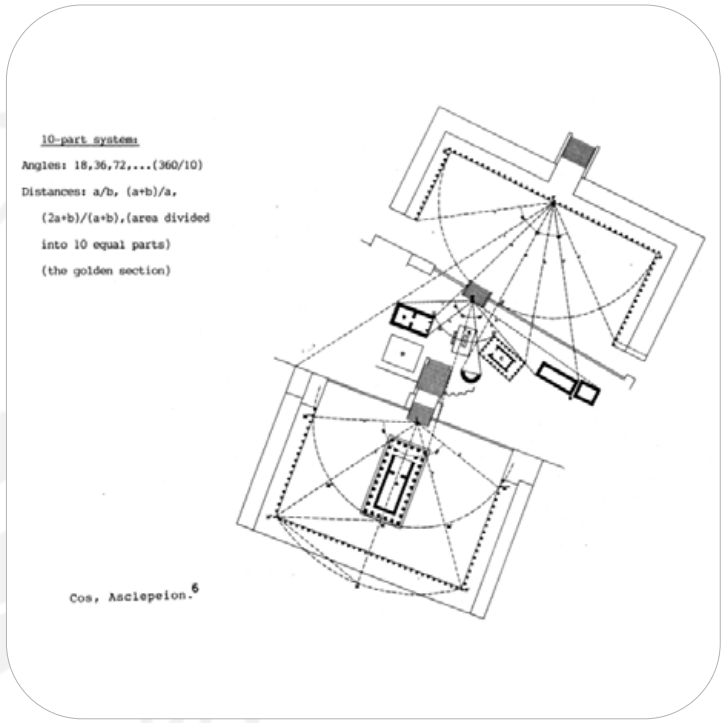
C.A. Doxiades points out in Architectural Space in Ancient Greece, the polar coordinate system had two design types. The 10-part, and the 12-part systems used in terms of the architectural style employed in the building.

1. Ionians, 10-part system

Considering space to be infinite, consequently they feared endless space and always enclosed open views in their layouts. The number ten was fundamental to Greek philosophy as seen in Philolaos' book, On The Pythagorean Numbers, "One must study the activities and the essence of Number in accordance with the power existing and the origin of divine and human life and its Leader;...without this, all things are unlimited, obscure and indescernible.

2. Dorians, 12-part system

Greeks saw space as finite and had no fear of infinity, their designs allowed free passageways. It appears to represent the notion that the universe is based on the equilateral triangle, with the 30, 60, 90, and 120 degree angles dominating.



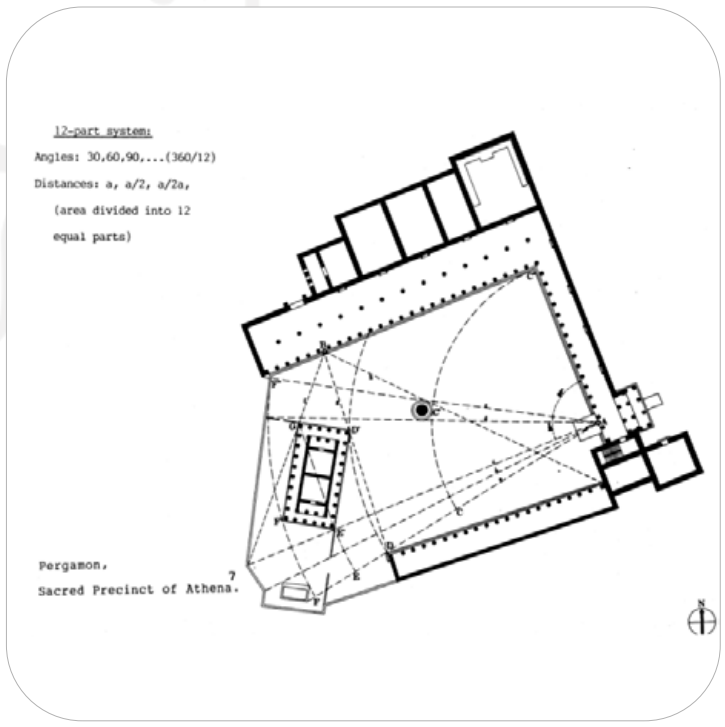


Figure 131. *Type of Distance*
Source: Ching
(proccessed on 20 May 2022)

ACCESSIBILITY: the distance by building height & connection

COASTAL CORRIDOR

According to Natural Resources Conservation Service (NRCS), defines that a landscape is a heterogeneous land area consisting of three fundamental elements: patches, corridors, and a matrix.

1. Patch
Generally a plant and animal community that is surrounded by areas with different community structure; however, a patch may be devoid of life.

2. Corridor
A linear patch that differs from its surroundings.

3. Matrix
The background within which patches and corridors exist (the matrix defines the flow of energy, matter, and organisms).

Patches, corridors, and the matrix all have biologically important interactions. As a result, this conceptual model can be used to investigate the function, structure, change, and conservation potential of landscape corridors.

TYPE OF CORRIDOR

Many various types of corridors have a line or strip structure. The following are the five most prevalent types of corridor origin.

1. Environmental Corridor
Environmental corridors are formed when plant responds to a natural resource such as a stream, soil type, or geologic formation. They usually have a winding (curvilinear) pattern with a wide range of widths.

2. Remnant Corridor
The most visible results of disturbance to the adjacent matrix are remnant corridors. After land is cleared for agriculture or other uses, strips of vegetation on locations that are too steep, rocky, or wet to put into production are left as vestiges. Some relics are line corridors that were used to mark property lines. Most remaining corridors vary greatly in width and configuration. The final assemblages of native plant and fauna in a watershed are often found in remnant corridors.

3. **Introduced Corridor**
Corridors that have been introduced (planted) date back to around 5000 BC. Over 200 million seedlings were planted in shelterbelts, with the Civilian Conservation Corps maintaining many of them (CCC). Introduced corridors have proven crucial habitat for many animal species in agriculturally dominated regions.

4. **Disturbance Corridor**
Land management actions that disturb plants in a line or strip create disturbance corridors. Typical configuration is a straight line. For some wildlife species, they may be large enough to act as a barrier, dividing a population into two metapopulations. Native species that require early successional habitat frequently use disturbance corridors as habitat.

5. **Regenerated Corridor**
Regrowth occurs in a disrupted line or strip, resulting in regenerated corridors. Natural succession or plant-based revegetation can result in regrowth.

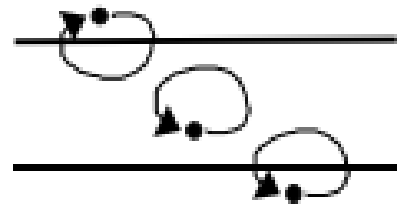
Figure 132. Type of Corridor Function
Source: Natural Resources Conservation Services (NCRS) (proccessed on 20 May 2022)

CORRIDOR FUNCTION

These five functions work in tandem, fluctuate with seasonal and weather variations, and evolve with time.

1. Habitat

A corridor can serve as habitat or as a component of habitat, especially for animals with limited home ranges and mobility. During seasonal migrations between patches, a corridor could function as a transitory habitat.

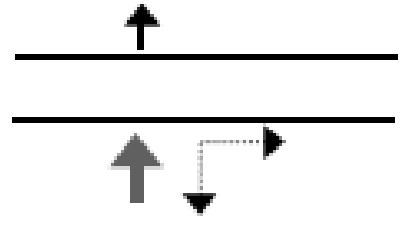


2. Conduit

When energy, water, nutrients, genes, seeds, organisme, and other elements are transported along a corridor, it acts as a conduit. Migration to breeding or childbirth on a regular basis Interactions between patches, If certain populations are to survive in remote areas, they must accept immigration.

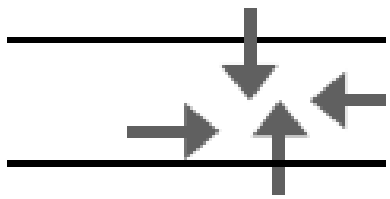
3. Filter/Barrier

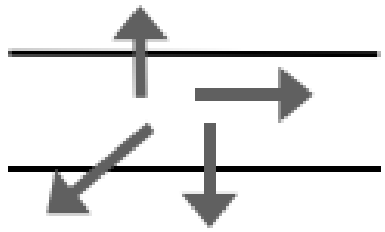
Filter sediments and agricultural chemicals from surrounding matrix runoff. They may also operate as wind barriers, reducing wind velocity and erosion.



4. Sink
when it accepts and holds things and substances that come from the matrix, such as soil, water, agricultural chemicals, seeds, and animals When the rate of mortality in the corridor due to predation and other reasons causes a net decrease in the population of either corridor inhabitants or migrant species, corridors can become sinks for wildlife.

5. Source
when things and substances are released into the neighboring matrix Weeds and wildlife pest species may be found in corridors. They could also be a source of predatory insects and insect-eating birds, which help to keep crop pests at bay. Wildlife can be found in high-quality corridors where reproduction outnumbers mortality and individuals are added to the population.

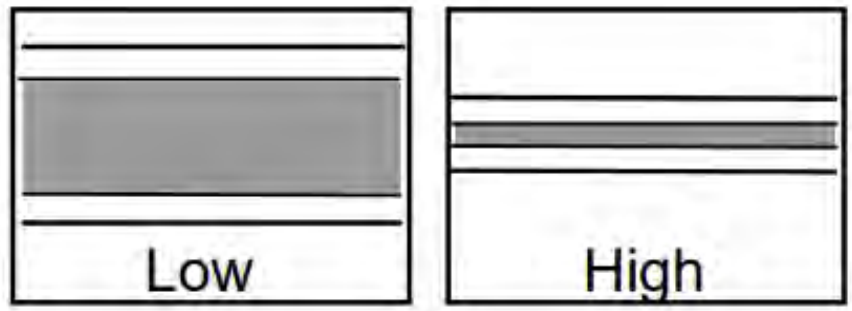




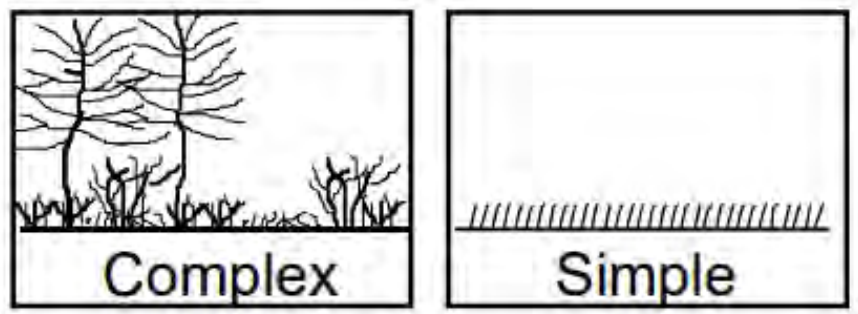
COASTAL CORRIDOR

How corridors work is determined by physical and biological qualities such as width, connectedness, plant community, structure (architecture), edge to interior ratio, length, and arrangement. The most essential ecological and visual aspects are corridor width, connectedness, and plant community design.

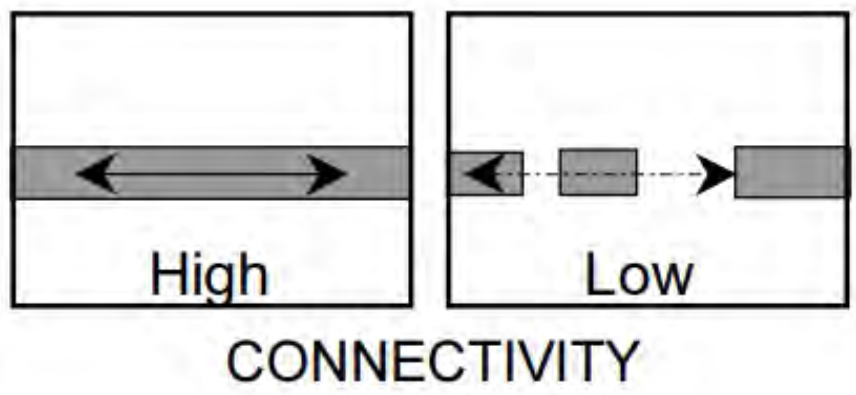
1. Edge to Interior Ratio



2. Plant Community Structure



3. Connectivity



PLANNING & DESIGN PRINCIPLES

Establish and maintain self-sustaining s at levels in dynamic equilibrium with the ecological, social, and economic values of the human community.

1. Preserve, enhance, or restore the function and structure of existing patches and corridors
2. Propose new patches or corridors in appropriate locations to restore lost habitat
3. Minimize the negative impacts that originate in the matrix
4. Maximize the positive habitat attributes the matrix provides
5. Incorporate the other functional benefits that patches and corridors provide
6. Restore natural disturbance regimes

Core Reserves, Buffer Zones, and Linkages (after Adams and Dove, 1989). Natural reserves and corridors at a watershed scale should be centered around preserving, linking and buffering high value nodes. Three basic concepts emerge.

1. Core reserves (nodes)
2. Buffer zones (establish multiple use)
3. Linkages (corridor)

APPLYING PRINCIPLES

1. Review the historical pattern of patches and corridors, if available.
2. Study the existing pattern of patches and corridors in the landscape.
3. Identify locations where connectivity is both desirable and feasible.
4. Use the above principles to propose the most efficient means to reconnect the landscape in a way that produces the greatest benefits to wildlife while minimizing the land area taken out of production or suburban development.

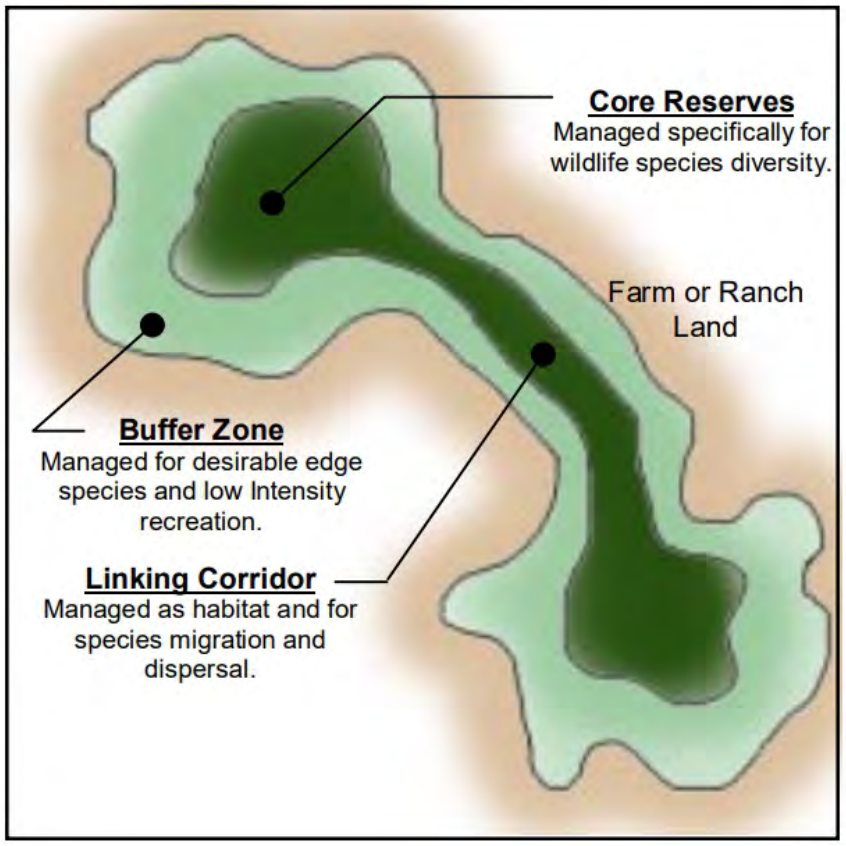
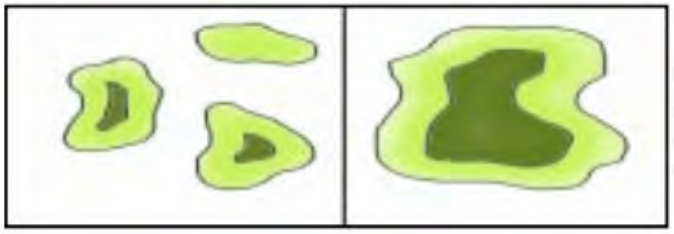
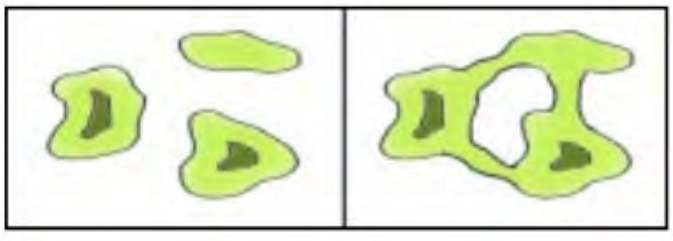


Figure 133. Applying Principles Zone
Source: Natural Resources Conservation Services (NCRS) (proccessed on 20 May 2022)

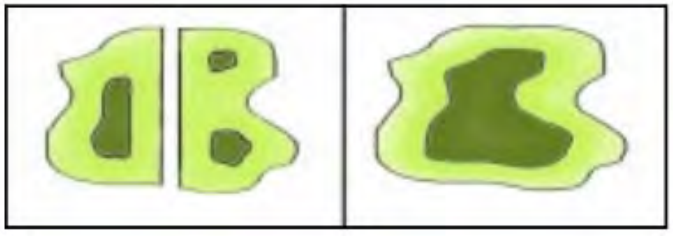
Patches, large reserves/patches are better than small reserves/patches. Typically capture and preserve a greater diversity and quality of habitats. They often serve as core reserves/patches. The advantage is positive area effects are increased, Edge effects are reduced, diversity is increased.



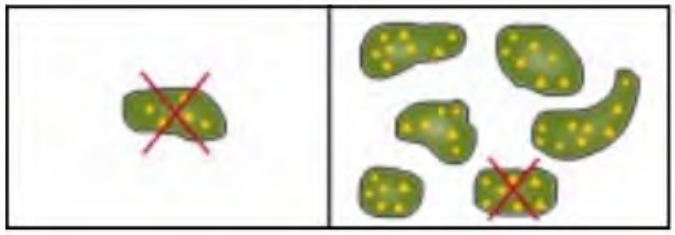
Patches, connected reserves/patches are better than separated reserves/patches. They enhance the habitat, conduit, filter/barrier, and source functions of corridors. Increased Habitat: connected, presence of conduits: communities and populations can move in response to seasonal disturbance or longterm environmental change, filter/barrier Functions: movement of exotic plant and animal species may be inhibited by connections, source functions: several reserves/patches connected by corridors are more likely to serve as a source (adding individuals to the population) than separated reserves.



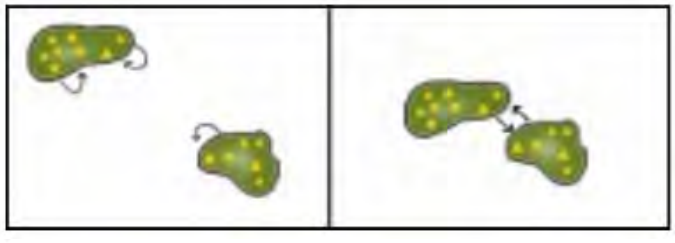
Patches, unified reserves/patches are better than fragmented reserves/patches. Of two reserves or patches having exactly the same area, one fragmented and one unified. The advantage, positive area effects are increased, edge effects are reduced, diversity is increased.



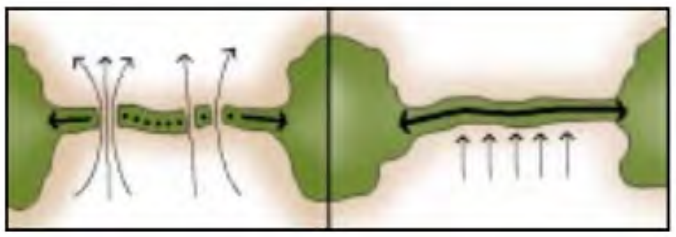
Patches, several reserves/patches (redundancy) are better than one reserve/patch. Redundancy is an essential component of healthy ecosystems at all scales. Populations and individuals frequently rely on more than one patch to fulfill life requirements. If only one reserve/patch exists at either the regional, watershed, or conservation plan scale, population and community viability may decline, also contribute to larger total numbers of individuals, greater genetic diversity, viable metapopulations, and the increased probability of recolonization after local extinction in one reserve/patch.



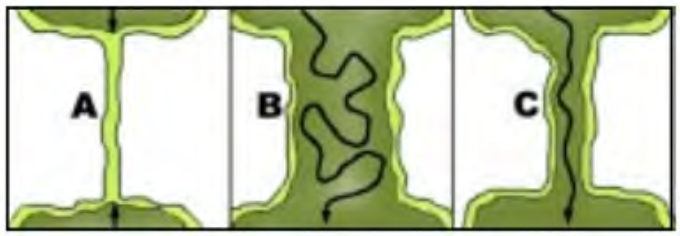
Patches, nearness is better than separation. The chance of interact becomes disproportionately greater as the distance between patches decreases. While that distance varies by species, they are more likely to encounter, and thus use, a nearer patch. Juvenile dispersal and recolonization are more likely to succeed between patches close to each other. Far-ranging movement patterns of individual species, shorter distances between patches, and less contrast between patch and matrix result in higher potential for movement between patches.



Corridor, continuous corridors are better than fragmented corridors. Conduit Functions: Corridors facilitate movement of organisms through landscapes. Gaps in corridors disrupt movement, especially for interior-dwelling species. The ability of an individual to cross corridor gaps is dependent on its tolerance for edge conditions, its movement and dispersal characteristics (i.e., how fast it moves, and how far it moves at one time), the length of the gap, and the amount of contrast between the corridor and the gap, Stepping Stones, Filter/Barrier Functions: Gaps in an otherwise solid corridor seriously diminish the effectiveness. Gaps allow plants, animals, pollutants, wind, and wind-blown particles access across the corridor, and often result in localized concentration of these elements. However, in some instances passage through corridors may be desirable.



Corridor, wider corridors are better than narrow corridors. Habitat Functions: the longer it takes a species to move through the corridor, the more important its habitat function becomes. Wider corridors reduce area effects and edge effects within the corridor. Conduit Functions: wandering within the corridor, increasing overall mortality. Filter/Barrier Functions: Wider corridors are more effective barriers to movement across them. Source Functions: Wider corridors are more likely to act as a population source (adding individuals) than as a sink (removing individuals).



Corridor, natural connectivity should be maintained or restored. Maintaining historical connections between patches is essential in maintaining species diversity and population viability within a watershed. Preventing fragmentation of existing corridors that connect patches is less expensive than restoring connections. In many cases, however, it may be necessary to restore historical connections between patches. Historical vegetation (the vegetation that existed prior to fragmentation) should be used in restoring corridor connections.

Corridor, introduced connectivity should be studied carefully. Ensure that one is not linking historically disconnected patches. Long-separated populations of the same species often develop specialized genetic adaptations to their particular habitat conditions. Connecting such populations through a corridor could result in the loss of those adaptations. In agricultural landscapes, connectivity between corridors and patches benefits most endemic (native) species when historic vegetation is planted in the corridor.

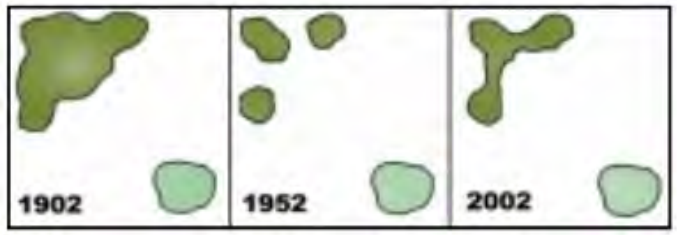
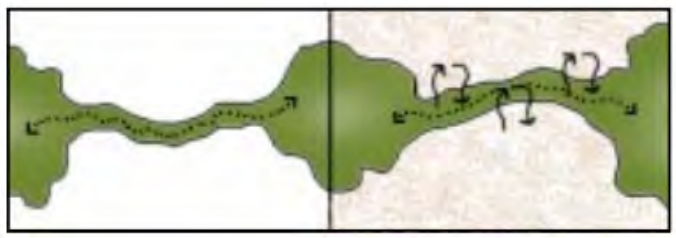


Figure 134. *Patch and Corridor Type in Conservation*
Source: Natural Resources Conservation Services (NCRS) (proccessed on 20 May 2022)

Corridor, two or more corridor connections between patches (redundancy) are better than one. Alternate routes: Redundancy should be built into the conservation corridor network, particularly at small scales, it will complete the journey. Insurance: Multiple corridor connections between patches safeguard the system from disturbances and disasters. If management mistakes or natural occurrences such as fire temporarily destroy one of the corridors, other corridors will maintain the link between the patches while the disturbed corridor regenerates. It should be noted that periodic burning of corridors may be necessary for management. Stepping stones: Closely spaced stepping stone patches can be effective in providing alternate routes between larger patches.

Matrix, manage the matrix with wildlife in mind. The matrix is often an important source of food and seasonal cover in agricultural landscapes. Mowing from the center to the edge (toward cover) is preferable.



Structure, structurally diverse corridors and patches are better than simple structure, native plants are better than introduced plants. Vertical structure refers to the layers of different plant forms and sizes in the plant community. Horizontal structure, at a watershed scale, refers to the arrangement of different habitat types as seen from above. Additional benefits: Both horizontal and vertical structure provide additional benefits on the agricultural landscape. For example, windbreaks are frequently employed to control wind erosion of soil. Native plants: Corridors are usually intended to benefit native or desirable naturalized co-evolved.

(B.R. Eaton, J.T. Fisher, G.T. McKenna, and J. Pollard. 2014). Habitat elements naturally embed within each other as spatial scale
increases.

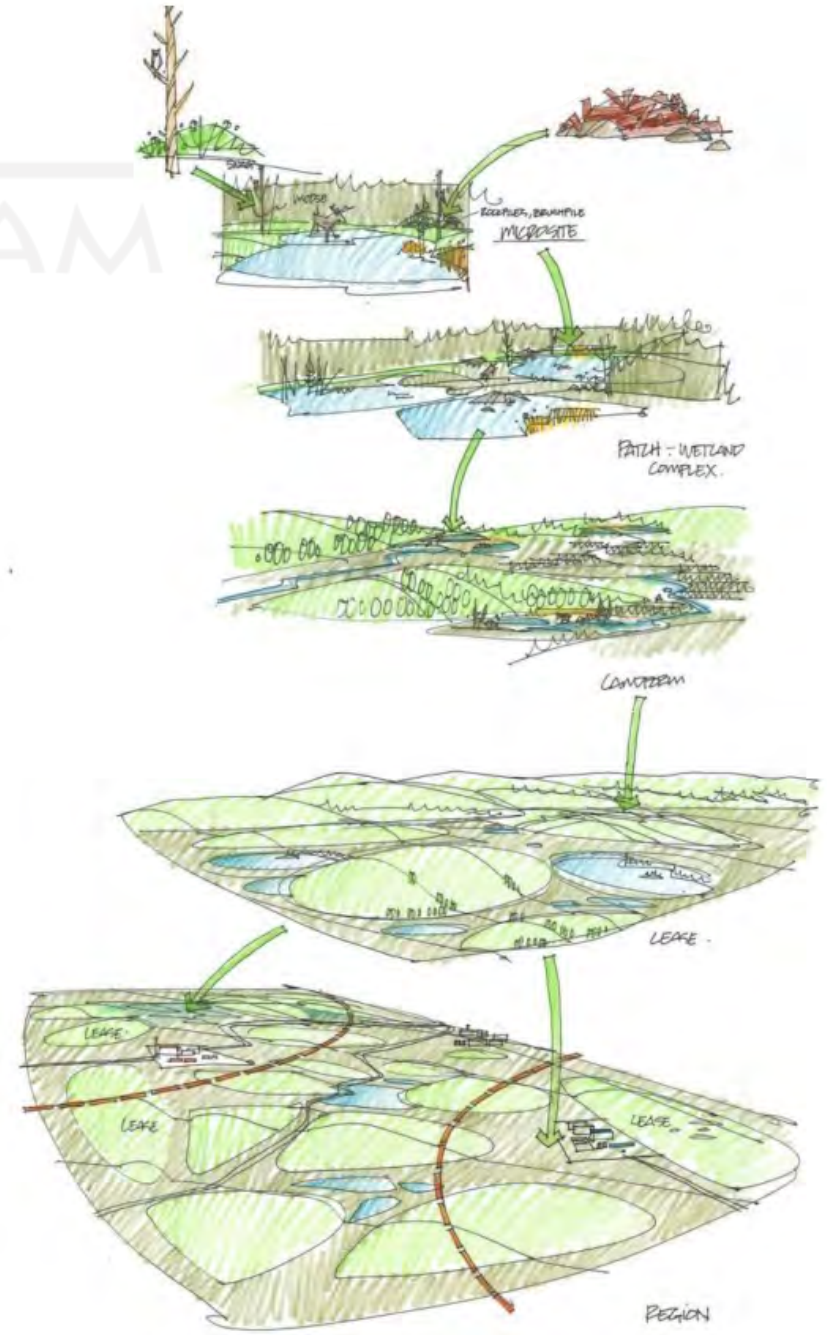
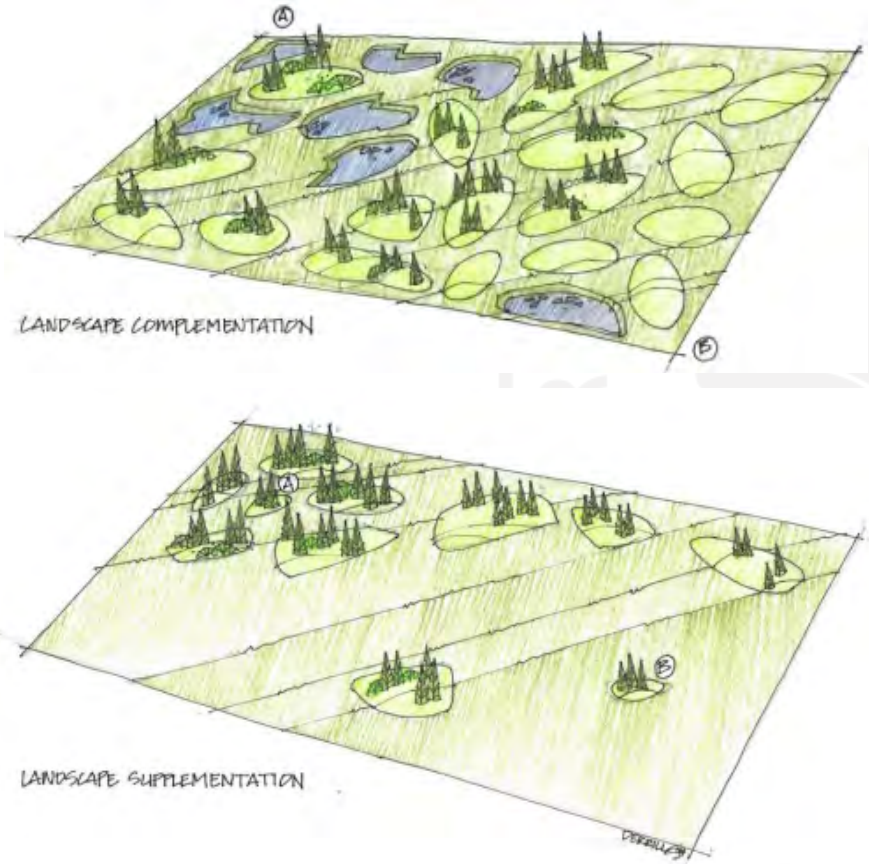
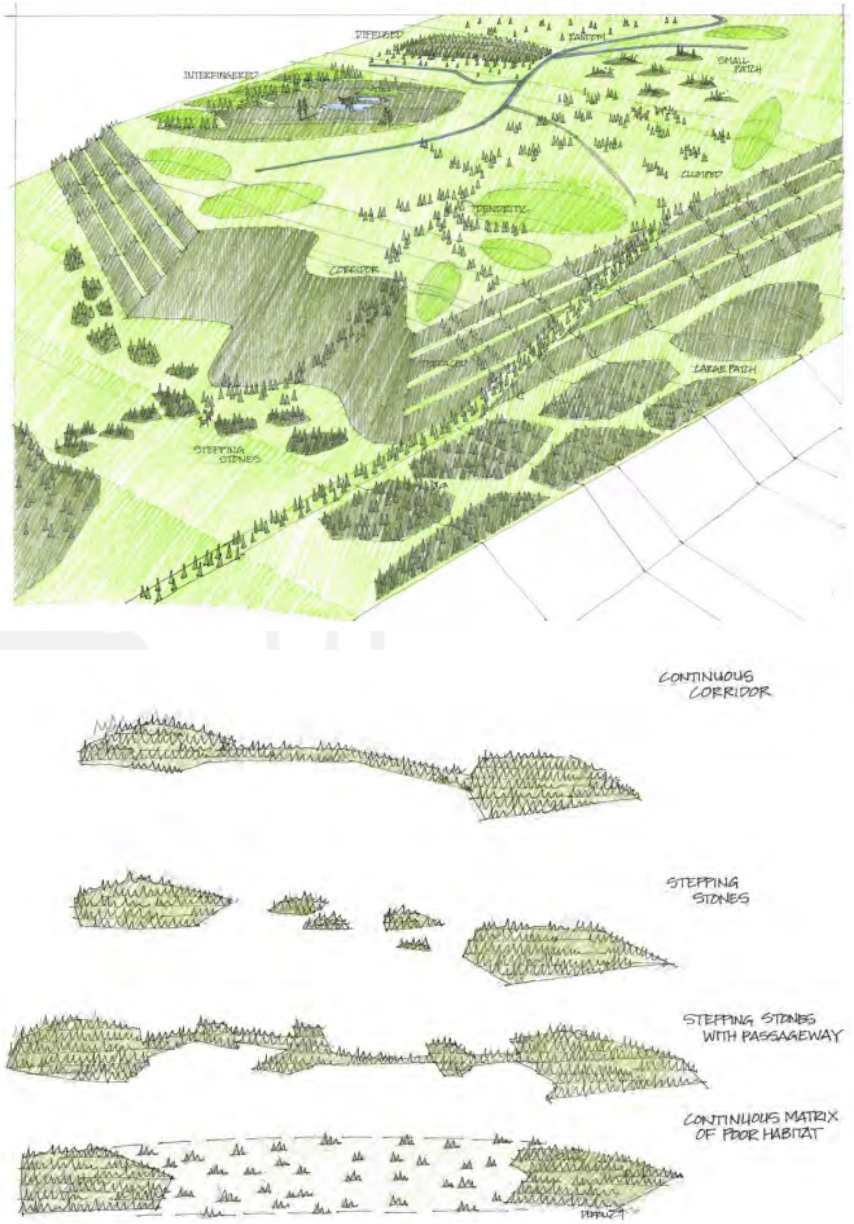


Figure 135. *Wildlife habitat elements naturally embed as spatial scale increases*
Source: Eaton, Brian R. et all. (proccessed on 20 May 2022)

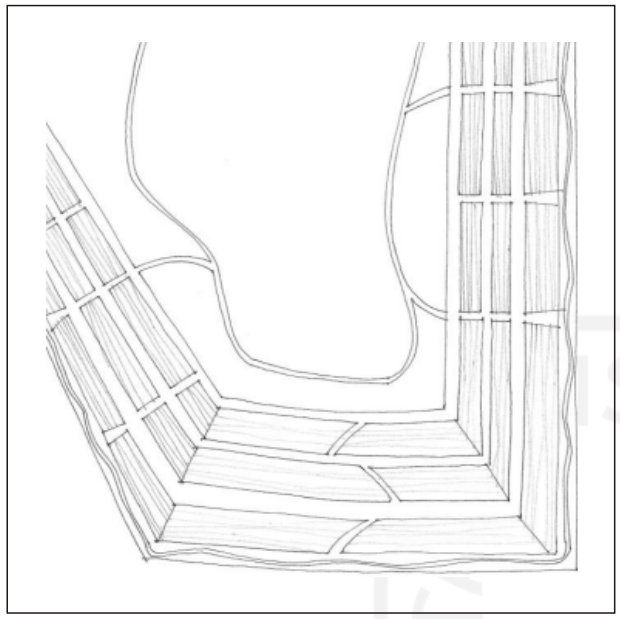
In the upper panel (complementation), each different habitat type might be used by a species during the course of a day, season, or over its lifecycle; each habitat type is necessary for the survival of the species. In the lower panel (supplementation), the polygons with trees are the same habitat type; these different patches provide sufficient habitat to support a species, even though each individual patch would be too small on its own. It is critical, in this scenario, that there is connectivity between these habitat patches.

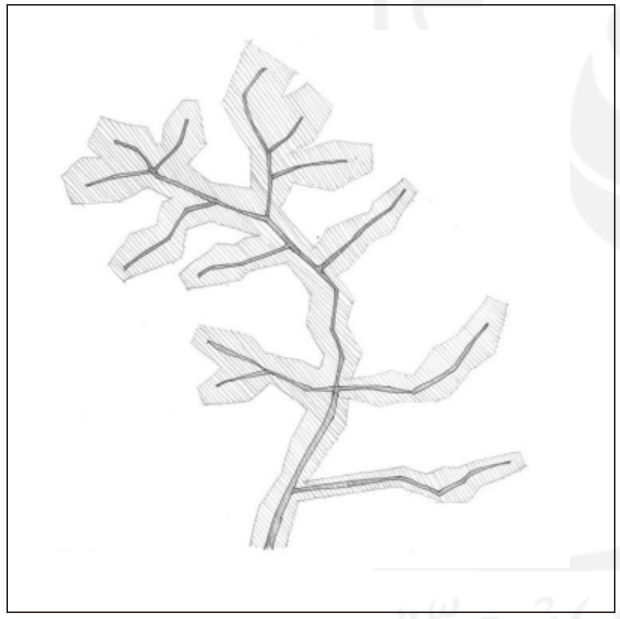


Examples of patch shapes, distribution patterns and types of connectivity for oil sands mine reclamation on a single landform. Note that patches must be designed within the context of the landscape to provide maximum effectiveness



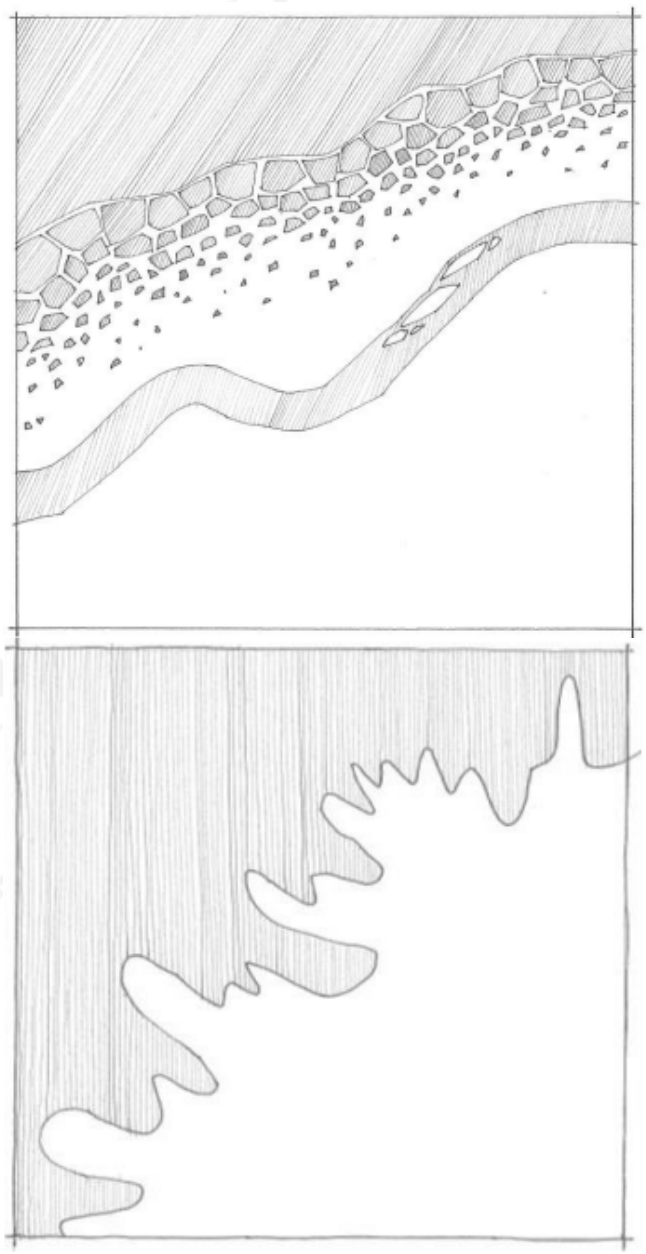
Examples of different type of corridors that can be used to provide connectivity across a landscape (adapted from Morrison (2009). Note that corridors do not necessarily have to be continuous for some species, which are able to cross suboptimal habitat if there are stepping stones (patches of acceptable habitat) within a certain distance of each other. This distance varies across species, and designs should cater to those needing the shortest distances.





Example of terraced reclamation patches on an oil sand landform. Note that these patches are long and narrow and are likely far from optimal, but they are common on mining landforms, most of which are terraced. Example of a dendritic habitat patch – the riparian zone edging a stream network. Two types of patch edges – interfingered and diffused. The diffused boundary provides a band of habitat between two patches where the vegetation and physical structures of the two patches intermingle to create a soft edge. This band may be created by interplanting of different vegetation types along the boundary between two patches (spatial), adjusting planting timing (temporal), through the creation of rough

of rough microtopography. The goal is to avoid creating a hard edge where one habitat stops and another begins, although this will sometimes occur. Interfingered edges may be created by a series of shallow mounds and swales along the edge of two patches; the important point is to create a series of invaginations where two different types of habitat meet. Such a boundary avoids straight lines, which may be exploited by predators, and provides a high edge to area ratio, negating edge effects. The coves created by the interfingering that face the prevailing wind may trap wind-dispersed seeds, increasing the rate at which natural colonization by plant species may occur.



SPECIAL ANALYSIS according to the problem

ACCESSIBILITY: landscape design and circulation

According to Nilgun and Makgulenur (2019), various elements have a role in defining the form composition.

1. User profile
User consisting a human, an animal, or a plant. The user's characteristic aspect prompted the designer to contemplate transforming the concept into a practical shape.

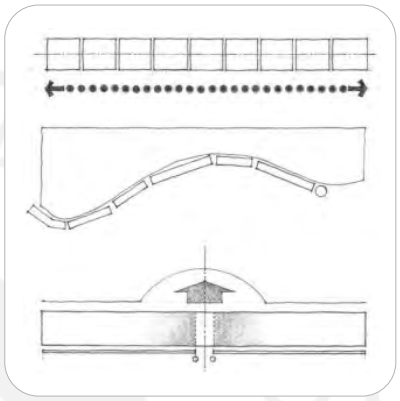
2. User wishes
User can desire refers to use the area for various activities based on their needs and wants.

3. Site potencies
The relationship between the site's elements can lead to the designer noticing a pattern.

4. Designer desires
How the designer negotiates with the fix elements and their thinking process capable of transforming thoughts into a clear formation is the designer desires.

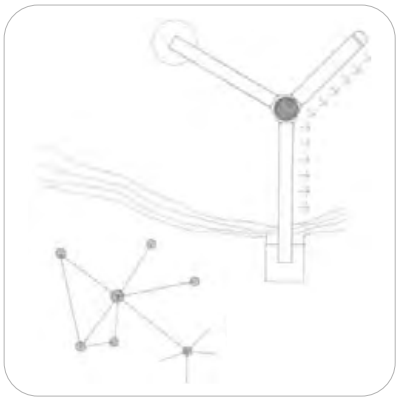
Based on Francis D.K. Ching, 1943. These elements and systems should be linked together to generate a unified whole with a consistent structure. When the organizing of parts makes their relationships to one another and to the structure as a whole visible, architectural order is generated. A conceptual order exists when these linkages are seen as mutually reinforcing and contributing to the singular nature of the whole. The path of our movement can be conceived as the perceptual thread that links the spaces of a building, or any series of interior or exterior spaces, together. Since we move in Time through a Sequence of Spaces.

LINEAR



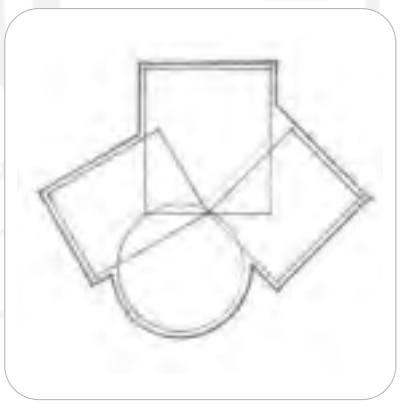
may be either repetitive or dissimilar in nature and organized by a separate and distinct. Can be segmented or curvelinear in respond to topography, vegetation, views, or other features of a site.

RADIAL



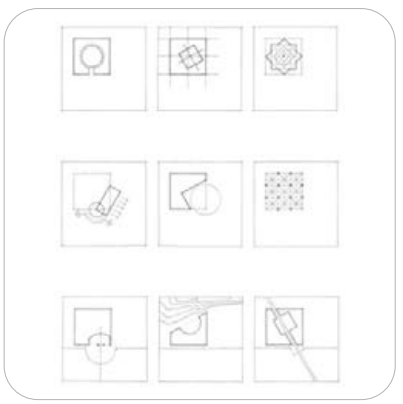
centrally located core element in a radiating manner. Can reach out and relate to or attach themselves to specific features of a site. Expose their elongated surfaces to desirable conditions of sun, wind, view, or space.

CLUSTERED



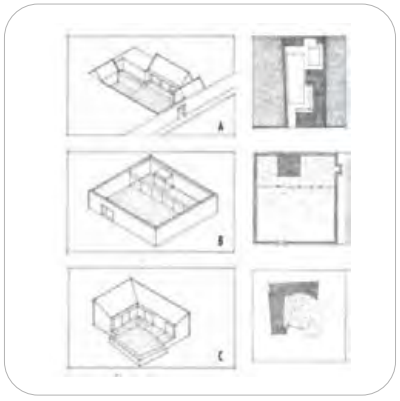
organization groups its forms according to functional requirements of size, shape, or proximity. While it lacks the geometric regularity and introverted nature.

FORMAL COLLISIONS



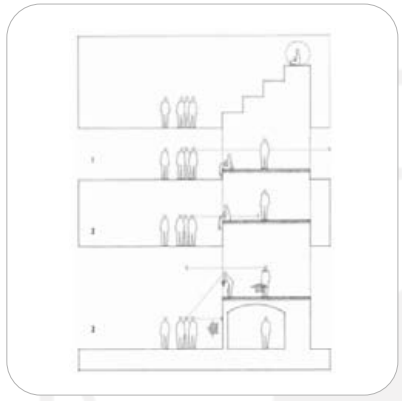
respond to contrasting geometry the topography, vegetation, boundaries, or existing structures of a site, reinforced local structure of symetry.

THE UNITY OF OPOSITES



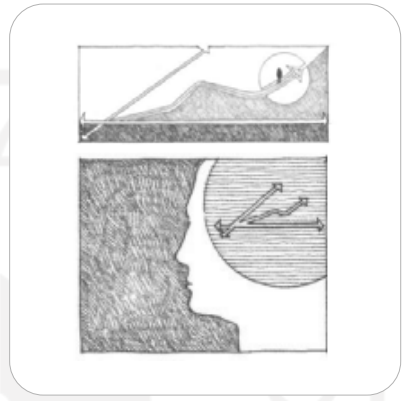
continue the existing fabric of a place, form a backdrop for other buildings, begin to define a positive outdoor space.

ELEVATED BASE PLANE



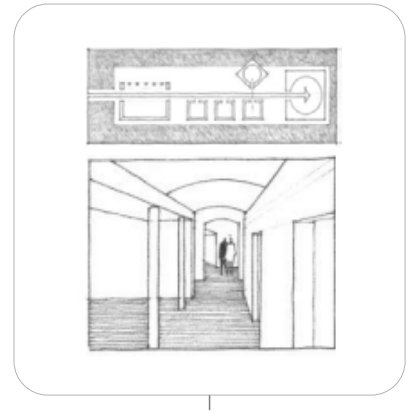
the degree to which spatial and visual continuity is maintained between an elevated space and its surroundings depends on the scale of the level change.

CONFIGURATION TO PATH

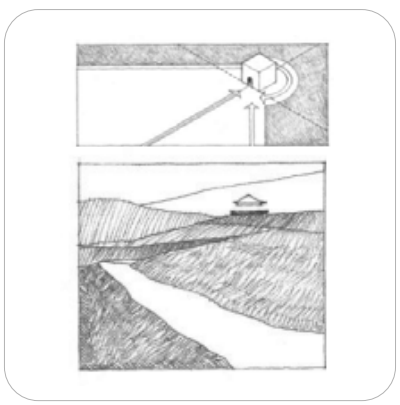


the sequence of spaces. Provide directions or path distinctions that intersect. Consists of linear, radial, spiral, grid, network.

PATH-SPACES RELATION

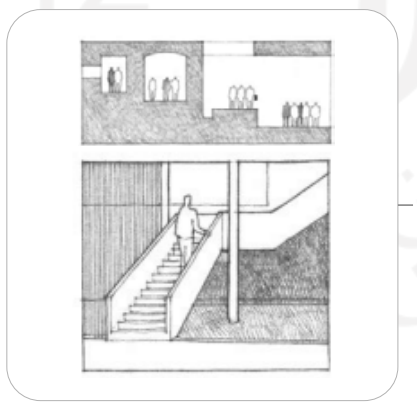


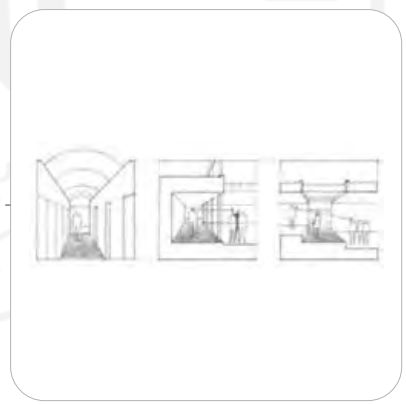
APPROACH



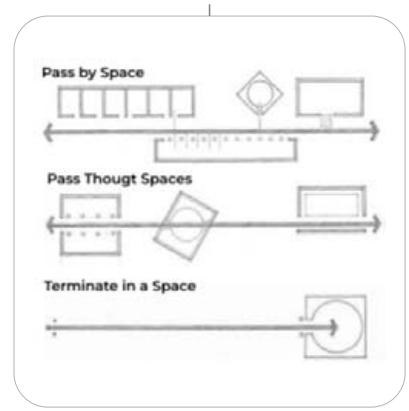
the distant view. Inviting, seeing, feeling, and utilizing space to get to the point of achievement. There are 3 types, frontal, oblique, spiral.

FORM CIRCULATION





corridors, halls, galleries, stairways, and room. Part of the circulation is in the form of space. Closed, open on one side, open on 2 sides.



edge, nodes, and termination to the path. Explain about how to connecting the space.

SPECIAL ANALYSIS according to the problem

ZONING & LAYOUT: Planting Pattern in Mangrove Nursery

THREE COMMONS PATTERN

Mangroves can be planted using a variety of planting schemes, each of which has unique advantages. Most mangrove planting projects spread the trees out evenly over the area.

All site types can be planted with mangroves using the conventional method. Plant seedlings in rows with equal distances between them. Plant with standard spacing if the location is wind- and wave-protected. Reduce the distance between seedlings if the location is subject to moderate to strong winds or waves.

This is appropriate for locations with moderate waves or winds. Plant seedlings in V-shaped groups with about 11 seedlings each, spaced 25 to 50 cm apart. To reduce the impact of waves, plant your tree so that the V's point faces the water.Each V should be placed between 1 and 1.5 meters apart. After two years, if all of the seedlings in the V pattern are flourishing, transfer them to the empty spaces.

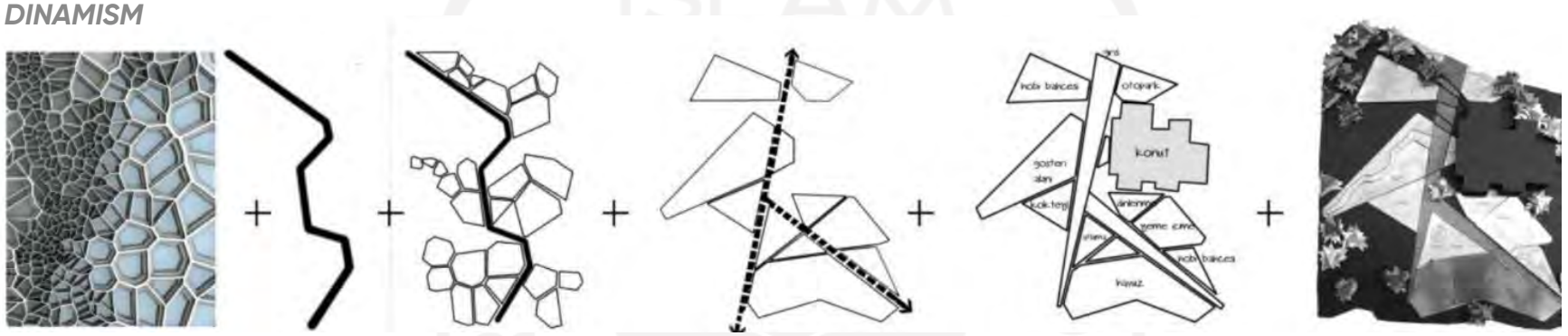
Sites exposed to severe winds or seas should use this. Ten or fewer seedlings should be placed in each tiny cluster, which should be spaced 25 to 50 cm apart. Each cluster should be placed between 1 and 1.5 meters from the one before it.

Figure 137. Type of Planting Pattern
Source: Google
(proccessed on 20 May 2022)

ACCESSIBILITY: landscape design and circulation

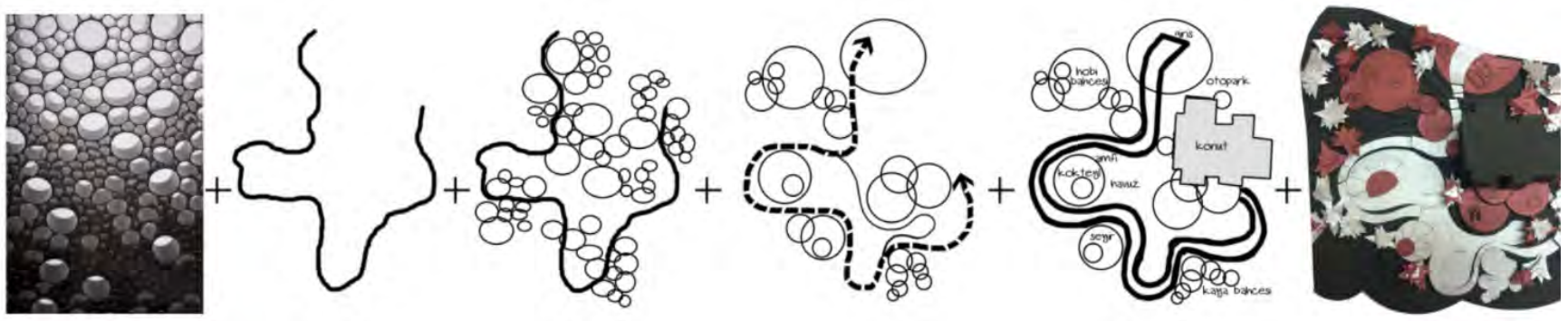
The landscape designs are shaped by considering the topography of the area to be designed, the structural elements on it, the desires of the users if there is any and the functionality of the area (Düzenli et al., 2017). Retrieved from Karadeniz Technical University, the students and lecture created landscape concepts and scenarios appropriate for the user profiles and context analysis. In this term, the baros conservation area was defined as street organic system.

DINAMISM



In the formulation of the design fiction, the term dynamism was extremely useful. Concepts like vibrant, lively, and motion were investigated in order to find a form. Combining the moveable and non-fixed asymmetrical portions of the shape examples revealed a dynamic form. The similarity of character in National Athlete built environment which are appropiate with Athlete character which are active and movable.

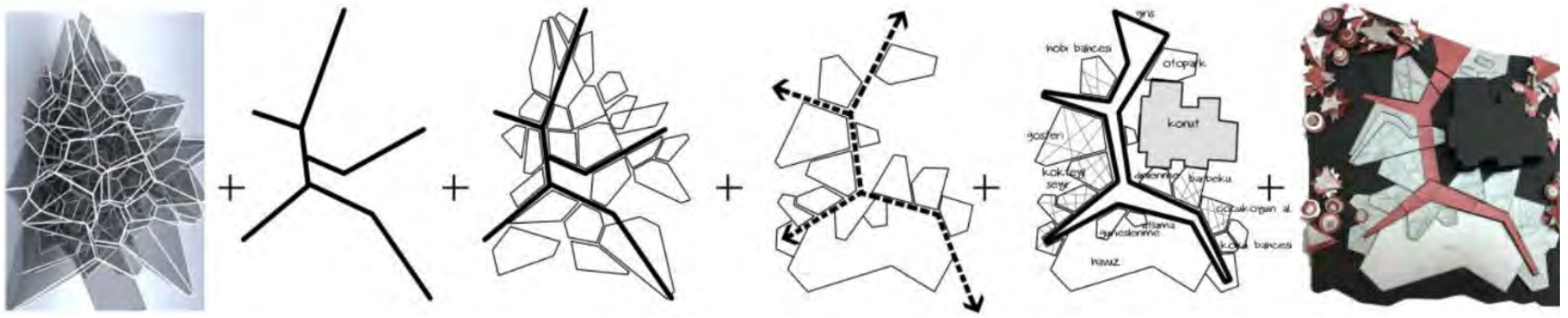
ETERNITY



inspired by the fact that the customers were interested in diving and described it as "the route to eternity." Pool looked for character examples regarding the inner structure of water to reflect the concept of infinity. The concept was molded with rounded outlines due to the tissue formed by the mixing of the drops. Water droplet-like structures were generated as a result of the phases. This type was supported by transportation networks that enabled delivery to locations and formed the main circulation.

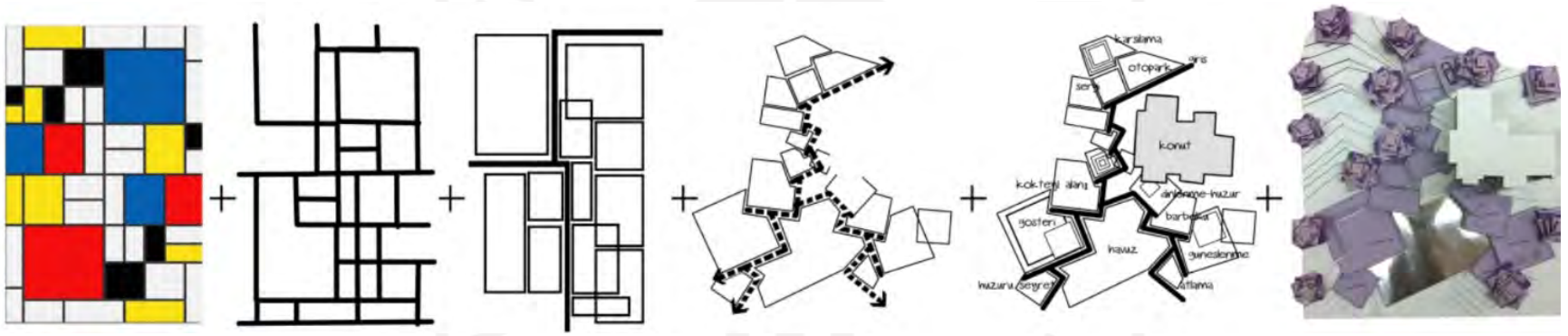
Figure 138. *Transformation from Concept to form in Landscape*
Source: Guneroglu, N., & Bekar, M. (proccessed on 19 May 2022)

RHYTHM



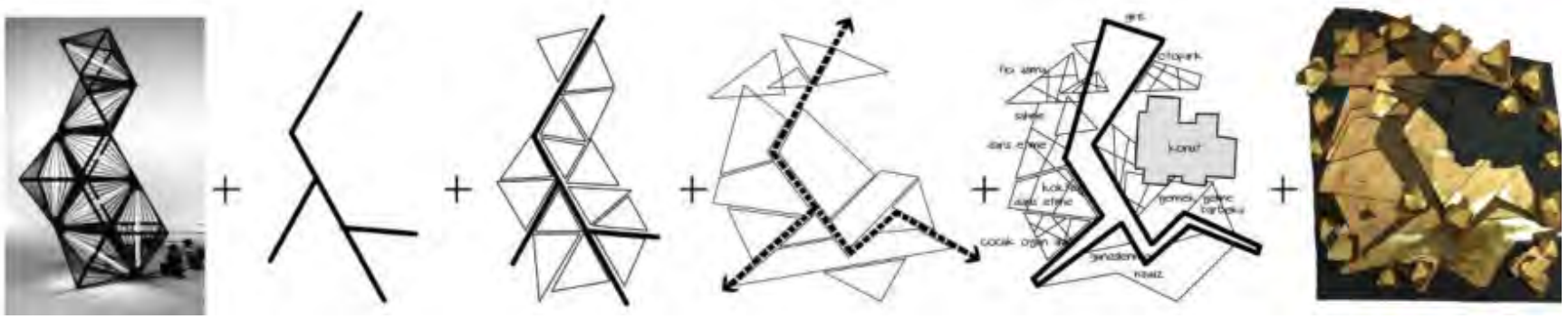
The user was a musician, the designer looked for a sample that matched the beat in the third example's concept and form creation. By reflecting the order in which the rhythm was formed, the harmony between the notes indicated the concept of having similar objects in terms of shape. The harmonic repetition of comparable form combinations resulted in the development of the rhythm concept into form. The sub-circulations of the transportation flow were conceived as rhythmical arms in the shape of a dancing human figure. The identified form was fictionalized as a series of rhythmic sections that followed each other, with similar activity areas placed close together.

PEACE



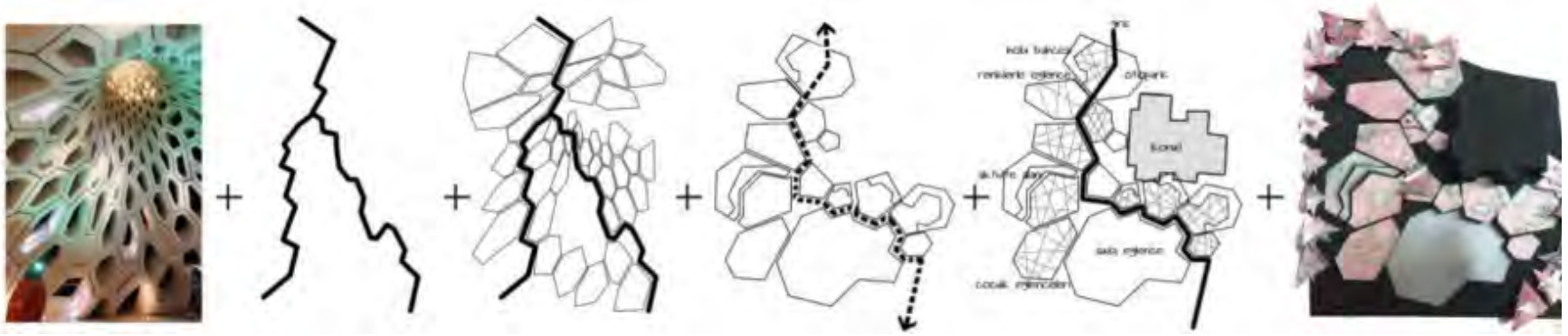
The user was a painter who finds calmness through painting, and rectangle and square canvas forms were employed to express the concept. To modify the order of the forms, the designer designed different orders. The sizes of the forms varied depending on the activities that would be carried out in the areas. The order of the colors on the palette indicated when the forms would arrive.

ENERGY



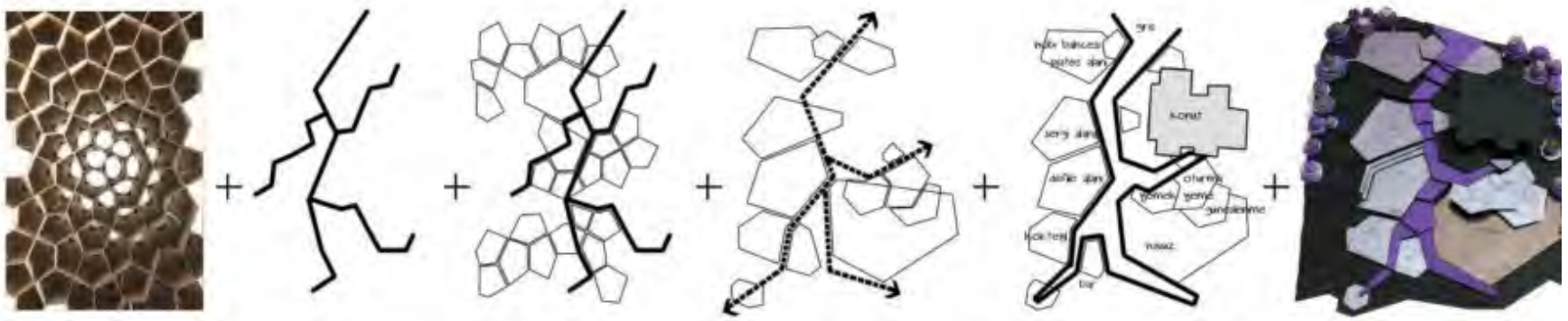
The dance's uneven lines were used to represent the excitement. The scenario's initial energy became meaningful through dancing were both changed into form through dance. The designer was drawn to examples affected by more formal geometric forms because of the sharp body shapes formed by the hand-arm, leg-foot, and torso in these dances. As a result, an abstract example was found that focused on triangular forms, and the energy notion was converted into forms.

ENTERTAIMENT



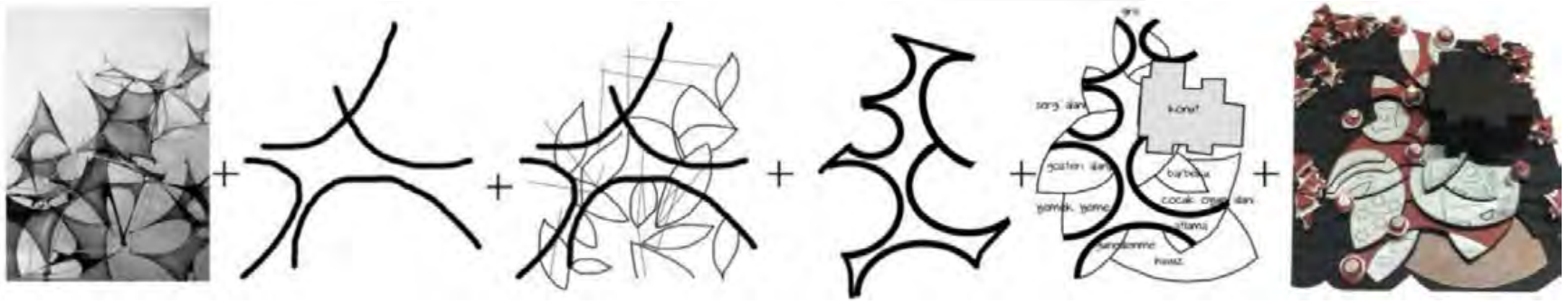
A character sample was found that demonstrated the person's excitement when the topic of entertainment was brought up. There were additional places developed that could be used simultaneously, in addition to specialized sport spaces for each individual in the house. After being abstracted, the relationship between the spaces was translated into a series of geometric forms.

SUSTAINABILITY



The fact that the user was environmentally conscious and created designs with natural themes. The designer was directed to the form of the honeycomb in order to contribute to sustainability by boosting the function of the pollen garden and bees in the ecosystem. The hexagonal forms were kept in the foreground of the design since the capacity of the activities made the size of the spaces evident. Podium, cocktail, and exhibition areas were built to showcase products made with natural ingredients and to host fashion displays at specific times. The hexagonal forms expressed the theme of sustainability throughout the process.

INTERSECTION



Instead of focusing on a core family as the user group, a packed family focused on the fact that the concept of family was made up of intersections and intended to define the concept with forms intersecting. In areas intersecting cross-space linkages, spaces suited for strengthening family engagement and bringing different generations to a common event were built. The junction of the activities led to the production of the shapes in this scenario. The concept was effectively transformed into form by the lines intersecting with the amorphous lines of the arc form.

BUILDING ENVELOPE: adjusting to the climate (heat & air comfort quality)

"Sustainable" Architecture is the movement that meets today's architectural needs, without jeopardizing the abilities of future generations. The need differs from one society to another, from one region to another (Steele, 1997). The community itself determines the best thing. Many papers focus the discussion on the building envelope, by varying the material, orientation direction, and color of the arrangement of the construction. It is only to obtain the effectiveness in the use of energy and thermal comfort in the indoor environment (Sadineni, Madala, & Boehm, 2011). The more surface area of the building will result in more energy cycles. The building envelope is an essential factor, too as part of the hardware to control (Wetter, 2011). According to Olgyay (2015), the level of productivity and human health is strongly influenced by local climatic conditions (Olgyay, 2015). If climatic conditions are by human physical needs, then the level of productivity can reach themaximum point. Similarly, the level of planting will reach optimal if climatic conditions also support achievement.

According to Lippsmeir (1994) the comfort limits for equatorial conditions are in the range of 22.5°C-29°C air temperature with 20 -50% air humidity (Carera & Prianto, 2016; Syah & Nugroho, 2013). Meanwhile, when compared to the baros fores mangrove site conditions, it includes a relatively high temperature at 28 degrees and a humidity level of 70-80%. This needs and can to be anticipated with an envelope design solution. It is further explained that the value of convenience should be considered with the possibility of a combination of radiation heat, air temperature, humidity, and air velocity (Bahrun, A.S., Ming, T. Z., Cinthya, A.,2019).

the fundamental heat flows from conduction, convection, and radiation is key to creating energy efficiency in buildings (Soares et al., 2013). Overall Thermal Transfer Value (OTTV), Building Shape and Orientation, Window Area (WWR), Glazing (SHGC and u-value), Shading Device, Light Shelf, Roof, Thermal Comfort, Infiltration

HEAT TRANSMITTION

In buildings dominated by external cooling loads, energy consumption for HVAC systems is primarily determined by heat transfer through building envelope components including (Zhao & Magoulès, 2012).

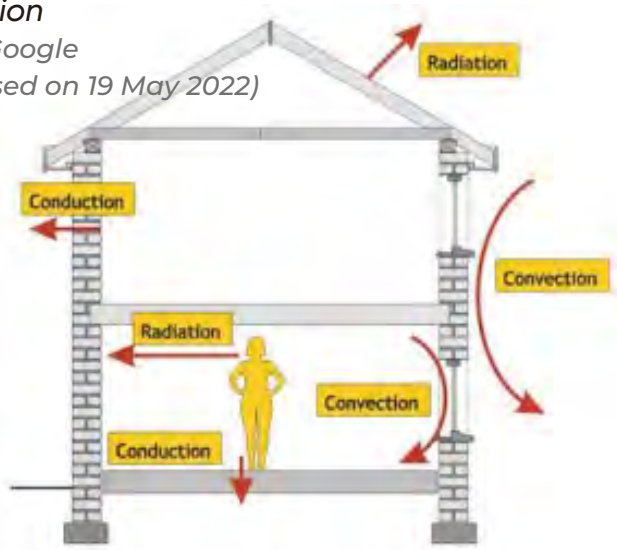
1. Heat transfer through windows,
2. Heat transfer through walls, Heat transfer through the roof,
3. Infiltration rate and exfiltration through cracks, windows, and door openings.

Several design principles can be applied to reduce heat recovery through building envelopes (Granadeiro et al., 2013).

1. Designing the shape and orientation of buildings to minimize exposure to the building envelope of solar and eastern sun radiation.
2. Reduced heat transmission through windows by reducing window area, providing an appropriately designed external shield and selecting glass material with low SHGC or SC values.
3. Reduced heat transmission through walls by using adequate insulation.
4. Reduced heat transmission through the roof with higher reflectivity, emissivity and insulation values.
5. Reduce infiltration and excitation by sealing the building tightly and controlling door and window openings.

Gorantla (2016) observed that for typical construction and building envelope materials, heat transfer through windows is approximately 40-130 times higher than heat transfer through walls (Kirankumar, Saboor, & Setty, 2016). Therefore, the control of heat transfer through the window to reduce the cooling load is an essential factor for the success of the overall passive design strategy.

Figure 139. *Building Shape and Orientation*
Source: Google
(proccessed on 19 May 2022)



BUILDING SHAPE AND ORIENTATION

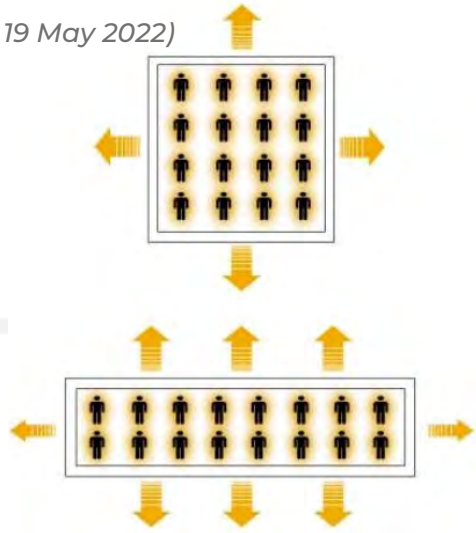
"Massing" is part of the design that determines the overall shape and size of the building. Is the building tall or short? Long or thin? Will it have a significant or more solid piece? Most successful use of common shapes and building sizes to minimize the energy load as much as possible and maximize the passive design of buildings where using free energy from sunlight and wind (Ballarini, Corgnati, & Corrado, 2014).

Sophisticated enrichment could be further away from this building's bulk to optimize heat or cooling gain (Ahn et al., 2014).

a. The roof can be tilted for optimal solar heating.
b. Discloses and overhangs can shade parts of buildings with other parts of the same building.
c. The aerodynamic curve can reduce heat loss due to infiltration.
d. The interior buffer zone can be placed on the west side of the building to protect the residential and work areas from the hot afternoon sun (e.g., ladders, toilets, and entrance corridors)
e. Directly facing south or 80° north-northeast

To avoid overheating of excessive solar radiation, the main surface of the building's envelope with windows is as far as possible oriented to the north and south (ValladaresRendóna, Schmid & Lo, 2016). The condition allows the window to get natural light also.

Figure 140. *Window Area*
Source: Google
(proccessed on 19 May 2022)



WINDOW AREA

The proportion of window width has a significant influence on the cooling load as it determines the total heat gain that goes into the building (Hee et al., 2015). The condition happens because the glass window can admit that the heat into the building is much higher than the massive wall. Therefore, the higher ratio of window to wall (WWR) area usually causes higher cooling load (Lee et al., 2013).

GLAZING

Based on their thermal properties, glass materials have different characteristics, depending on the nature of solar transmittance, solar absorption, solar reflectance, and visible transmittance. The thermal transmission characteristics of the glass material are measured from U-values, for conduction, and Solar Heat Gain Coefficient (SHGC) or Shading Coefficient (SC) for radiation. In this case, the value of SHGC = 0.86 SC (Lee et al., 2013).

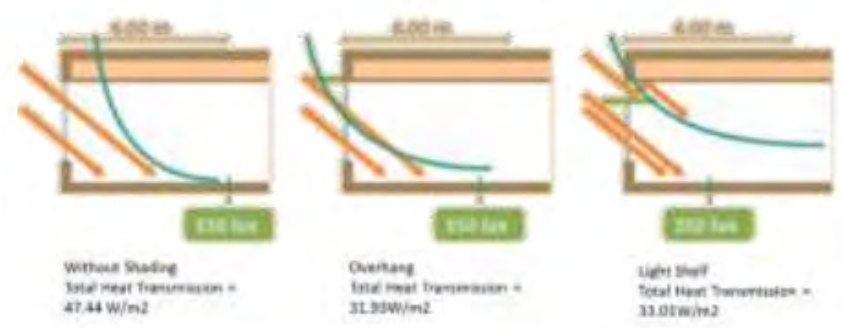
Single Glazing 8mm	*U-Value*	*Visual Transmittion %*	*SC*	*SHGC*
Clear	4,94	89	0,95	0,82
Color	5,18	55	0,51-0,57	0,44-0,49
Reflective	5,18	42-48	0,42-0,53	0,36-0,46
Low	4,54	35-67	0,40-0,69	0,34-0,59

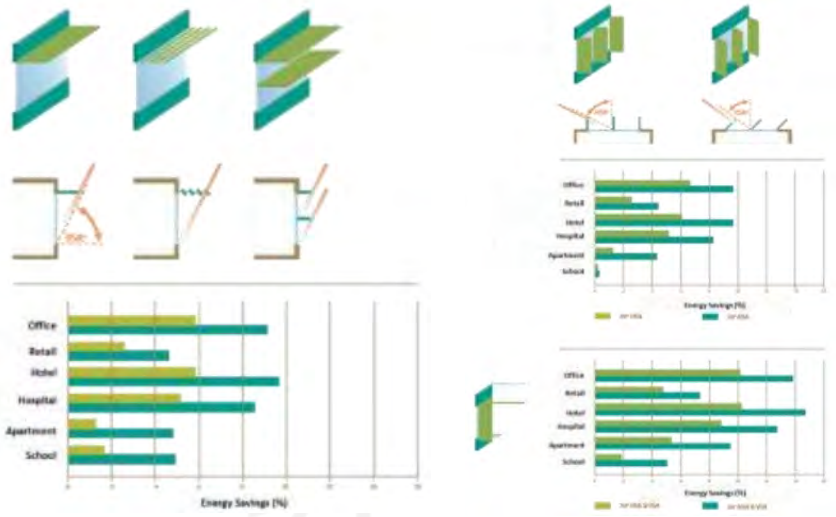
INTERNAL SHADING DEVICE

The internal shade (curtain) retains solar radiation after passing through the glass window and prevents the occurrence of direct solar radiation concerning the occupants and the deeper interior (Gago et al., 2015). However, internal shading is not as effective as external shade in reducing cooling loads. Bright colors from internal shading with reflective layers are more effective than dark colors because more heat is reflected out through the window glass. It can be distinguished as roller shades, horizontal blinds, vertical blinds, and curtains.

LIGHT SHELF

Light Shelf is a horizontal element that divides the window into two parts. Upper window for natural lighting and lower window for vision In addition to functioning as a lower window shade, the reflector of light also serves to reflect sunlight coming from the top of the window to help penetrate natural light into the room away from the window.





INTERNAL SHADING DEVICE

The external shade is more effective, reducing solar thermal gain than the internal shade because it can block solar radiation before it reaches the building envelope. The external shade needs to be carefully designed not only to reduce the cooling load but also to create an aesthetic architecture while taking into account the natural lighting performance (Huang, Niu, & Chung, 2103). The geometry of the shading device should be designed according to the path of the sun movement, which led to the design of different shapes and sizes for different orientations. In general, horizontal shading devices are more suitable for windows with south and north orientation, where the angle of sunlight arrives relatively high.

WALL

The building wall generally consists of several layers of material with different thickness and thermal properties. The combined value of conductance (k) and resistance R-value of each material layer determine the overall thermal properties of the wall, which can be represented by the U-Value (Ficco et al., 2015).

ROOF

To minimize the increase of heat through the roof, materials with high reflectivity and emissivity should be selected (Dabaieh et al., 2015).

FACTOR AFFECTING THERMAL COMFORT

The six factors that affect thermal comfort include environmental and personal factors. Environment Factors: Air Temperature, Radiant Temperature, Air Velocity, Humidity. Personal Factors: Cloth Isulation (Clo), Metabolism (Met).

1. Air Temperature

Air temperature measured by a thermometer is an essential element of weather. This weather element changes according to place and time. The place is open; the temperature is different from the place, as well as in different grass areas with a barren or paved road and so forth. Air temperature measurements only obtain one average value from the atmosphere. To get the average temperature can be calculated by adding the maximum temperature (Tmax) with minimum temperature (Tmin) then divided by two (Perini & Magliocco, 2014).

2. Radiant Temperature

Radiation temperatures have a significant influence over the air temperature associated with loss and addition of heat to the environment (Tan, Wong & Jusuf, 2014).

3. Air Velocity

Wind movement can help cool it if it is colder than the environment Airflow velocity is also an essential factor in thermal comfort because people are sensitive to it. Air movement in hot or humid conditions can increase heat loss through convection without changes in air temperature (Maimaitiyiming et al., 2014). Limited air movement in cold environments can be felt as airflow. If the air temperature is lower than the skin temperature, this will affect increasing the heat loss of convection. Physical activity can also improve air movement.

4. Air Humidity

If the water is heated and will evaporate into the environment. Air humidity is the ratio between the actual amount of water vapor in the air with the maximum amount of water vapor in the air at the same temperature. Air humidity between 40% and 70% does not significantly affect thermal comfort (Amara et al., 2015).

KINETIC FACADE

optimizing occupant comfort by using daylight is challenging because there are two distinct spaces including interior (inside) and the environment (outside), which are interacting together. Furthermore, optimizing visual and thermal comfort is difficult due to conflicts between them. The façade is a complex interface between inside of buildings and the outside environment that has the capability to function as a protective or regulatory element against severe fluctuations of external. Kinetic concept can be a significant strategy for optimizing regulatory function of façade which needs to respond to different stimuli for meeting occupant comfort.

FORM AS MICROCLIMATE MODIFIER

Regulatory function of façade benefits from modifying microclimate in ambient environment by controlling airflow, solar radiation across the facade body resulting in adjusting surfaces temperature of the building nearby the interior spaces. Although Herzog et al., (3 p.18–21) refer to vegetation and bodies of water as measures influencing the microclimate, exploring traditional courtyard building characteristics, as a microclimate modifier, reveals several courtyard elements which significantly affect microclimate.

a. State of the Arts
b. Kinetic Concept
c. Indoor Comfort
d. Passive Strategy and Active Technology
e. Net Zero Energy
f. Parametric Modelling

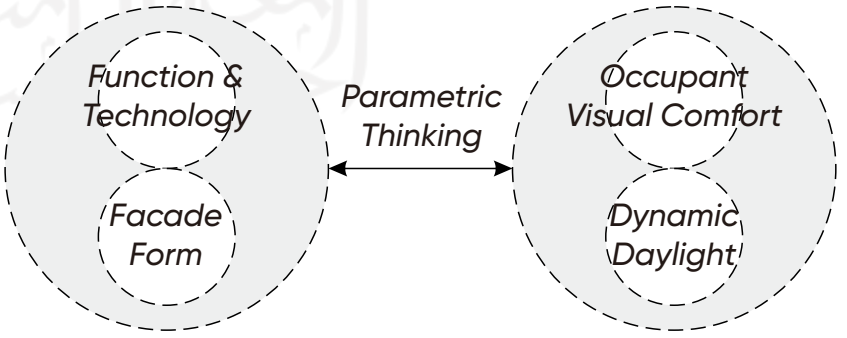


Figure 141. Parametric Thinking Diagram
Source: Author
(proccessed on 19 May 2022)

S. M. HOSEINI, et al (2019) KINETIC FACADE ANALYSIS

Analyzing kinetic façade regarding interactivity and indoor comfort condition by movement types and characteristic element.

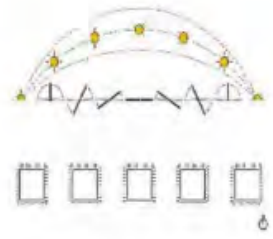
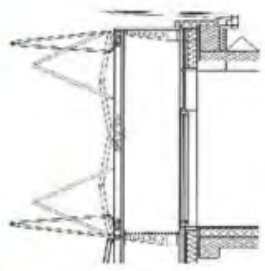
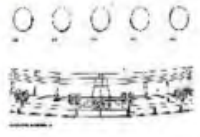
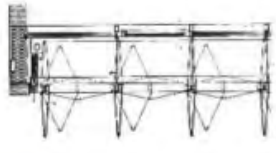
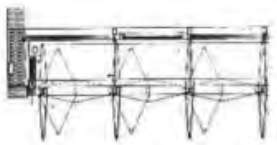
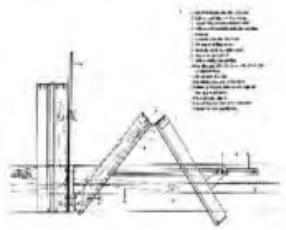
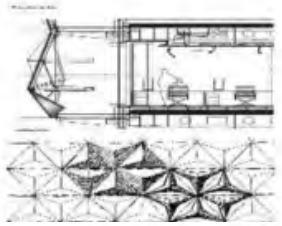
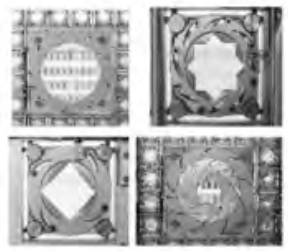
Project Name	Year	Climate	Characteristic element	Detail	Movement type	Scale of kinetic element	Function	Indoor environment quality
Manitoba Hydro	**2009**	**Dfb**			**F**	**LEF**	**IDD, IW**	**DP, CSH, AMNV**
Thyssen Krupp Cube, Q1	2010	Cfb			F, P	LEF	IDD	RG, DP
Kiefer Technic Showroom	2007	Cfb			Fo	LEF	IDD, IFS	DP, CSH
EWE Arena	2005	Cfb			S	PF	GEF	DP
House at the Milsertor	2008	Dfb			Fo, S	LEF	IDD	DP

Figure 142. Transformation from Concept to form in Kinetic Building Envelope
Source:pure.tue.nl/ws/portalfiles/ (proccessed on 19 May 2022)

House at the Milsertor	2008	Dfb			Fo, S	LEF	IDD	DP
St. Ingbert Town Hall	2009	Cfb			Fo, S	LEF	IDD	DP, CSH
Al Bahar Towers	2012	BWh			Fo, EC	LEF	IDD	DP, RG, CSH
Institut du Monde Arabe	1987	Cfb			R	LEF	IDD	DP
SDU Campus	2014	Cfb			F	LEF	IDD, IFS	DP, CSH
Sharifi-Ha House	2013	Csa			R	PF	ISC, IFS	DP, CSH

Climate_ Dfb: Humid continental, Cfb: Temperate, BWh: Warm desert, Cfb: Marine West Coast, Csa: mild, semi-humid; Movement type_ F: Flap, Fo: Fold, R: Rotate, P: Pivot, S: Slide, EC: Expand & Contract, PH: Pneumatic or Hydraulic; Scale of kinetic element_ WF: The whole facade as one piece, PF: Parts or volumes in the façade, LEF: Larger element in façade, SEF: Small elements in façade; Functions_ IDD: Interactive to dynamic daylight, IHM: Interactive to human movement, IW: Interactive to wind, GEF: Generating energy in façade, ISC: Interactive to seasons change, IFS: Interactive functional scenarios; Indoor environment quality_ RG: Reducing Glare, DP: Daylight Performance, CSH: Control Solar Heating, AMNV: Air Movement & Natural Ventilation.

BUILDING CONSTRUCTION: modular & deployable (decomposable system) floating structure

MODULAR DESIGN STRUCTURE

In order to more effectively organize complicated designs and processes, modular design fundamentally involves breaking complex systems down into manageable modules. The designer can easily adjust each module rather than modifying the entire design because the components are grouped into each module. Additionally, to expand the system within a certain range, additional functionalities can be added by simply plugging in a new module to the system. e. Furthermore, concurrent engineering and flexible manufacturing are made possible by the modularized components. By achieving economy of scale, customizing a wide range of highly demanded products becomes practical (Mitchell M. Tseng, et.all., 2018).

PART OF MODULARITY

A physical or conceptual collection of components is called a module. The idea of modularity is the division of a system into separate components or modules that can be handled as logical pieces (Pimmler and Eppinger, 1994). According to Simon (1981), complicated design issues can be explained in terms of hierarchical structures made up of "almost decomposable systems" that are arranged so that only weaker interactions take place inside and between groups.

REQUIREMENTS

By describing the functional requirements of product design in terms of exchanges of energy, materials, and signals between functional elements arranged in hierarchical functional structures, Pahl and Beitz (1996) and Suh (1990) elaborate on these ideas. Three problems with modular design are module identification/creation, interface evaluation/analysis, and module configuration/selection.

A typical four step process to establish modular architecture is proposed in (Ulrich and Eppinger 2000).

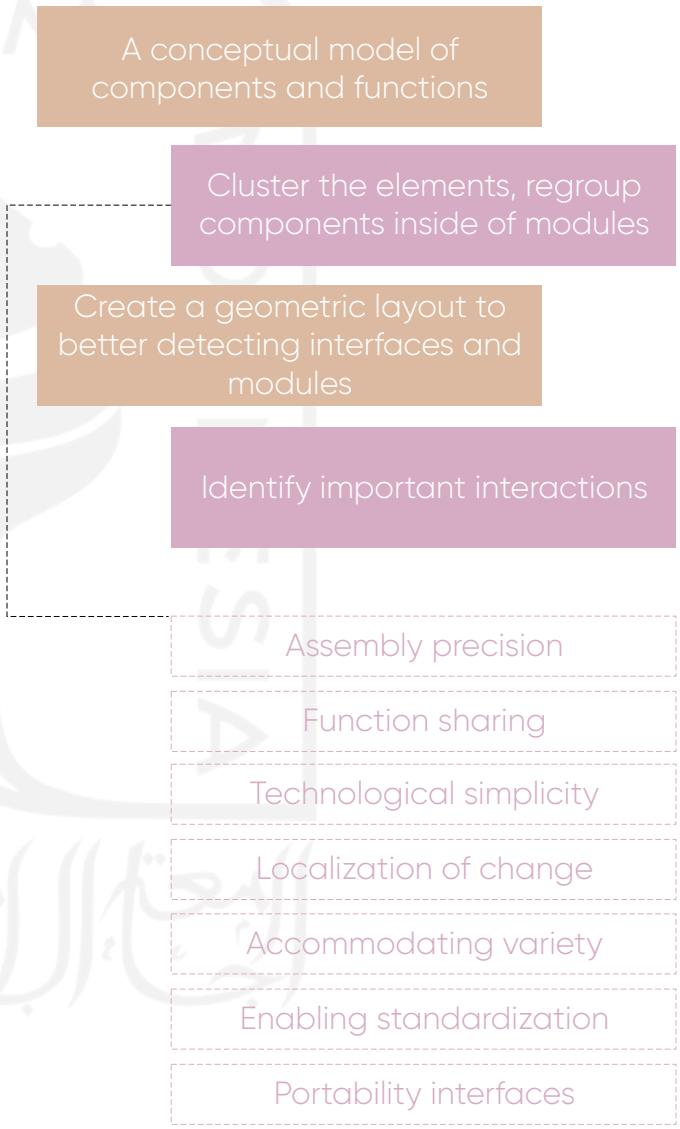


Figure 143. Step Proccess in Making Modular Construction
Source:researchgate.net/publication /323834472_Modular_Design/ (proccessed on 27 June 2022)

MODULAR DESIGN CLASSIFICATION

Building systems can be categorized into

1. Frame or post and beam system, the truss system is generally in buildings that require spans wide.
2. Panel system, used for buildings where the load is on the floor and walls, widely used in high rise buildings, hollow panels form, widely used in interior and exterior.
3. Box system, The box system considers the availability of high technology (heavy equipment, transportation routes).

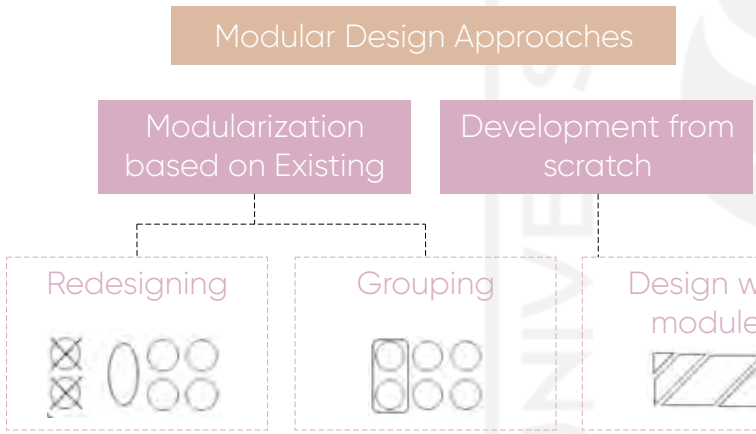


Figure 144. *Three modular design approaches: redesigning, grouping and design with modules*
Source:researchgate.net/publication/329460155_Modular_Design_Guideline_for_Projects_from_Scratch/ (proccessed on 27 June 2022)

MODULAR DESIGN STEP

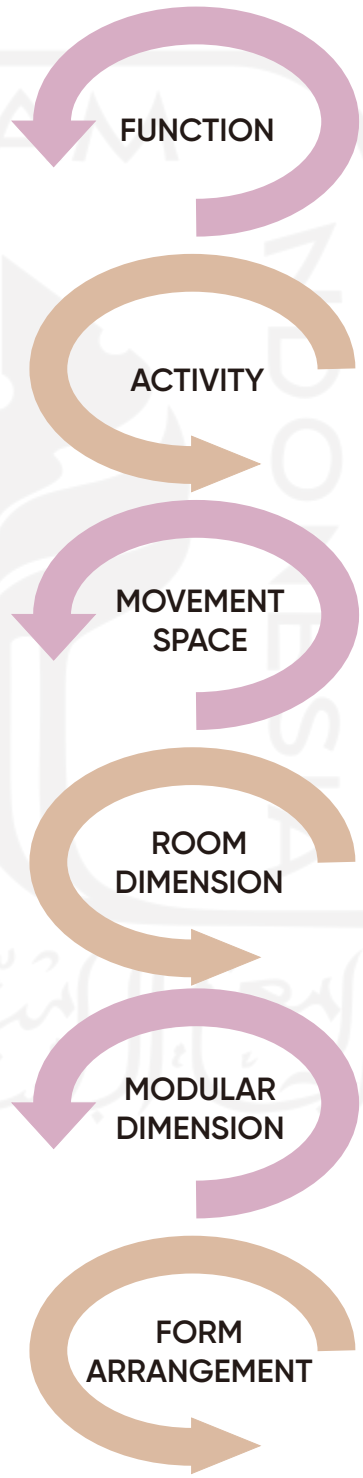
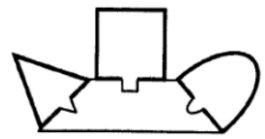


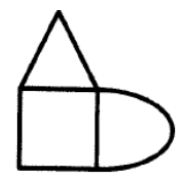
Figure 145. *Step developing modular design*
Source: Author (proccessed on 27 June 2022)

1. Slot Modular Arch.
unique interfaces for attachment to a base element.



2. Bus Modular Arch.
common interfaces for attachment to a base element.

3. Sectional-Modular
common interfaces between elements without a base element.



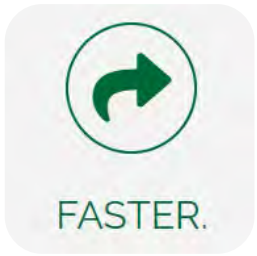
MODULAR CONSTRUCTION ADVANTAGE

Using the same materials and conforming to the same norms and standards as conventionally built structures, modular construction is a procedure in which a building is erected off-site, under controlled factory settings, in about half the time. Buildings are made using prefabricated "modules" that, when assembled on site, represent the exact architectural intent and requirements of the most advanced site-built building, without any compromise.

Greater Flexibility and Reuse
disassembled and the modules relocated or refurbished for new use, reducing the demand for raw materials and minimizing the amount of energy..

Less Material Waste
waste is eliminated by recycling materials, controlling inventory and protecting building materials.

Improved Air Quality
using dry materials, the potential for high levels of moisture being trapped in the new construction is eliminated.



Safer Construction
reduces the risks of accidents and related liabilities for workers.

Better Engineered Building & BIM
visualization to assess the energy performance and identify the most cost-effective efficiency measures.

Limitless Design Opportunities
Modular units may be designed to fit in with external aesthetics of any existing building and modular units, once assembled, are virtually indistinguishable from their site-built counterparts.

MODULAR CONSTRUCTION TYPES

1. Permanent Modular Construction (PMC)
an innovative, sustainable construction delivery method utilizing offsite, lean manufacturing techniques to prefabricate single or multi-story whole building solutions in deliverable module sections.

2. A Relocatable Building (RB)
a partially or completely assembled building that complies with applicable codes or state regulations and is constructed in a building manufacturing facility using a modular construction process.

DEPLOYABLE STRUCTURE

Adrover, S. R., 2015 in his book explain about deployable structures can expand and contract due to their geometrical, material and mechanical properties, offering the potential to create truly transforming environments. These structures are sometimes referred to as foldable, reconfigurable, unfurlable, auxetic, extendible or expandable structures.

It would seem that deployable structures offer great potential for creating truly transforming, dynamic experiences and environments. Their lightness and transportability allow them to adapt to a society and nature that is constantly evolving and changing.

TWO DISTINCT APPROACHES

Regarding creating a deployable. The first is based on the deployable mechanism's structural components; structures that use this method are categorized as structural components. The second is primarily concerned with movement and form that draws inspiration from diverse sources; generative technique is used to define these structures.

Two general types of Structural Components have been identified by experts in this field. These are Rigid Component Deployables and Deformable Component Deployables (You, 2006).

Other structural typologies cannot be classified within these two main existing types, thus other main types are created, Flexible Deployables and Combined Deployables.

EXAMPLE OF DEPLOYABLE PLANTS CONCEPT

Some plants' shape and motion can serve as an inspiration for biomimetic deployable concepts, which may also include reversible and irreversible movements. A bird landing on a flower, for instance, could trigger the deployment in some circumstances. Strelitzia reginae is a species that contains this mechanism.

1. Geometry of unfolding tree leaves
H. Kobayashi, B. Kresling and J. F. V. Vincent

A leaf has a corrugated appearance due to the array of parallel secondary veins that are divided symmetrically by a straight primary central vein. The angle between the primary vein and secondary veins gradually increases from 30 to 50 degrees toward the petiole (stalk) of the leaf in both hornbeam and beech leaves, with an average angle of 40 degrees. The biological processes of nutrient absorption and support by the leaf may be connected to this straightforward and uncomplicated geometrical design.

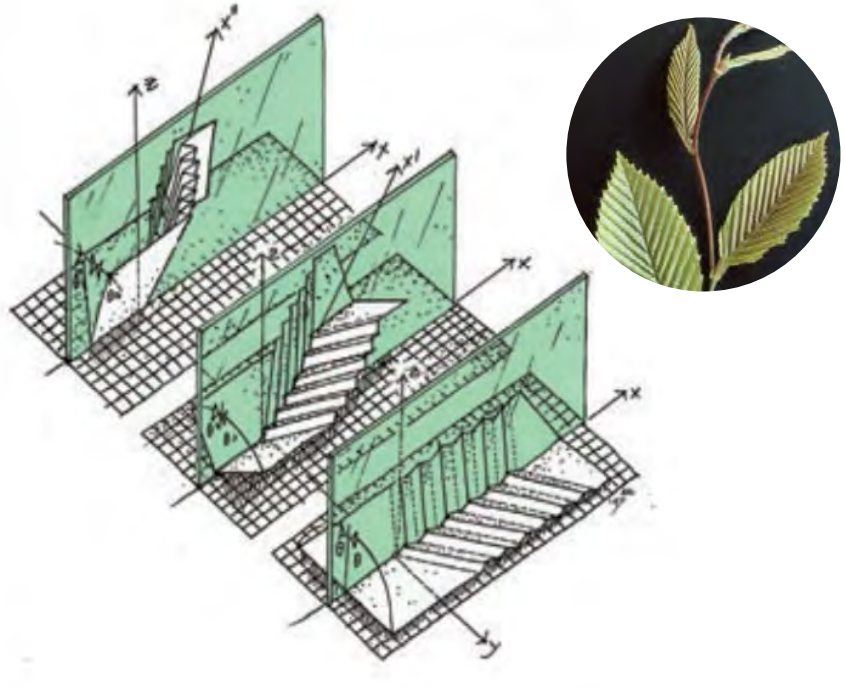


Figure 146. Displays the opening sequence of the corrugated leaves
Source: Adrover, S. R., 2015
(proccessed on 27 June 2022)

2. Elastic Kinematics Concepts for Adaptive Shading Systems

Simon Schleicher, Julian Lienhard, Simon Poppinga, Tom Masselter, Thomas Speck, Jan Knippers and Markus Milwich

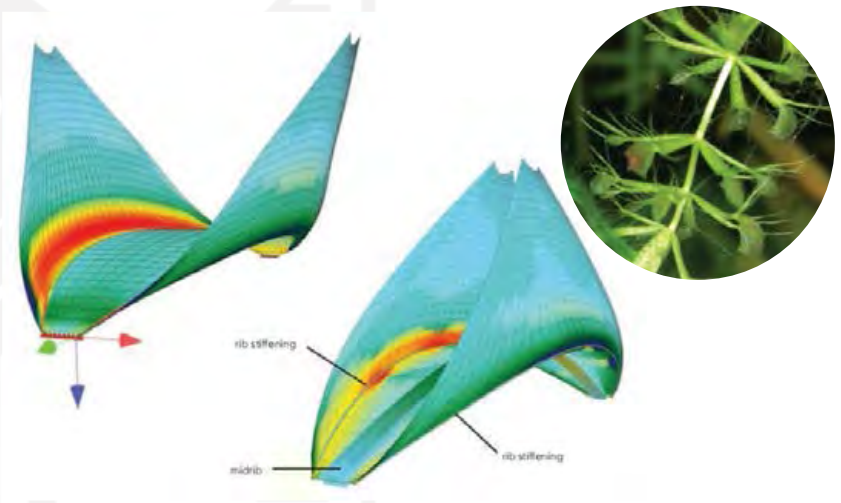
a novel elastic mechanism inspired by plant biomimetics that can be used as shading for facades. Plants have special anatomical and morphological characteristics that allow them to bend with a high degree of flexibility while retaining their structural stability. The following two case studies, one of a flower opening and the other of a leaf folding.

Abstraction of the Elastic Kinematics of Strelitzia reginae

In order to reach the nectar, the birds land on the flower perch, made of two jointed petals or fl aps. The weight of the bird causes the petals to bend downwards and sideways, revealing the anthers and the style (male and female sexual organs), while the pollen sticks to the bird. Once the bird leaves the flower, the open perch returns to its original closed state due to its elastic morphology.

Abstraction of the Curved-Line Folding Elastic Kinematics of Aldrovanda Vesiculosa

Free-floating aquatic plant with a fascinating trap mechanism that captures small aquatic invertebrates. The traps are arranged in whorls around its central free-floating stem. A very small linear displacement actuates the complex deformation of multiple surfaces.



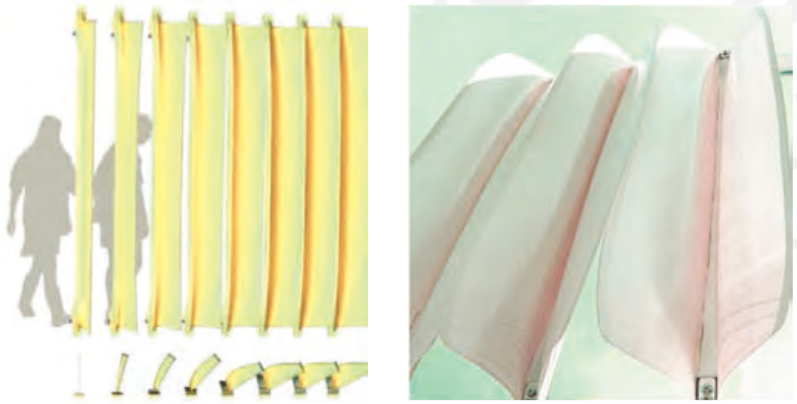


Figure 147. *Adjustable shading made with fins*
Source: Adrover, S. R., 2015 (proccessed on 27 June 2022)

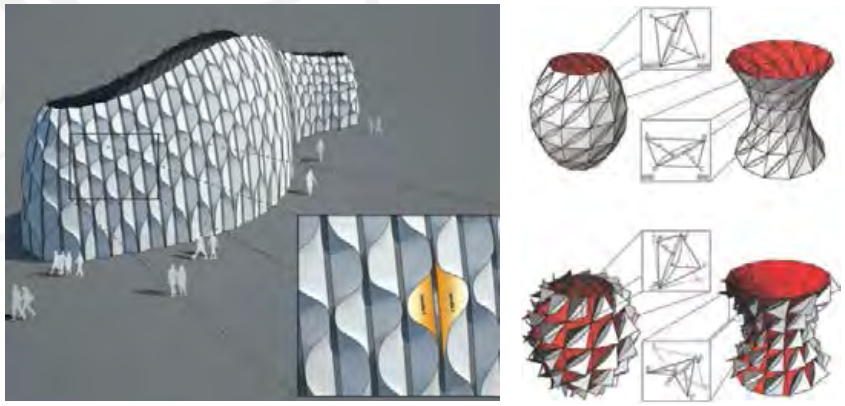


Figure 148. *Implementation of curved and bending component*
Source: Adrover, S. R., 2015 (proccessed on 27 June 2022)

FLOATING STRUCTURE

According to A.A. El-Shihy, J.M. Ezquiaga (2019), the portability, dynamic geography, development, survival/durability, security, and water life are the most important goals identified for coastal area. A fully self-reliant community from the outside will result if such elements are incorporated with energy and food production in any design. The design respond should include anwering the problem of wave behaviour.

The main goal was to maintain the coastal sovereignty of the Baros while providing a self-sufficient platform to make up for the sunken areas rather than recovering it using antiquated and conventional methods.

1. Foams
In order to build or mark a fish farm, floating structures like buoys are employed. To make a farming structure float in the sea, cylindrical floating structures are hung with agricultural structures like nets or ropes. In several sectors of the marine goods industry, adhesion organisms like laver, brown seaweed, or oysters are raised in seawater on floating platforms (Niaounakis, M. 2017).

2. Mooring
The station system of the mega-floating structure could be categorized into two main approaches. The chain/cable, the tension leg methods, the pier/quay wall, the pile-type dolphins-foreguide with rubber fender system (C.M. Wang, Z.Y. Tay, 2011). The dolphin system to be the most suitable for growing while only using the hexagonal modules while the squared modules can only expand in linear way.

3. Sitting
Modular platforms could help in expansion strategies, movability in case of emergencies, and creating ordered formations.

4. Structure and stability
The floating structure must be appropriate for the sea-site and avoid harmful.

5. Platform size
Subjected to social needs, functionality, site properties and further aspects such as financial and structural boundaries. Findings show that optimum platform size varies between 45 and 75 m for structural stability and safety purposes.

6. Expanding dynamics and growth strategy
7. Pathways and wave attenuators
8. Material
The selected materials (concrete, steel, and composite materials) are analyzed in terms of maintenance, cost, weight, and stability.

9. Safety Equipment
10. Fire Fighting Equipment
11. Minimum Water Depth 1m
12. Balustrade and Handrail
13. Non-slip Surface

MATERIAL: highly anti corrosion, renewable, and locality

WOOD AS BUILDING MATERIAL

Wood is a forest product from natural resources, is a raw material that is easily processed to make goods according to technological advances. Wood has several properties at the same time, which other materials cannot imitate. The definition of wood here is a material, which is obtained from the result of collecting trees in the forest, which is part of the tree, after calculating which parts are used more for something the intended use. Good shaped carpentry, wood industry and firewood (Dumanauw.J.F, 1990). Wood comes from various types of trees that have different traits. some properties that are common to all types of wood.

1. Wood is composed of cells that have various types and the composition of the cell walls consists of compounds chemical form of cellulose and hemi cellulose (carbohydrates) as well as lignin (non-carbohydrate).
2. All wood is anisotropic, i.e. exhibits different properties when tested in three directions (longitudinal, radial and tangential).
3. Wood is a hygroscopic material can absorb or release moisture content (moisture) as a result of changes in humidity and air temperature in the around him.
4. Wood can be attacked by pests and diseases and can burns, especially when dry.

Building wood is divided into 3 (three) usage groups.

1. Structural Building Wood, building Timber used for structural parts. Buildings and their use require calculations burden.
2. Non-Structural Building Timber, building Timber used in the Building section, whose use does not require load calculations.
3. Building wood for other purposes

RIZOPHORA, SPP. AS BUILDING MATERIAL

1. Physical Characteristic

Tree height up to 20 m, trunk free branches 2-15 m, diameter up to 50 cm, buttresses 1 m high, rooted breath that is up to 30 cm high rises upright above ground level. The outer skin is gray or dark brown to black, shallow grooved, slightly peeling deep big and thick sheet. Class III wood with dry density in air 0.60-0.40, Flexural strength (kg/cm2) 725-500, Compressive strength (kg/cm2) 425-300. Hygroscopic is the property that data absorbs or releases water or moisture. Rough wood-Slightly smooth texture. The specific gravity is relatively light < 0.60 kg. Resistant hardness is related to wear, abrasion, scratching. Wood will expand if the water content rises and shrinks if the water content decreases, the average size is expansion and contraction in the tangential direction is 14%, radial direction 28%, and axial direction 0.1 0.2%. The impression of touch is slippery.

2. Mecanical Characteristic

The tensile strength of wood is high at 300 N/mm2. The compressive strength parallel to the fiber is 15 times the vertical compressive strength straight fiber and the magnitude is between 25 – 95 N/mm2, while the compressive strength perpendicular to the fiber varies between 1 – 20 N/mm2. Transverse shear strength is 3-4 times greater than shear strength axial. Has static bending strength. Parallel low split strength fiber (easy to split). Wood has a lower MOE than other materials, but when viewed from its density, the value of its elasticity is comparable to that of steel. The energy absorbed by the wood is greater at the load shock than static loads, on dynamic load girders can be carried twice the static load.

Advantage (+)
1. Wood is easy to work with so that the time relatively short, the price is more economical, and there are still many on the market.
2. The quality of the wood can be seen visually.
3. Wood is more resistant to pressure and bending.
4. Can filter salt from sea water.
5. a lifespan of 10-15 years of use

Lack (-)
Wood cannot be fully utilized so that the rest of the use of wood only becomes waste.

Mangroves commonly used for foundations are.

1. Shallow foundation

Shallow Foundation is called Foundation shallow due to the relative depth of ingress into the ground shallow, only a few meters into the ground. The function of the shallow foundation is to carry the load from the walls and columns of the building to the hard ground. Foundation Shallow can be divided into several types.
a. Local Foundation (Single Footing)
b. Continuous Footing (Continuous Footing)
c. Plate Foundation (Plate Foundation)
d. Chicken Claw Foundation
e. Cobweb Foundation

2. Deep foundation (deep foundation)

Deep foundation is the structure under a construction which serves to transmit the construction load to the a layer of hard soil that is far from the soil surface. Bored Pile foundation and pile foundation.

The high level of criticality of mangroves can be caused by several factors including overexploitation. Mangrove exploitation is related to the need for raw materials. For this, it needs to be balanced by planting and using solutions for mangrove management.

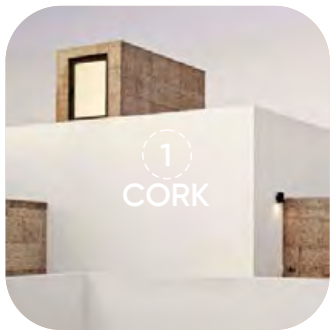
PRE-FABRICATED AS BUILDING MATERIAL

Prefabricated building materials are used for buildings that are manufactured off-site and shipped later to assemble at the final location same of the commonly used prefabricated building materials are aluminum steel, wood, fiberglass and concrete. This is to protect the building against corrosion rust and fire. It also provides a sturdy and protective covering to the prefabricated building. Prefabricated, building materials used for small prefabricated buildings are steel, wood, fiberglass. Plastic or aluminum materials. These materials are cheaper than regular brick and concrete buildings. Materials like steel, fiberglass, wood and aluminum.

Figure 149. Types of Pre-Fabricated as Building Material
Source: Author
(proccessed on 27 June 2022)

BIODEGRADABLE AS BUILDING MATERIAL

It is disposed of in a landfill, as is the case with the majority of non-recyclable garbage, and landfill land is becoming an increasingly rare resource. An easy and economical strategy to encourage eco-friendly architecture is to use biodegradable materials in building. This the example of 8 biodegradable materials that could be found in near site.



The cork tree is not harmed in any way during the cork harvesting process, grows back after 10 years. As a fire retardant, acoustic insulator, and exceptionally waterproof material.

Its sustainability credentials than for the material's aesthetic characteristics. Bamboo is two to three times stronger than steel and can grow up to four feet per day. It also regrows after being harvested.

A concrete-like composite product made from plenty of desert sand. It can decompose also be gathered and reused for several life-cycles, which reduces material use, unlike concrete, which cannot biodegrade.

Linoleum is totally made of natural resources, including linseed oil, natural resin, pulverized cork dust, wood flour, and powdered limestone, as opposed to vinyl, which is formed of a synthetic mixture of chlorinated petrochemicals.

We must both cut back on consumption and develop cleaner options as plastic builds up in our rivers and oceans. Bioplastics degrade far more quickly than synthetic plastic at a rate comparable to that of paper, producing biomass in the process.

The treatment of timber used in building must be taken into consideration because a significant portion of it may become "special waste" that needs additional processing before being disposed of.

The vegetative portion of the fungus, known as mycelium, is made up of numerous intertwined threads that the spores develop, making it an extraordinarily strong material when dried.

Figure 150. Biodegradable Materials
Source: Archdaily.com
(proccessed on 27 June 2022)

WATER IRRIGATION SYSTEM: water sensitive and sponge for brakish and fresh nursery water

WHAT IS WATER SENSITIVE?

The water aspect was always significant and had a big impact on how the project looked and who the characters were, whether it was near rivers or the seashore. Water Sensitive is focused on using water more wisely and integrating the water cycle with the built environment. It depends on respecting one of the most essential environmental natural resources, water.

WATER SENSITIVE APPLICATION PRINCIPLES

There is some challenges for this approach such as (Shutes & Raggatt, 2010).
1. Lack of Implementation
2. Missing or Lacking Integrated Approaches
3. Lack of Knowledge, Acceptance and Awareness

a group of principles for a successful water sensitive.

1. Water Sensitivity
should use decentralised methods to bring the water management closer to the natural water cycle.
2. Aesthetic
provide an aesthetic benefit where possibble and adapted and integrated to surrounding area.
3. Functionality
Consider the corresponding maintenance requirements and adaptability for changing basic conditions.
4. Usability
create places that are usable for recreation and/or nature conservation purposes.
5. Public Perception and Acceptance
consider demands of all stakeholders and involve them. The cost shoud comparable to conventional.
From Shutes & Raggatt (2010).

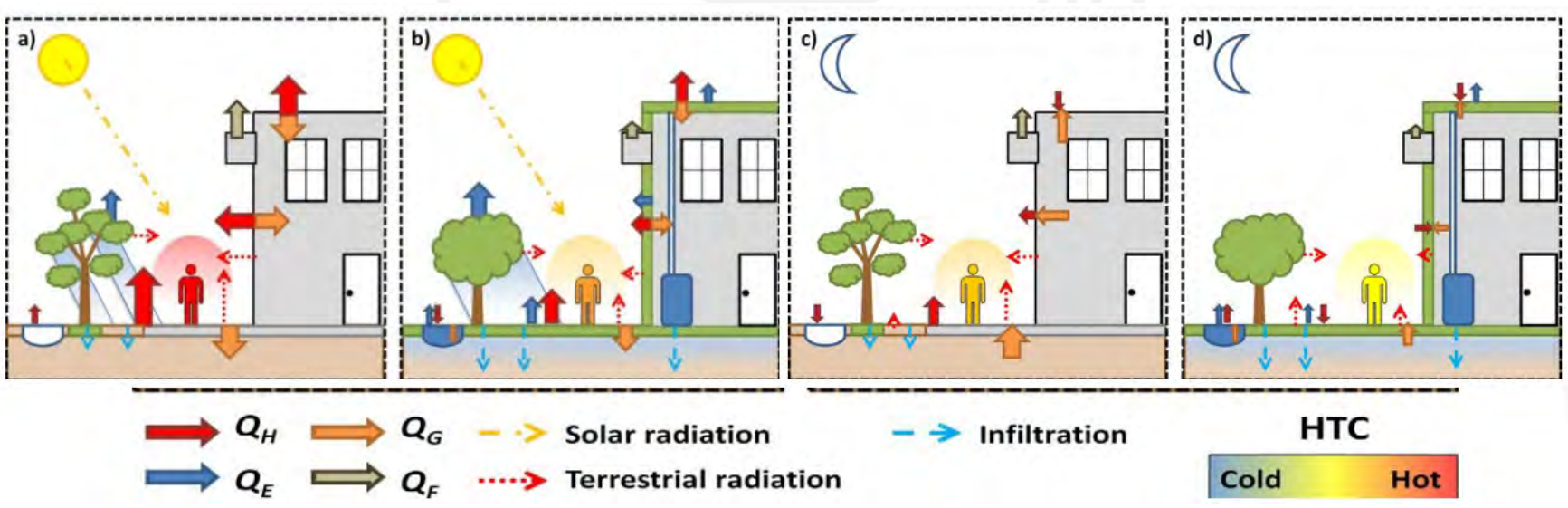


Figure 151. *The formation of urban micro-climates during summer for convential water limited*
Source: Oke (2009) & Nassar U., Waseef. A., Hosam.S.M (2017)
(proccessed on 27 June 2022)

WATER SENSITIVE PARAMETER AND INDICATOR

These solutions/measures were developed to adapt with specific stormwater management needs and site opportunities (Hoyer et al., 2011). Objectives and benefits of Water Sensitive can't be achieved simply by constructing a lake or wetland structure.

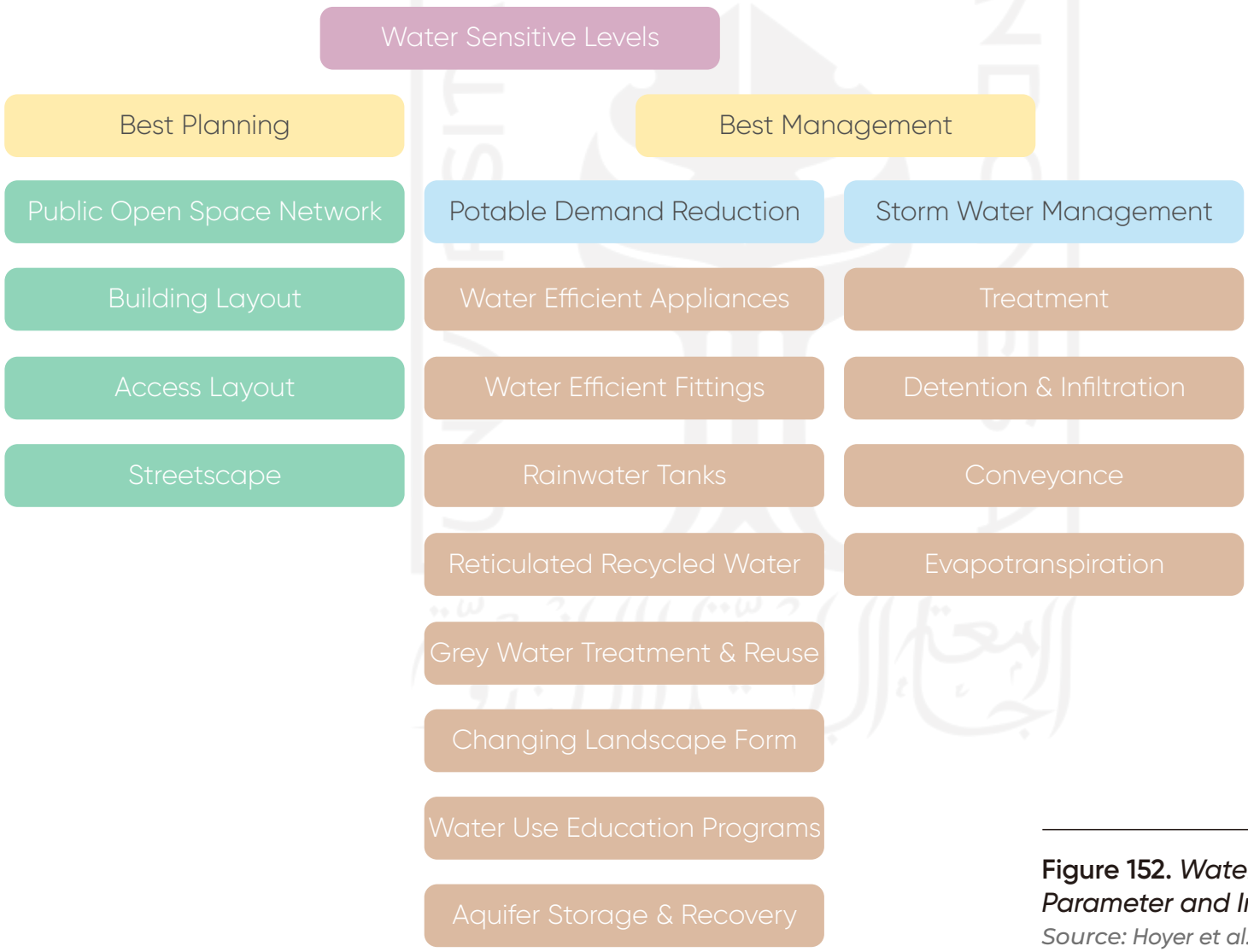


Figure 152. *Water Sensitive Parameter and Indicator*
Source: Hoyer et al. (2011); BMT WBM Pty Ltd. (2009)
(proccessed on 27 June 2022)

WARM LIGHTING: Maintaining Room Temperature at Night for Nursery

LIGHTING INFLUENCE

Lighting is a fundamental component of nursery spaces. The parameters affected by lighting include the optimal visibility of all information to the community and visitor, the mood or behaviour, and the growth ability in order for the maximizing the room temperature performance. A significant amount of research has focused on the effects of lighting in the nursery environment. Thus, it can be assumed that these effects already identified may also apply to the nursery setting.

The two most important characteristics of light that must be considered regarding human perception are correlated colour temperature (CCT) and illuminance level (Shamsul, B.; Sia, C.; Ng, Y.; Karmegan, 2013).

According to Yang, W. Jeon, JY. (2020), that already conduct the experiment. The ventilation system was kept active throughout the experiments, and the background noise level in the classroom was measured as 41 dBA. The room temperature of 25C and the relative humidity of 40%, which corresponded to neutral sensation.

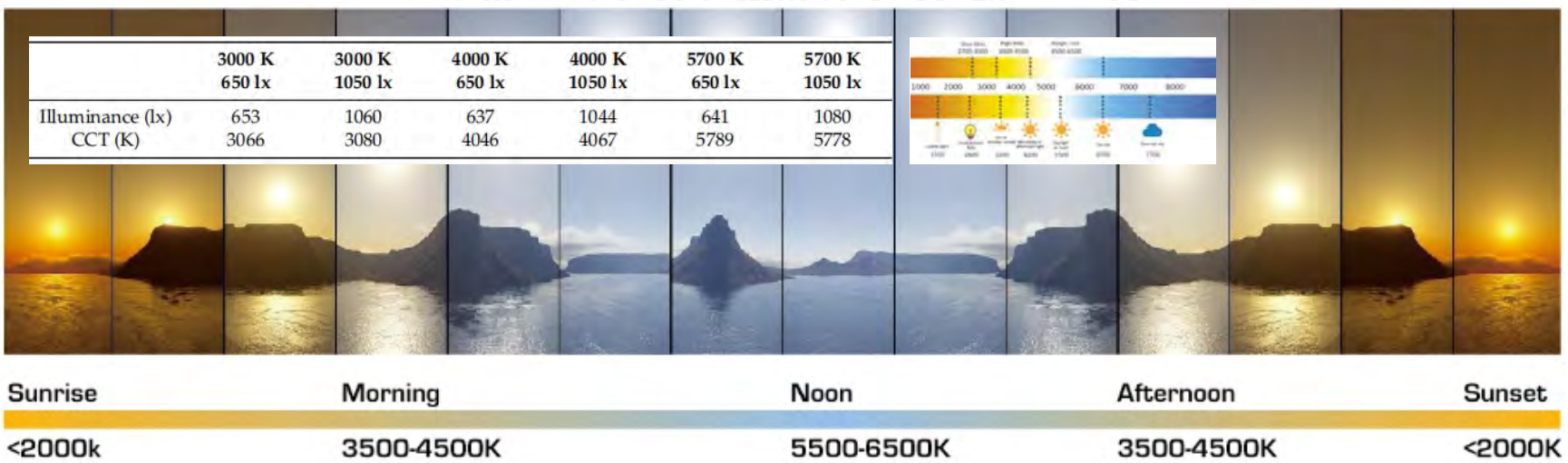
1. Warm white 2700K to 3900K have a cozy, intimate, a friendly, relax, welcoming atmosphere.

2. Pure White 4000K to 4900K has a clean, focused, slightly cold, high concentration.

3. Cold white 5000K to 7000K, energetic, important application is agriculture, especially indoor horticulture and laboratory.

Figure 153. *Lighting configurations*
Source: Yang, W. Jeon, JY. (2020) (proccessed on 27 June 2022)

Figure 154. *Lighting color temperature*
Source: ledrise.eu/blog/color-temperature-explained-lr/ (proccessed on 27 June 2022)



MANGROVE CONSERVATION: Coastal Reborn
Mangrove Renaturation in Thailand: a Symbiosis of Architecture & Environment

https://www.holcimfoundation.org/search?text=Mangrove+Recovery+in+Thailand

Student Competition Project by
Dolathep Chetty

Project Year
@2017

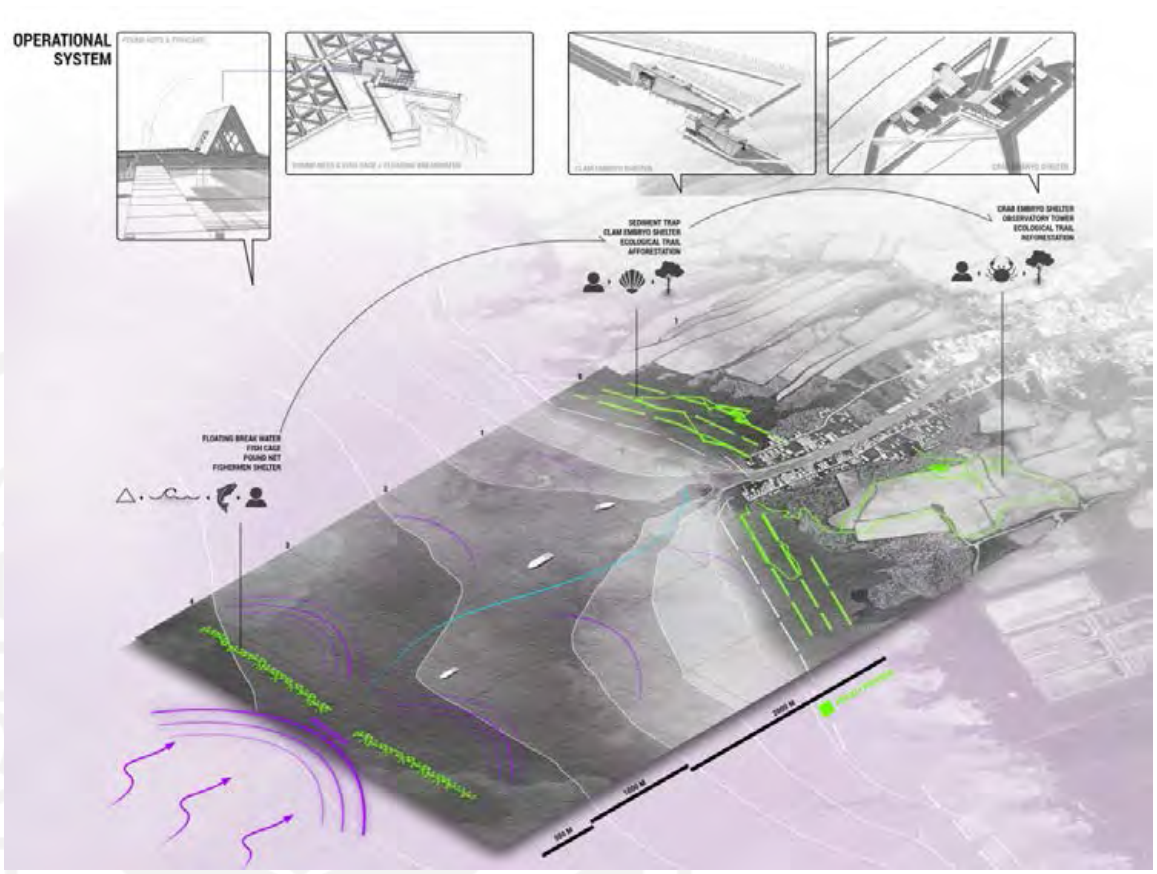
Location
Klong dan, Samut prakan, Thailand

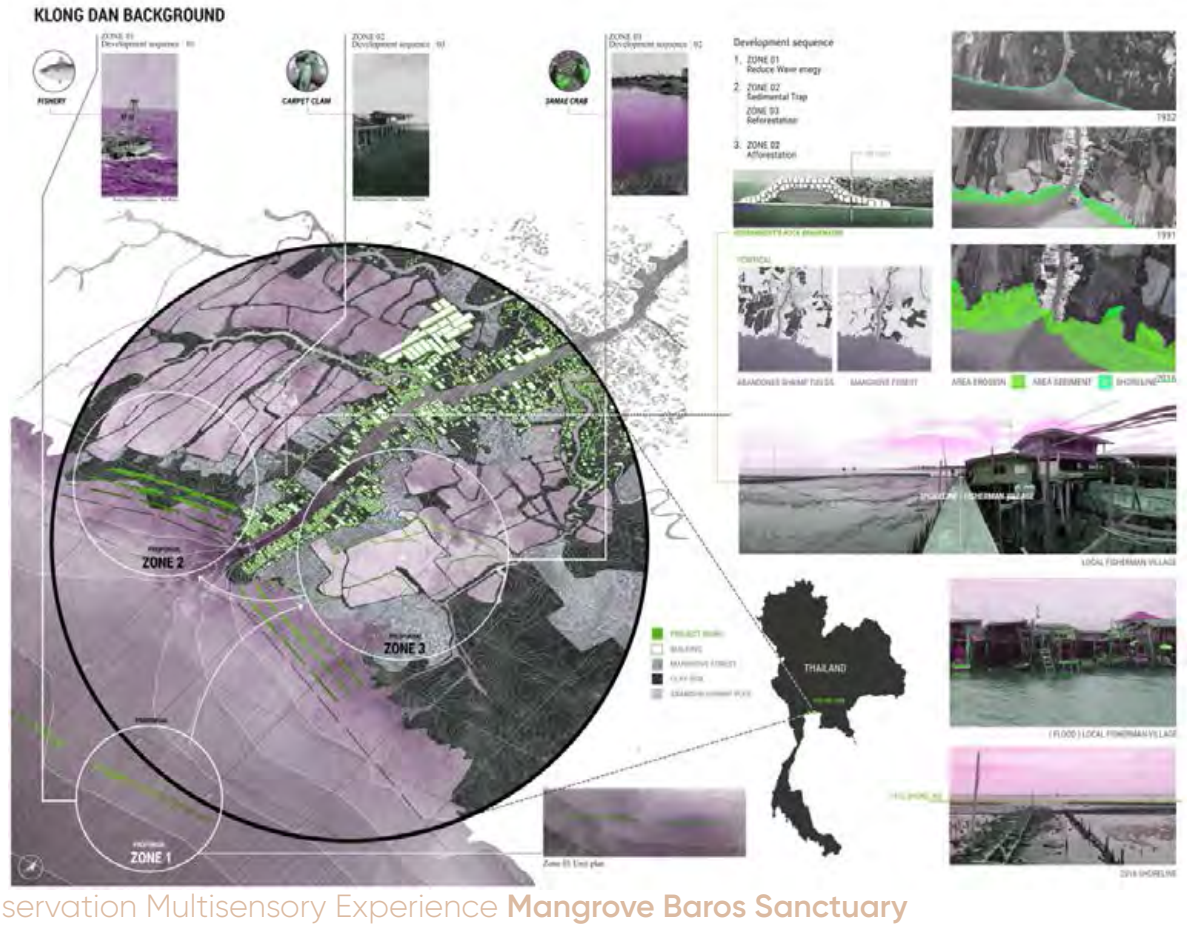
Project Background

Overuse of resources, population development, increased tourism, aquaculture, and industrial production have led to a progressive coastal deterioration in Thailand over the past few decades that puts local populations and ecosystems in peril. By restoring a mangrove forest in the Khlong Dan municipality, this project restores the Northern Gulf of Thailand's coastline environment.

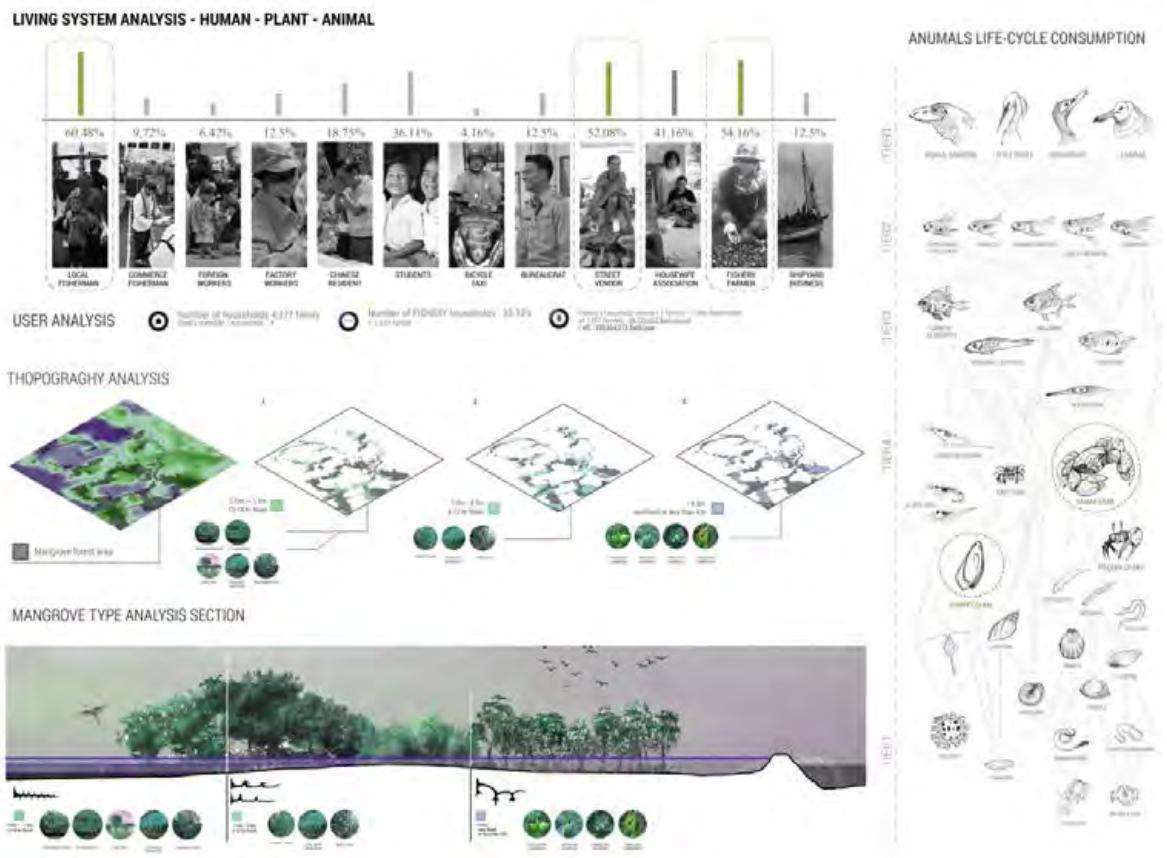
Embryos are raised in mangrove crab shelters and then released back into the wild. While eco-tourists use the ecological route, locals and visitors alike enjoy the outdoor terrace as a communal entertainment area. Through a compelling multi-layered and multi-scale design, the important environmental issue of coastal erosion in Thailand is addressed.

There are three created zones in the massive operational system. The first is a group of floating breakwaters in the ocean, 20 kilometers from the coast. The second is a sediment trap system on the beach that is connected with an ecological trail and clam embryo shelter. The third is an ecological route that leads to an observation tower and shelter for crab embryos in the interior.





Eighty triangular floating breakwaters are positioned in the water several kilometers offshore to lessen the force of the waves. These lightweight constructions do not harm the bottom and can be taken down 30 years after installation, after the mangrove regeneration is well-established, as opposed to fighting nature with heavy foundations. A system of bamboo docks along the shoreline helps to further absorb wave energy, retains the silt required for mangrove afforestation, and creates a trail to encourage ecotourism in the area. An observation tower and clam embryo shelter are housed in a tiny pavilion that is situated close to the water. The architecture, which is made of biodegradable materials, will gradually deteriorate over the following 30 years.

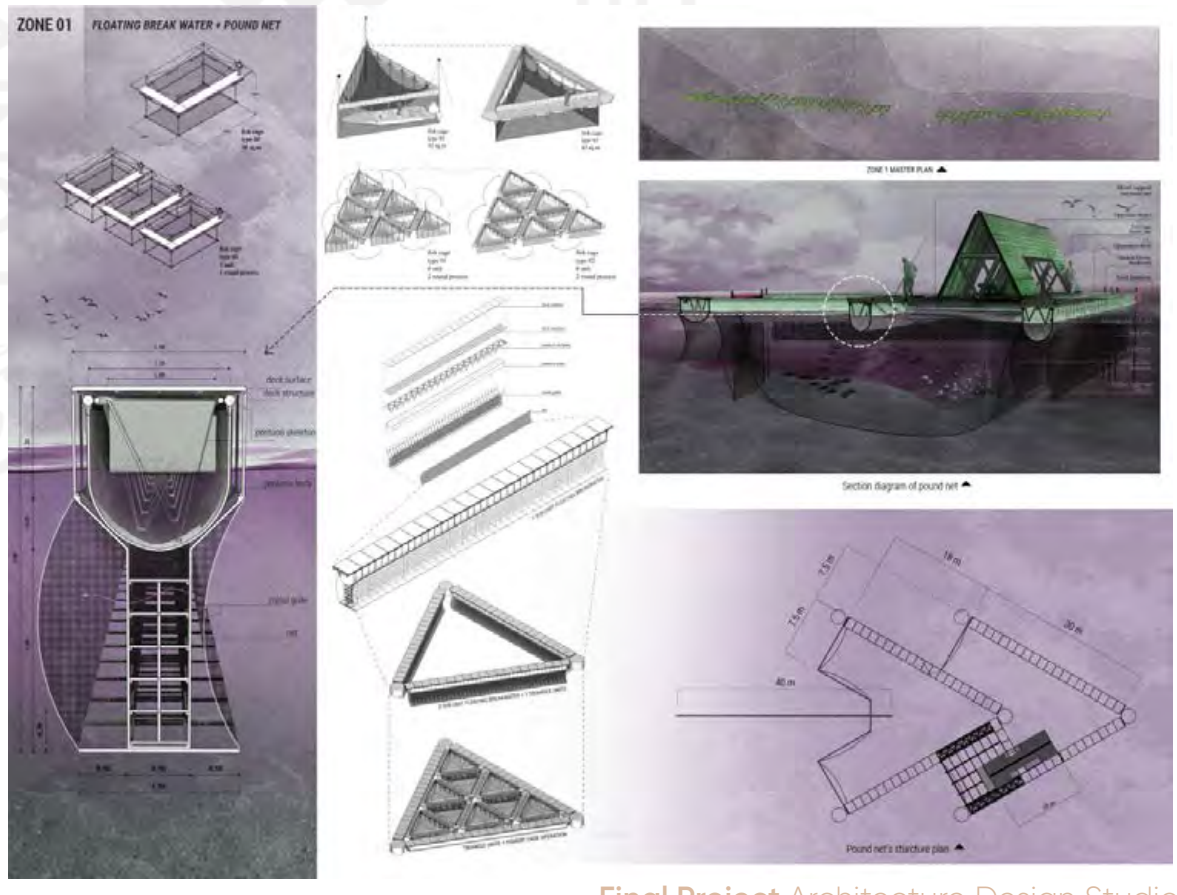


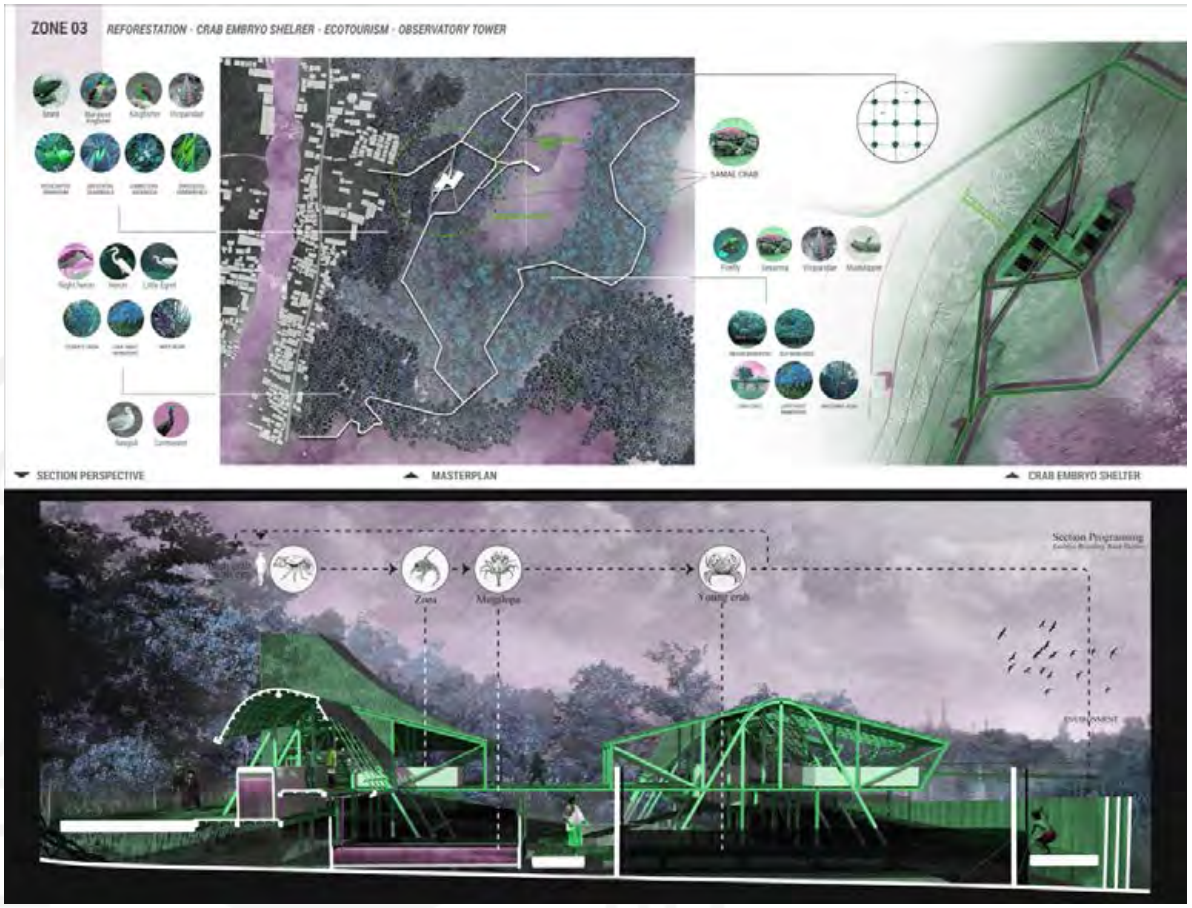
Ecological reclamation process

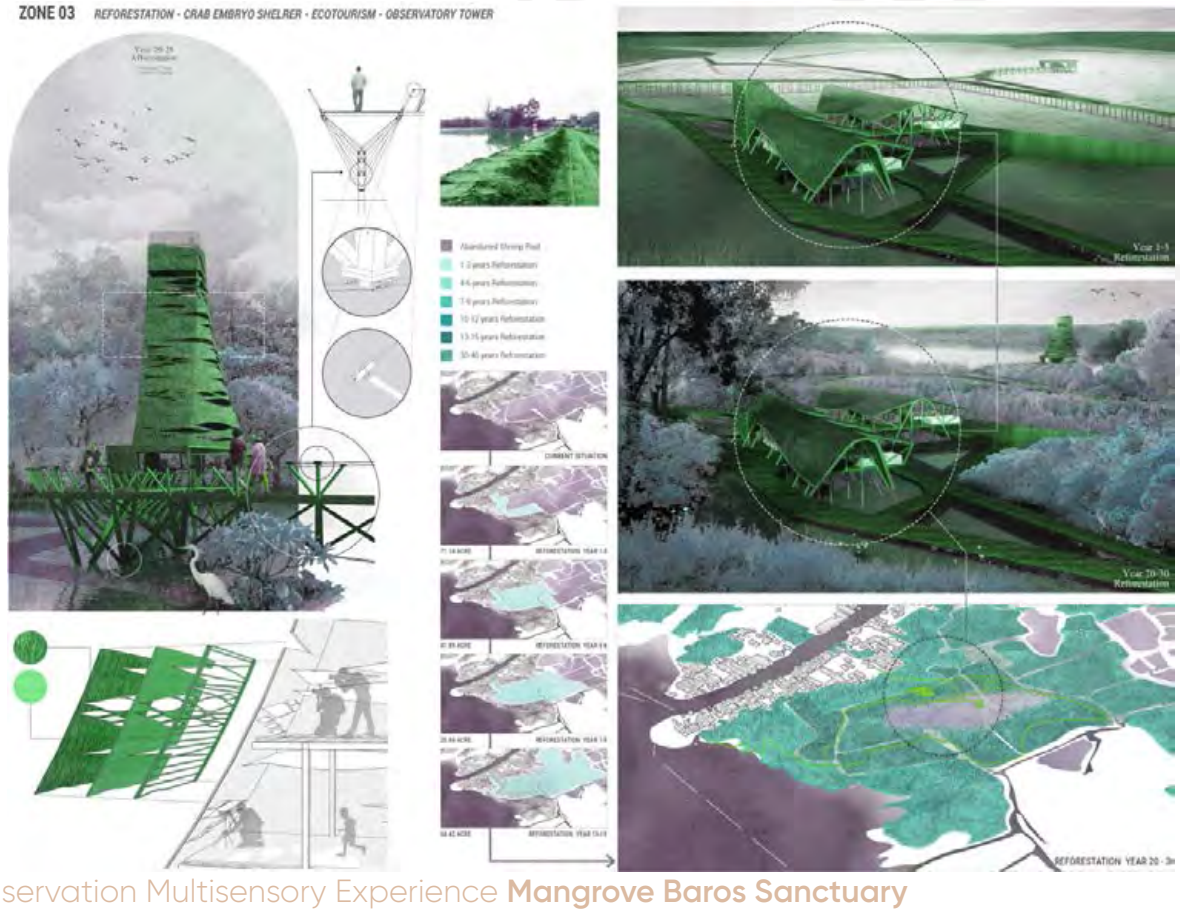
The living system analysis of human, animals, and vegetation in the area. Along the shoreline, three lines of bamboo traps are built up gradually to absorb wave energy and capture silt for the reforestation of mangroves. Over time, the ridges of the shrimp farms are destroyed, enabling seawater to enter the interior. Water contamination can be avoided by allowing natural water flow. The process of reforestation then starts on the abandoned shrimp farms. The afforestation procedure can be carried out along the seashore where sediments have been returned once the forest has grown. Floating breakwaters can be eliminated from the coastal environment during the next 30 years as mangrove forests develop into a natural barrier.

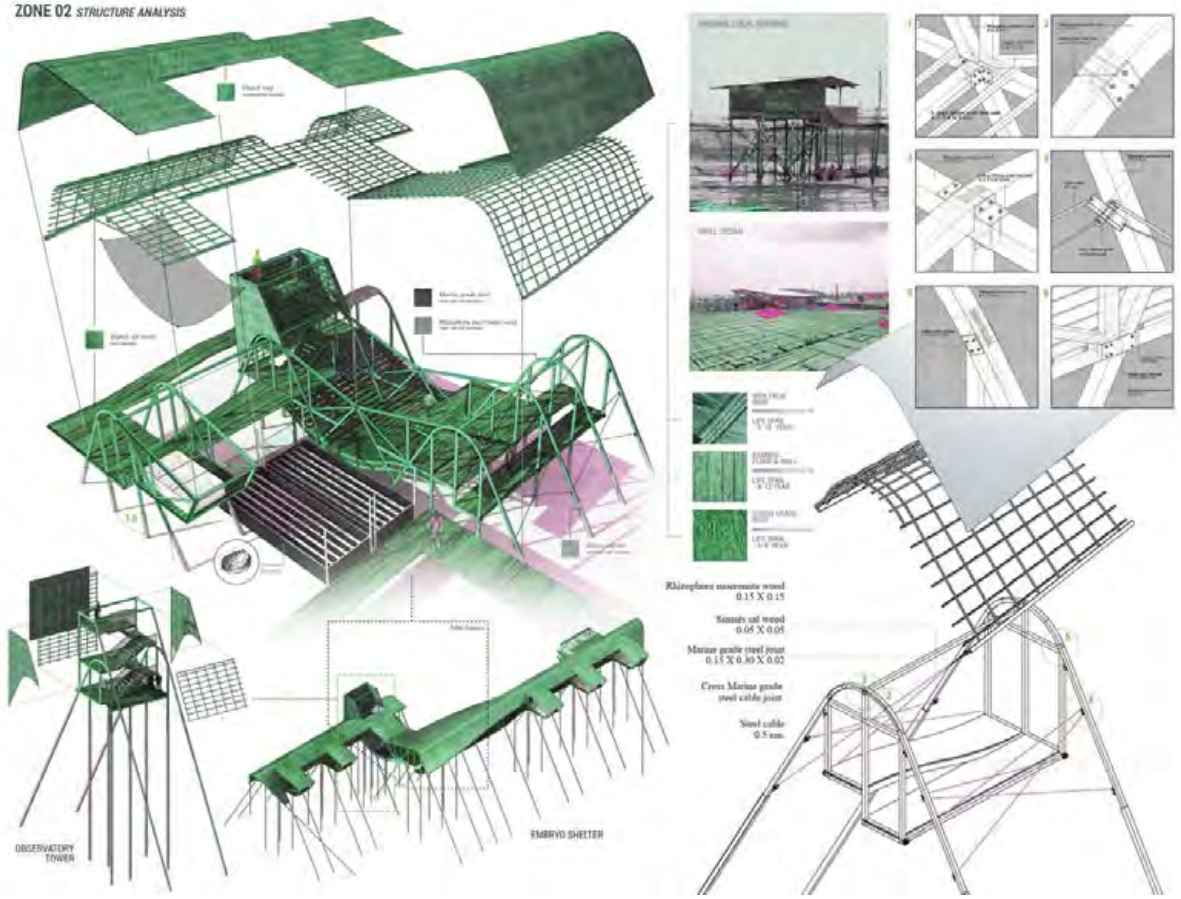
Structural innovations to reduce wave intensity, trap sediment, and building on soft clay

The triangular unit of floating breakwater made of galvanized trusses in the sea is best at absorbing wave energy. The metal grille and net that make up the pontoon's framework increase the waves' frictional forces. On the coastline, a bamboo ecological route that forms a zigzag traps sediment in layers. Wide-span cable structures are utilized in conjunction with 60-degree columns to the ground that resemble the bracing roots of mangroves to reduce footing. In 30 years, the architecture will have decomposed and become a part of nature thanks to the biodegradable elements.




ZONE 03 REFORESTATION - CRAB EMBRYO SHELRER - ECOTOURISM - OBSERVATORY TOWER
SAMAL CRAB
SECTION PERSPECTIVE
MASTERPLAN
CRAB EMBRYO SHELTER
Section Programming
Zoea
Megalopa
Young crab
ENVIRONMENT


ZONE 03 REFORESTATION - CRAB EMBRYO SHELRER - ECOTOURISM - OBSERVATORY TOWER
Abandoned Shrimp Pond
1-2 years Reforestation
4-6 years Reforestation
7-9 years Reforestation
10-12 years Reforestation
13-15 years Reforestation
30-40 years Reforestation
CURRENT SITUATION
Year 1-5 Reforestation
Year 20-30 Reforestation
REFORESTATION YEAR 20 - 3



Mechanism sustaining coastal ecology and local economy

The impact by declining aquatic animal population as a result of the loss of mangrove forests, which has an effect on the ecosystem's animal life cycle. In order to cultivate embryos and release them back into nature, clam and mangrove crab shelters are constructed. This procedure contributes to the long-term viability of local fisheries by completing the food chain in the coastal environment. Local "sun-dried krill litter" inspired the outdoor patio, which can be enjoyed by tourists and fisherman alike as a tranquil retreat. The promotion of ecotourism in this area, which will ultimately boost the local economy, includes an ecological trail and observatory tower that allow visitors to experience biodiversity.

CONSERVATION & INTERPRETATION: Moriyama & Teshima Design New Honey Bee Research Center in Canada

Eric Baldwin. "Moriyama & Teshima Design New Honey Bee Research Center in Canada" 18 Mar 2020. ArchDaily. Accessed 3 Aug 2022. <https://www.archdaily.com/935700/moriyama-and-teshima-design-new-honey-bee-research-center-in-canada> ISSN 0719-8884

Built Project by
Moriyama & Teshima Architects

Project Year
@2020

Location
Ontario Agricultural College

Project Background

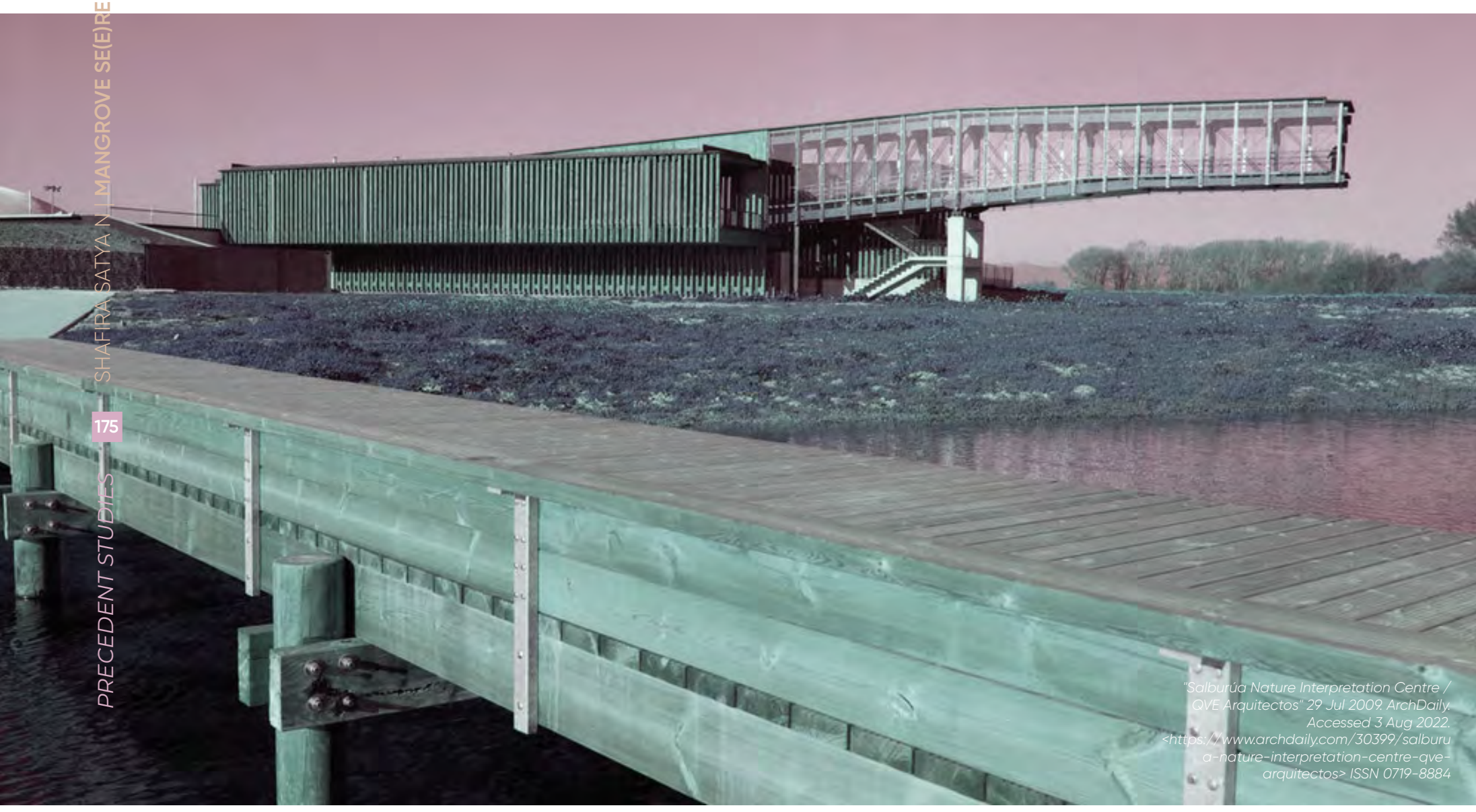
a brand-new Honey Bee Research Center has opened at Canada's University of Guelph. a brand-new building for the university's Ontario Agricultural College. The facility, which aims to be a landmark project, will be made of mass timber and will focus on sustainability, honey bee health, and well-being.

According to the university, the new center is designed to be a low-carbon undertaking that promotes adaptable research and education for people of all ages. Children, students, and academics from all over the world are welcome at the HBRC, which also features a sizable, multipurpose Discovery and Learning Space, Exhibition Area, Research & Extraction Labs, Classrooms, a Café, and Gift Shop. The sweeping roof structure of the mass timber building serves as the primary expression of the public area. A trail that ascends and leads to the Center's iconic Interpretive Tower, which serves as both a solar chimney and a pollinator-friendly habitat, integrates the roof and the surrounding landscape.

The HBRC's linkages to the nearby University of Guelph campus, the surrounding natural environment, and its current integrated trail system are all being improved. The new Center is envisioned as a productive and sociable environment that can host a variety of events, programs, and activities. The grounds highlight the formal productivity of the land through developed agricultural plots and working hives, balancing the ecological functions of the site with educational programs.

Conservation Multisensory Experience **Mangrove Baros Sanctuary**

NATURE INTERPRETATION: Salburúa Nature Interpretation QVE Arquitectos



"Salburúa Nature Interpretation Centre / QVE Arquitectos" 29 Jul 2009. ArchDaily. Accessed 3 Aug 2022. <https://www.archdaily.com/30399/salburua-nature-interpretation-centre-qve-arquitectos> ISSN 0719-8884

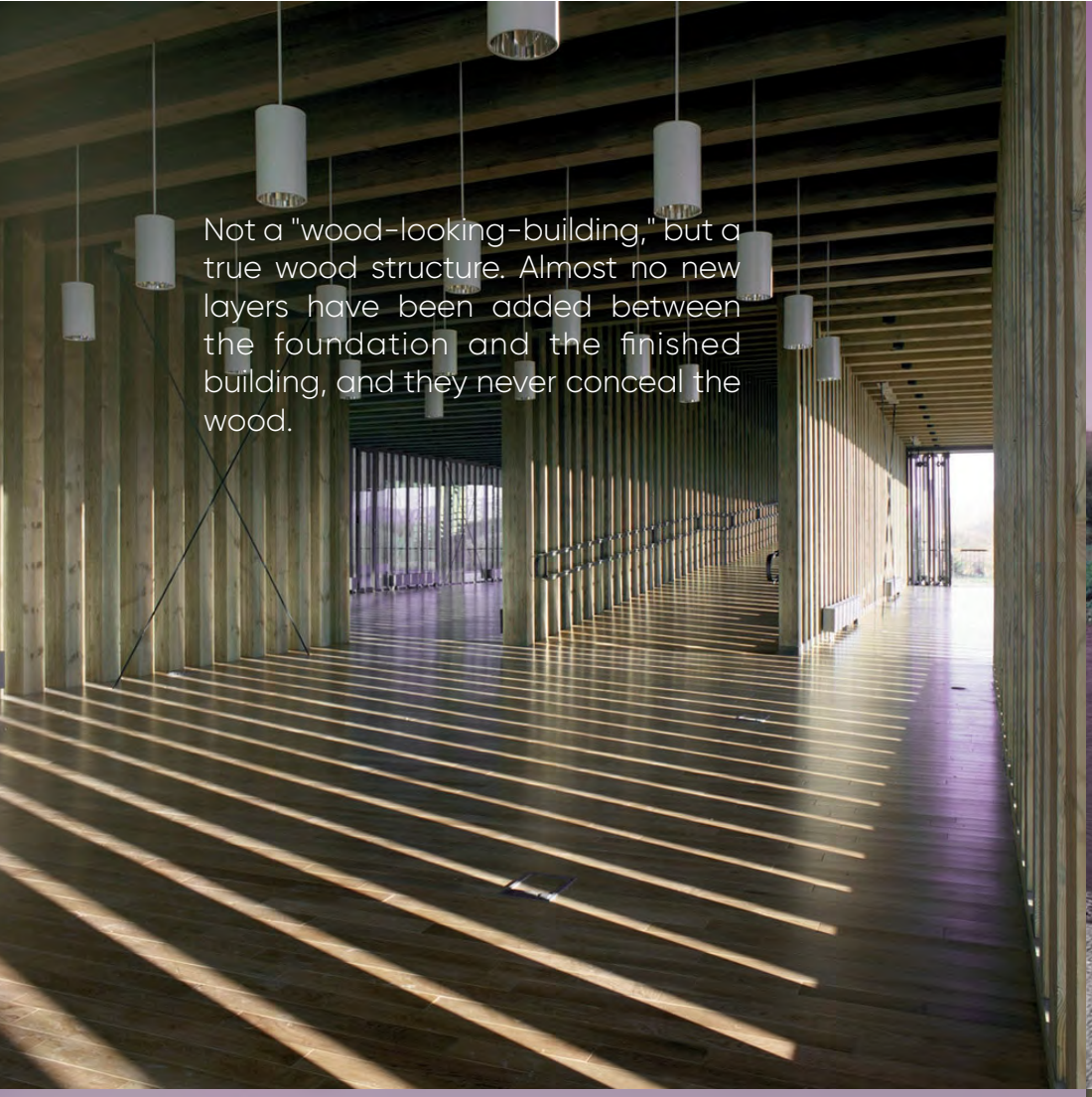
Built Project by
QVE Arquitectos

Project Year
@2003

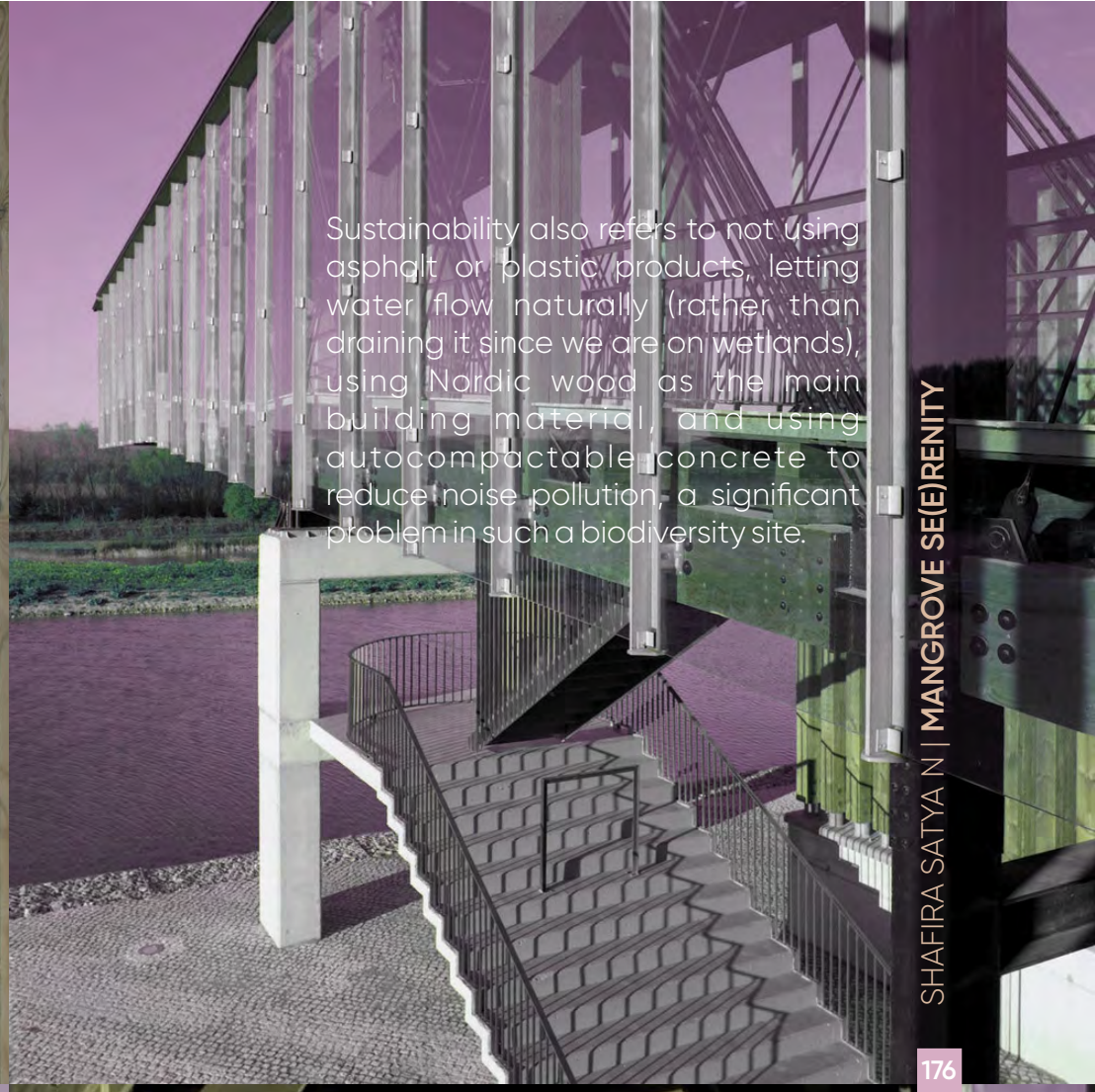
Location
Victoria, Spain

Project Background

The opportunity to risk and try to arrive where you had never been: the joy of playing with gravity. The desire to extend the building above its bounds and soar above the water in order to place the visitors in a special location within the park with the city behind them and over the water at a location that would be impossible to get in any other way: a wood and steel cantilever with a twenty-one meter span.



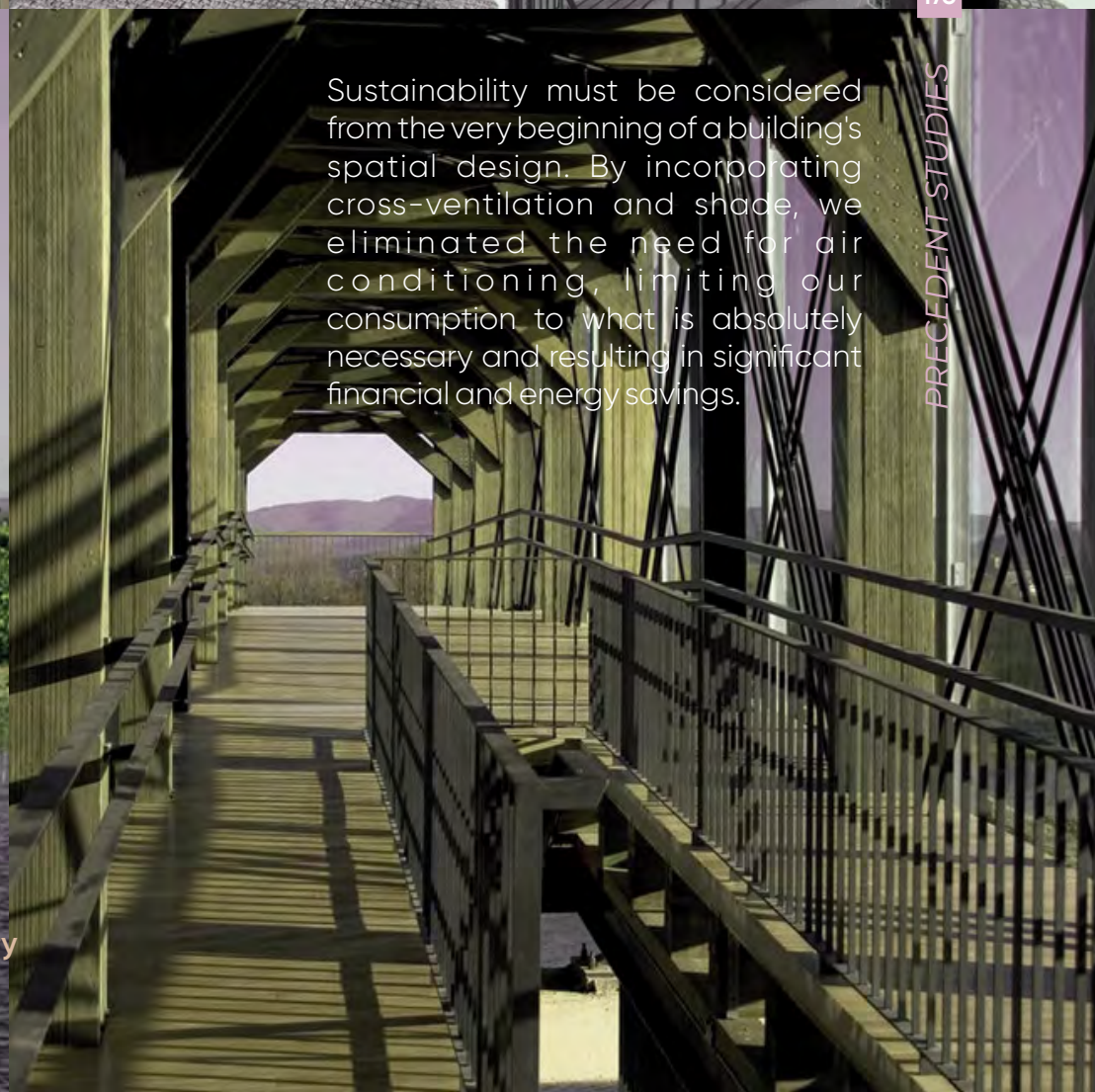
Not a "wood-looking-building," but a true wood structure. Almost no new layers have been added between the foundation and the finished building, and they never conceal the wood.



Sustainability also refers to not using asphalt or plastic products, letting water flow naturally (rather than draining it since we are on wetlands), using Nordic wood as the main building material, and using autocompactable concrete to reduce noise pollution, a significant problem in such a biodiversity site.

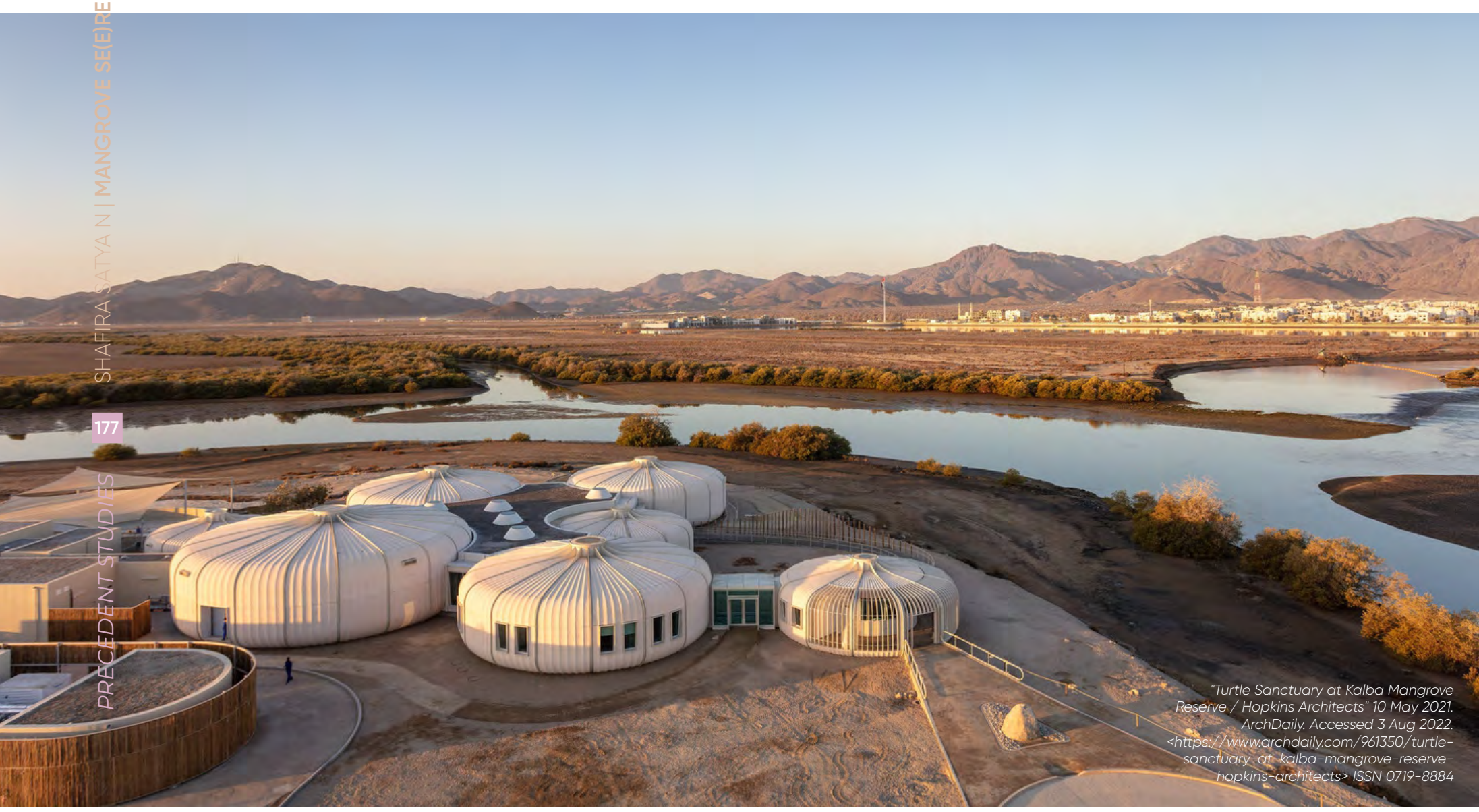
Let the structure "grow by himself" Each part is built up by repetition, so we could make it grow or contract by adding or removing a number of frames. Six frames for six section schemes, according to the desired geometry; used concrete walls and steel knots to solve the contact between two worlds (wood and ground); and decided on a severe rhythm for the entire building.

Conservation Multisensory Experience **Mangrove Baros Sanctuary**



Sustainability must be considered from the very beginning of a building's spatial design. By incorporating cross-ventilation and shade, we eliminated the need for air conditioning, limiting our consumption to what is absolutely necessary and resulting in significant financial and energy savings.

SANCTUARY HABITAT: Turtle Sanctuary at Kalba Mangrove Reserve by Hopkins Architects



"Turtle Sanctuary at Kalba Mangrove Reserve / Hopkins Architects" 10 May 2021. ArchDaily. Accessed 3 Aug 2022. <https://www.archdaily.com/961350/turtle-sanctuary-at-kalba-mangrove-reserve-hopkins-architects> ISSN 0719-8884

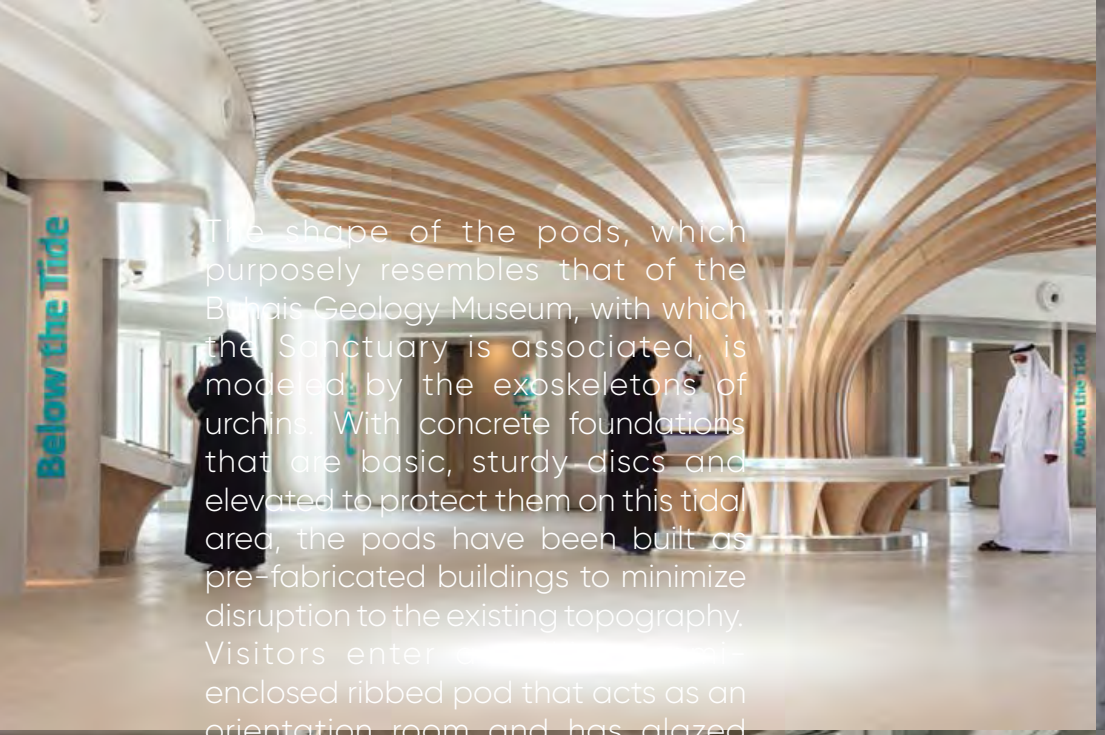
Built Project by
Hopkins Architects

Project Year
@2021

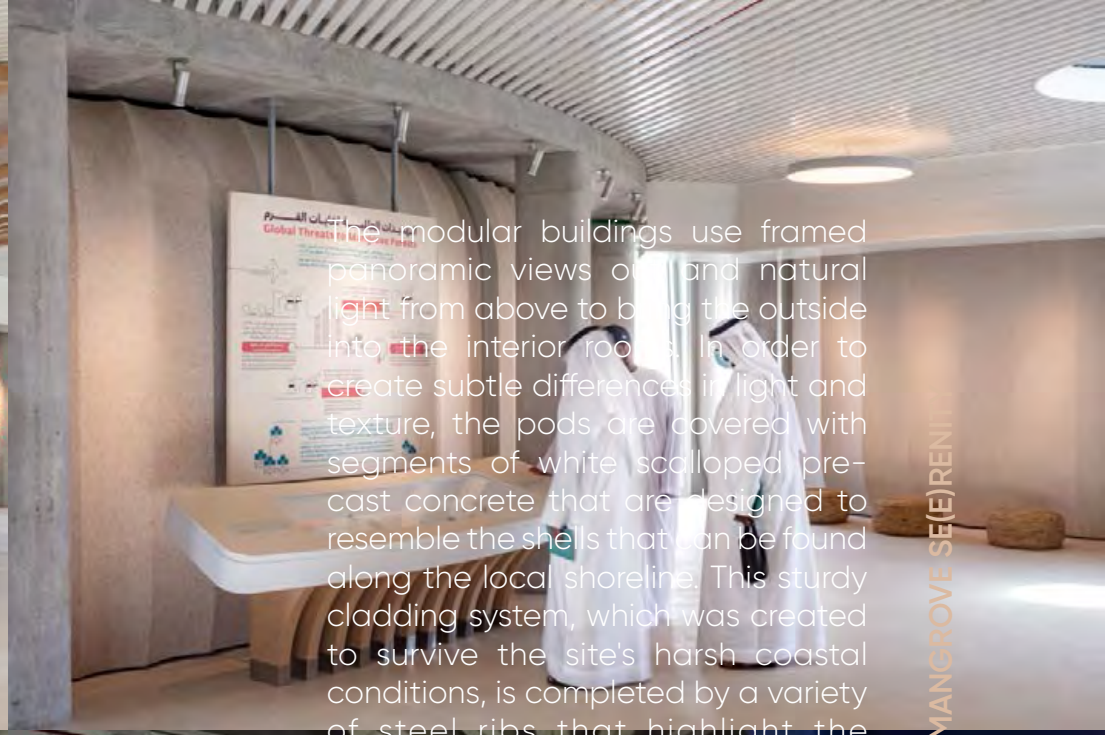
Location
Sharjah, United Arab Emirates

Project Background

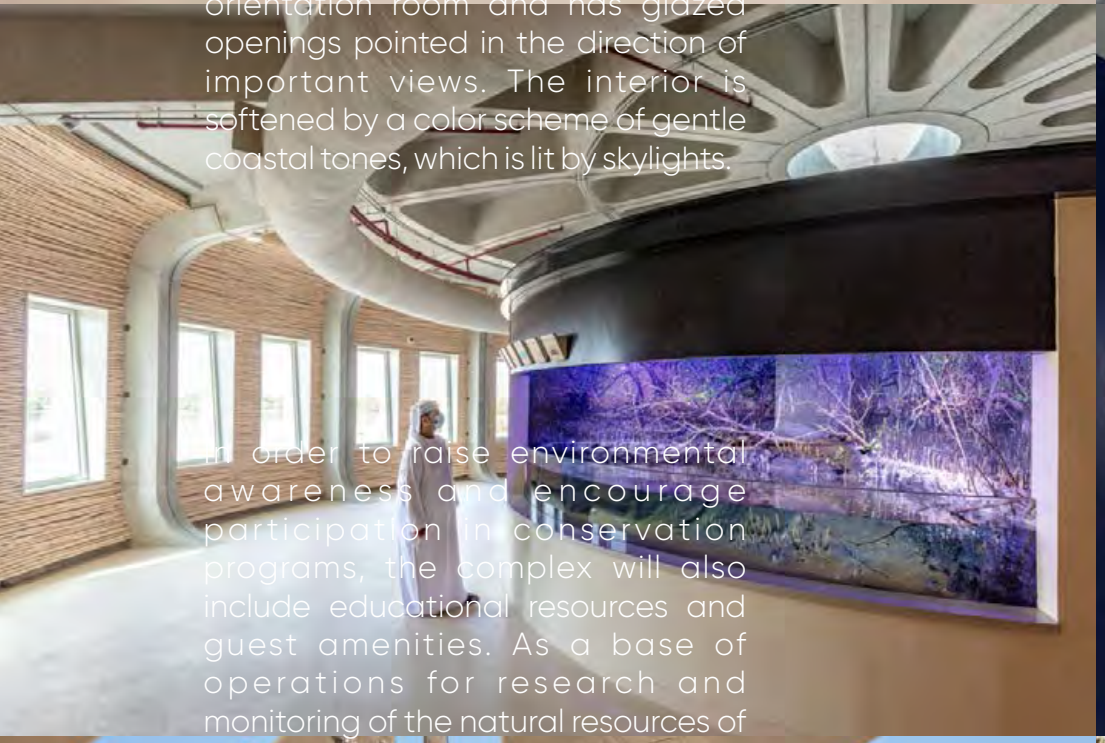
The Khor Kalba Turtle and Wildlife Sanctuary is a collection of rounded building forms that creates a sanctuary for caring for endangered birds and rehabilitating turtles, collaborating with regional initiatives and knowledge. It is situated on one of the Gulf's most sensitive and biodiverse nature reserves.



The shape of the pods, which purposely resembles that of the Buhais Geology Museum, with which the Sanctuary is associated, is modeled by the exoskeletons of urchins. With concrete foundations that are basic, sturdy discs and elevated to protect them on this tidal area, the pods have been built as pre-fabricated buildings to minimize disruption to the existing topography. Visitors enter a semi-enclosed ribbed pod that acts as an orientation room and has glazed openings pointed in the direction of important views. The interior is softened by a color scheme of gentle coastal tones, which is lit by skylights.

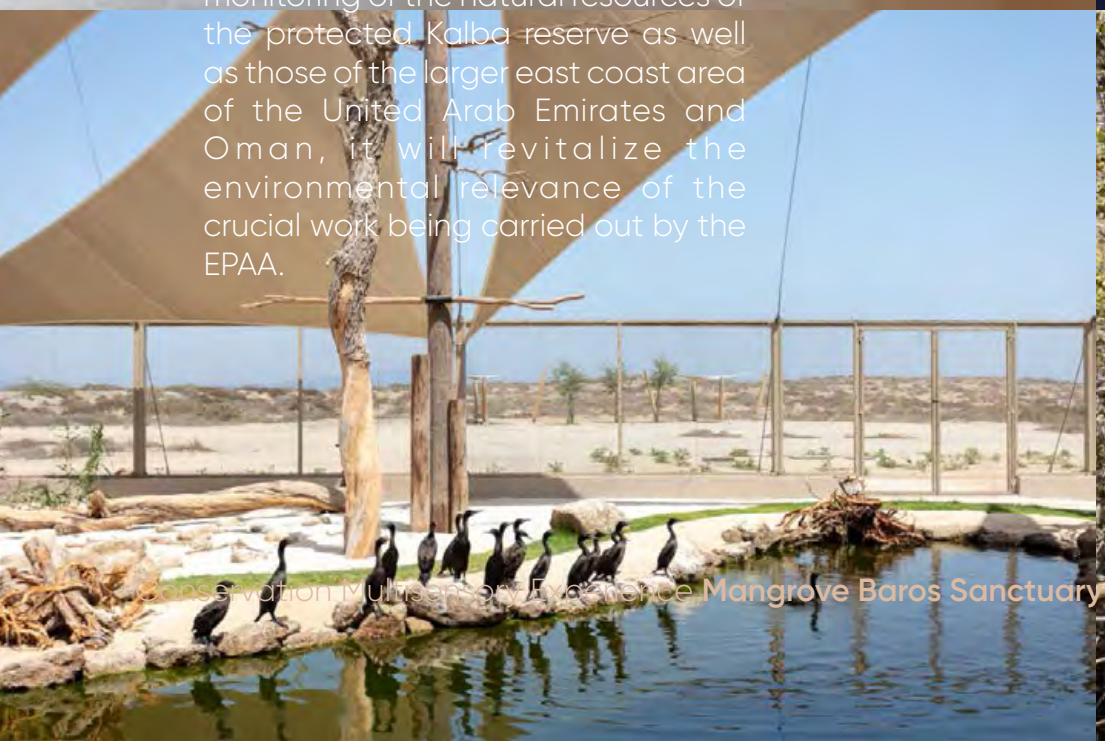


The modular buildings use framed panoramic views of and natural light from above to bring the outside into the interior rooms. In order to create subtle differences in light and texture, the pods are covered with segments of white scalloped pre-cast concrete that are designed to resemble the shells that can be found along the local shoreline. This sturdy cladding system, which was created to survive the site's harsh coastal conditions, is completed by a variety of steel ribs that highlight the cantilevered forms' sculptural qualities. In order to shield the interior areas from the desert heat and reduce the overall operational energy needed, passive design concepts were given top priority throughout the construction process.

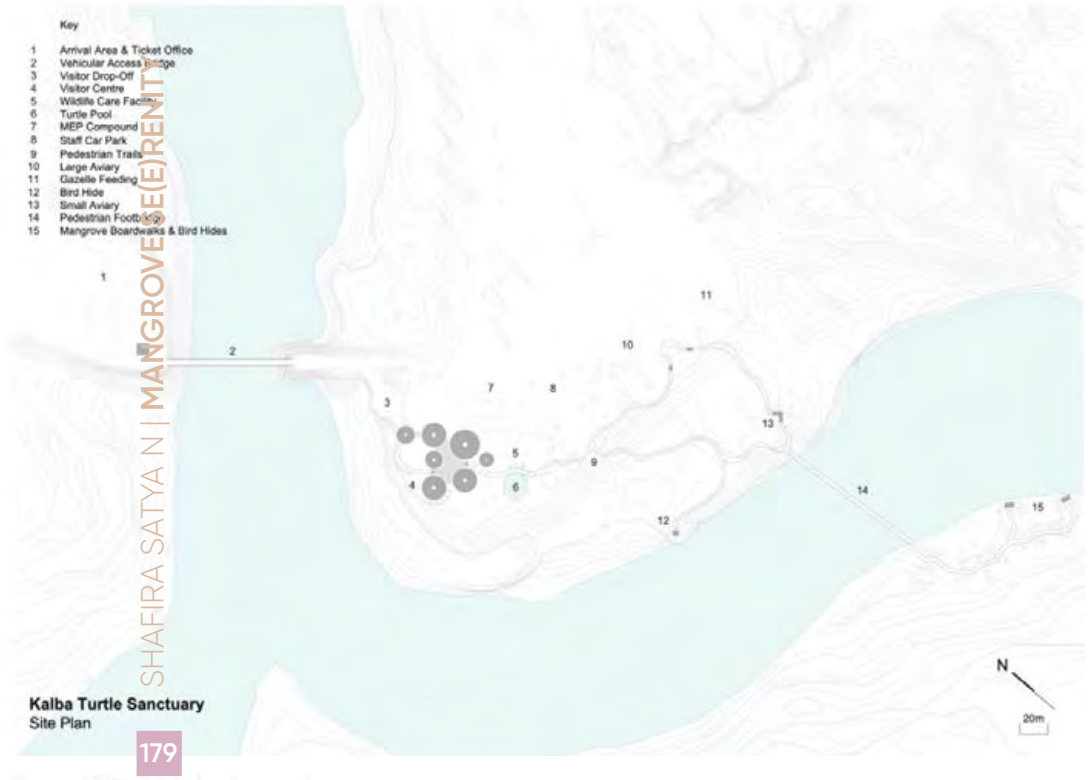


In order to raise environmental awareness and encourage participation in conservation programs, the complex will also include educational resources and guest amenities. As a base of operations for research and monitoring of the natural resources of the protected Kalba reserve as well as those of the larger east coast area of the United Arab Emirates and Oman, it will revitalize the environmental relevance of the crucial work being carried out by the EPAA.

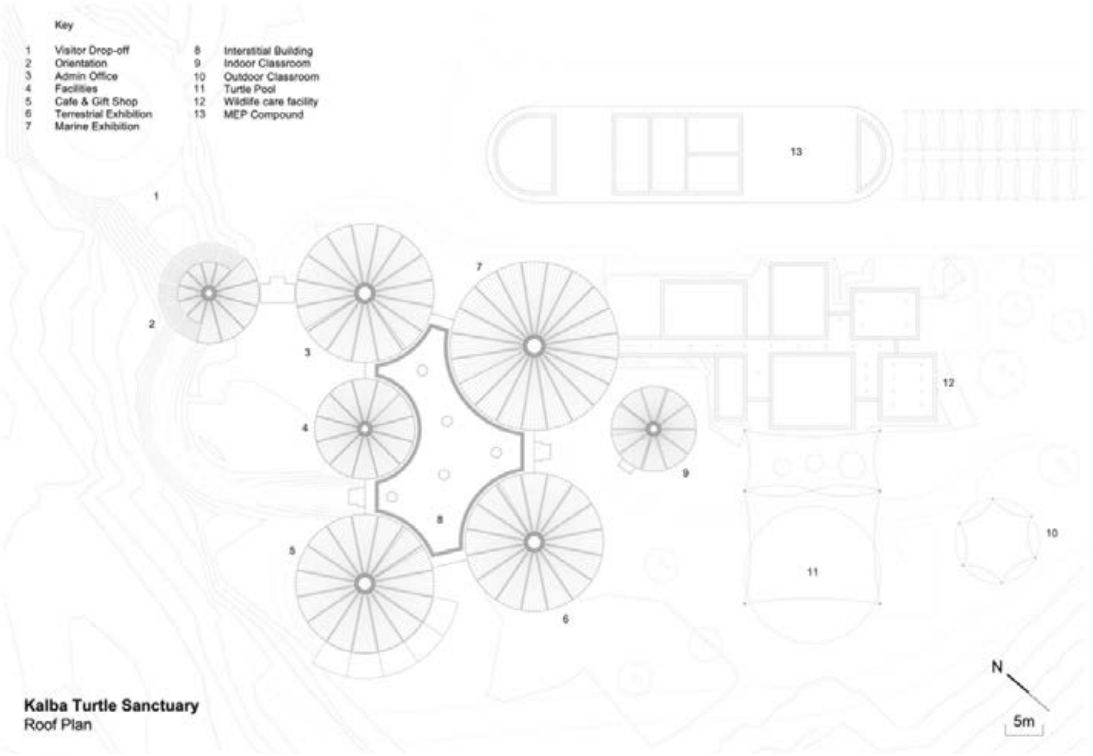
A visitor center made of seven interconnected pods and tensile constructions features a terrace with expansive views of the mangrove forests and distant mountains. Services include classrooms, gift shops, aquariums, exhibition spaces, visitor amenities, staff offices, veterinary facilities, and a cafe. Visitors are encouraged to explore the reserve's diverse biodiversity, which includes native mangrove forests and mudflats, as well as the species they sustain, such as turtles, stingrays, gazelles, and the endangered Arabian Collard Kingfisher.



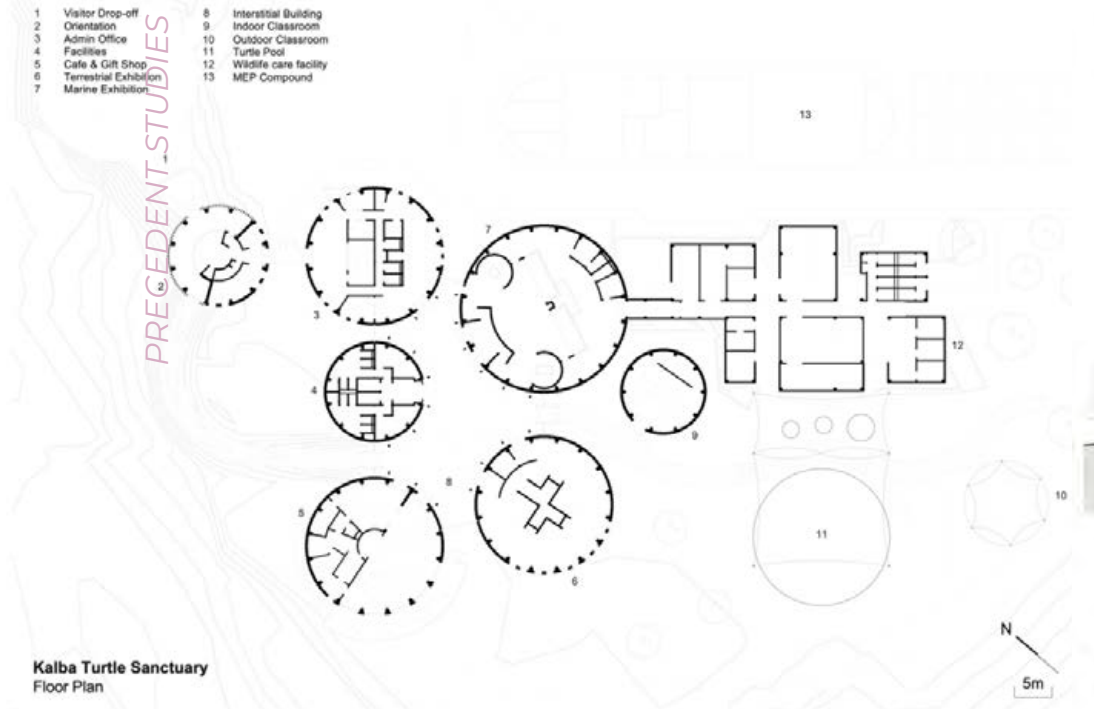
Conservation Multisensory Experience **Mangrove Baros Sanctuary**



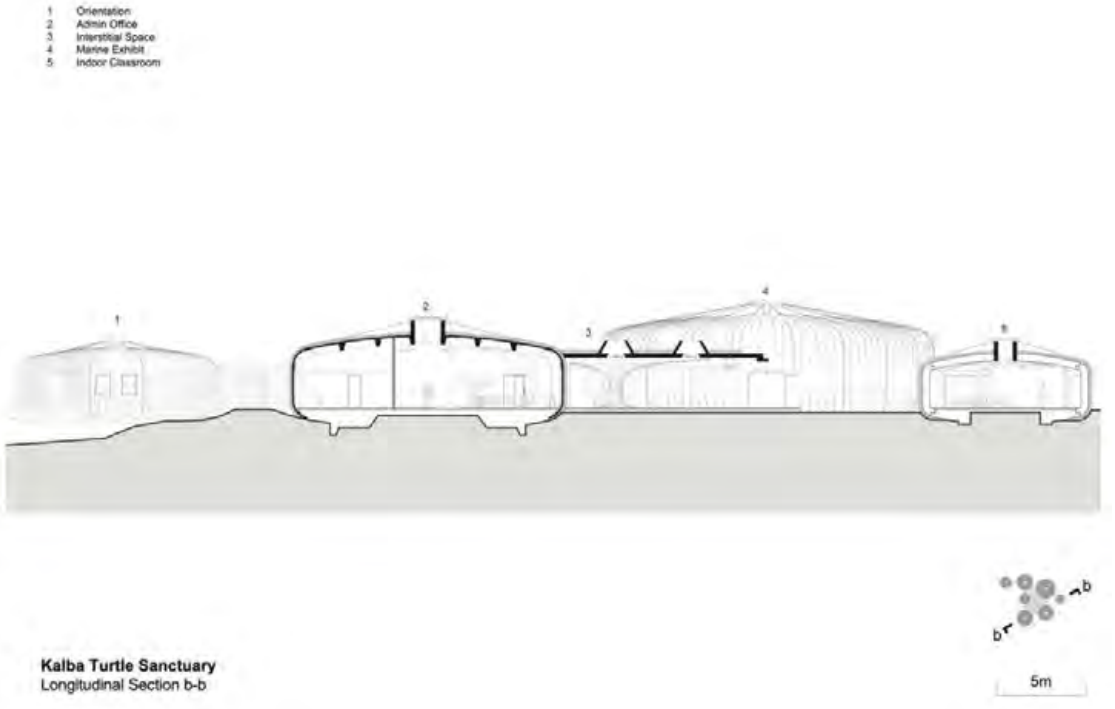
Kalba Turtle Sanctuary
Site Plan



Kalba Turtle Sanctuary
Roof Plan



Kalba Turtle Sanctuary
Floor Plan



Kalba Turtle Sanctuary
Longitudinal Section b-b

BOTANICAL GARDEN: Tropicario Bogotá Botanic Garden by DARP

"Tropicario Bogotá Botanic Garden / DARP" [Tropicario Jardín botánico de Bogotá / DARP] 10 May 2022. ArchDaily. Accessed 3 Aug 2022. <https://www.archdaily.com/960662/tropicario-bogota-botanic-garden-darp> ISSN 0719-8884

Built Project by
DARP Architect

Project Year
@2020

Location
Bogota, Columbia

Project Background

High levels of deforestation and resource exploitation contrast with the country's environmental abundance; among of the main issues are indiscriminate logging, vast cattle ranching, and illegal mining. Colombia is one of the eight nations listed on the "red list" as contributing to half of the planet's decline due to the high rates of endangered species.

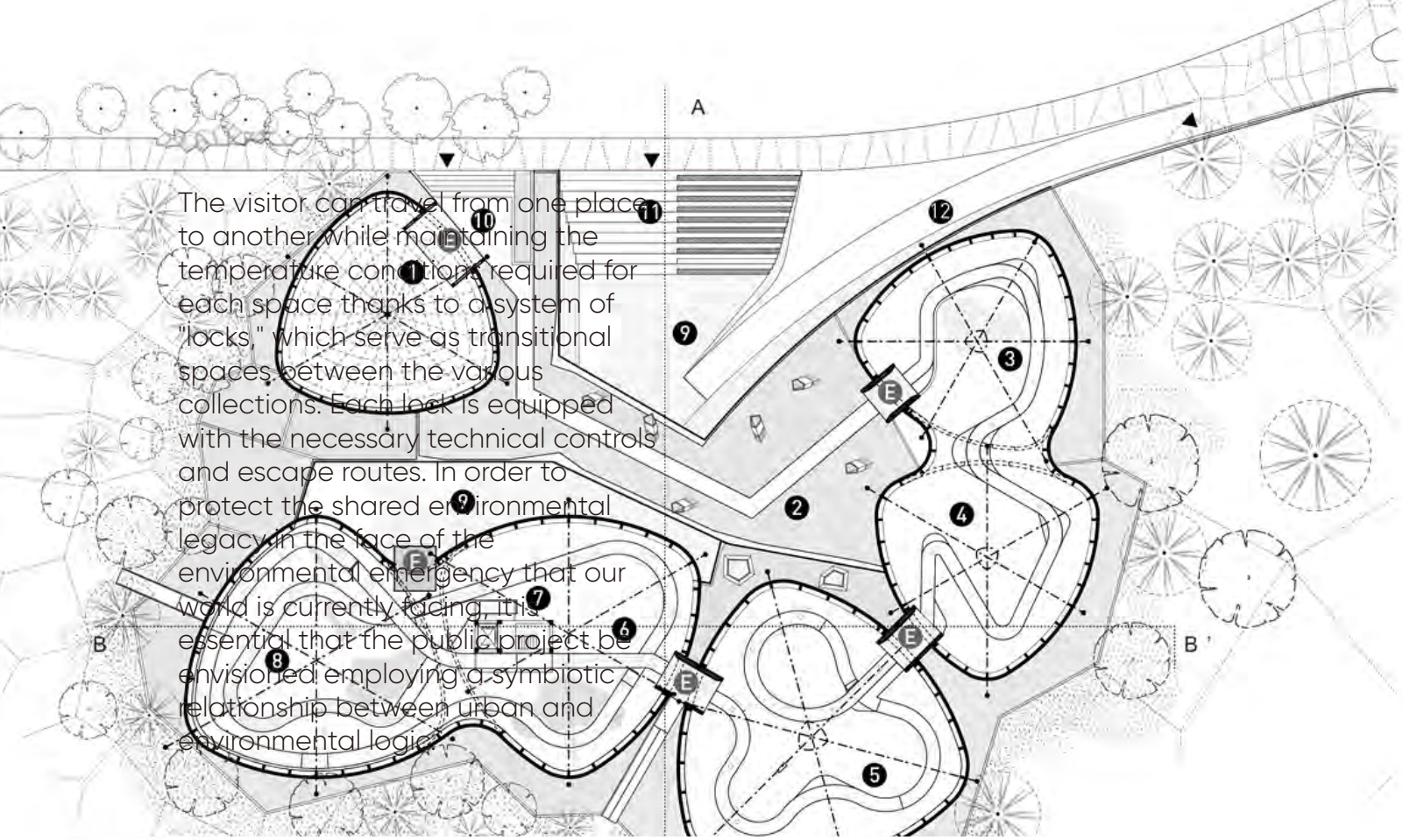
The "Bogota Savanna," a plateau that is a component of the Andes' eastern mountain range, is the name of the area where the city is located. The Bogotá River and a mountain range known as the eastern hills serve as the city's boundaries in the east and west, respectively. This region was formerly a sizable lake that connected the hills with the river about 20,000 years ago. Only a few remnants of this former lake remain today because the city drained the great majority of wetlands for urban development, reducing the 50,000 hectares that existed at the turn of the 20th century to just 727, or 1.45 percent, of the original area. This deterioration is largely due to widespread ignorance of the importance of wetlands in ecosystems.

The ambitious project "Nodos de Diversidad" or "Nodes of Diversity" was developed by the Botanical Garden of Bogotá as a strategy for the conservation and protection of ecosystems. It aims to conduct a new botanical expedition throughout various regions of the country and will allow protecting and appreciating some of the most endangered ecosystems on Colombian soil.

El Tropicario cannot be viewed as a building with walls surrounding it because it is a part of the Garden's overall itinerary and the suggested architecture is made for walking. In order to contribute to the culture of the surrounding terrain, the project will serve as a venue for teaching and disseminating information about the environmental values and challenges that this region faces.

The key support system for this strategy. It will serve as the venue for showcasing the findings of these trips. The project is situated on the site of an existing building that was severely deteriorating. One crucial aspect of the undertaking was the preservation of the wax palms that surrounded the implantation location. It is an endangered species with very sluggish growth that has been designated a national tree. These palms can grow up to 70 meters tall and live for more than a century. Around El Tropicario, there are more than 70 adult palms of this variety. To avoid harming the trees, this prompted the necessity for a system of flexible forms.

Conceptually, the various program regions operate as floating spaces inside a marsh, which is the Bogotá Savanna habitat. References to pre-Hispanic engineering's development of amphibian architecture (Chinampas, Camellones, Floating Islands) were crucial for this. Humid Forest, Dry Forest, Special Collections, Useful Plants, Superpáramos, and Biodiversity are the six collections that make up the project. Each collection has certain height, temperature, and humidity needs. These areas perform as "floating" modules that are connected by an artificial wetland that was an idea put up by the design team during the competition phase.



The visitor can travel from one place to another while maintaining the temperature conditions required for each space thanks to a system of "locks," which serve as transitional spaces between the various collections. Each lock is equipped with the necessary technical controls and escape routes. In order to protect the shared environmental legacy in the face of the environmental emergency that our world is currently facing, it is essential that the public project be envisioned employing a symbiotic relationship between urban and environmental logics.

PLANTA NIVEL 0.00

CONVENCIONES

Tropicario
Bogotá

USOS

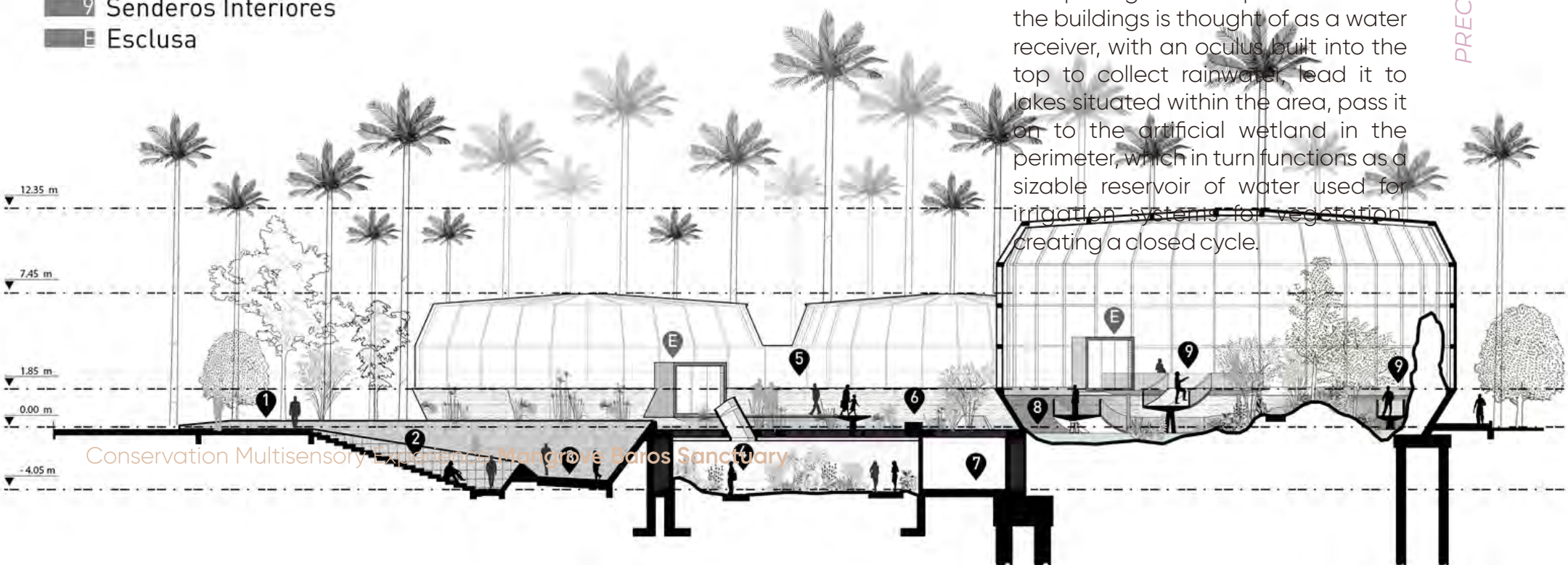
1. Biodiversario
2. Humedal Artificial
3. Plantas útiles
4. Plantas Especializadas
5. Bosque Seco Jardín
6. Bosque Húmedo (Amazonia)
7. Punto Fijo
8. Bosque Húmedo (Chocó Biogeográfico)
9. Plazoleta de Acceso
10. Pasarela de conexión
11. Gradería de acceso
12. Rampa de acceso

E. Esclusa

SECCIÓN A-A'

1. Acceso
2. Gradería de acceso
3. Rampa de Acceso
4. Superpáramo
5. Pasarela de conexión
6. Humedal Artificial
7. Cuarto Tecnico
8. Bosque Seco Jardín
9. Senderos Interiores

E. Esclusa



It was encouraged to employ passive temperature management methods that don't rely on mechanical ventilation systems, such as glass with various filter types and thicknesses and automated systems for opening certain spaces. Each of the buildings is thought of as a water receiver, with an oculus built into the top to collect rainwater, lead it to lakes situated within the area, pass it on to the artificial wetland in the perimeter, which in turn functions as a sizable reservoir of water used for irrigation systems for vegetation, creating a closed cycle.

PRECEDENT STUDIES

WORKSHOP MULTI-EXPERIENCE: Atelier Alice Trepp / Mino Caggiula Architects

"Atelier Alice Trepp / Mino Caggiula Architects" 28 May 2022. ArchDaily. Accessed 3 Aug 2022. <https://www.archdaily.com/962384/atelier-alice-trepp-mino-caggiula-architects> ISSN 0719-8884

Built Project by
Mino Caggiula Architect

Project Year
@2019

Location
Origlio, Switzerland

Project Background

immortalizing time-based events. Get people to occupy the structures they construct to blend in as organically as possible with the contour lines.The building blends with the land's undulating contours because it is wedged among the two highest upward-curving contour lines. To make the architecture appear like a natural landscape element, the volume develops shape, emerging like leaves out of the ground.

The two stories are intertwined and built around this core, producing a dynamic play of transparency and visual permeability. As they constantly interact with the light and the surrounding landscape, inside and outside areas merge and take on new shapes. The cenote at Atelier Trepp serves as a place for reflection and nature contact. A multi-sensorial sense of the passage of time is facilitated by the reflection and refracted light playing on the water. The cenote captures the fleeting moments of the day as it commemorates the passage of time as the day goes on and the light changes. The freshness coming off the water, the light breeze that gently sways the sweet-smelling overhanging vegetation, the twittering of birds, and the view of the passing clouds conjure up visions of the artist lying on the gravel of the shallow water immersed in a moment of sensory exploration.

Conservation Multisensory Experience **Mangrove Baros Sanctuary**

INTERPRETATION SPACE: Monarto Safari Park Visitor Centre / INTRO. + Studio-Gram

"Monarto Safari Park Visitor Centre / INTRO. + Studio-Gram" 23 Jun 2022. ArchDaily. Accessed 3 Aug 2022. <https://www.archdaily.com/984139/monarto-safari-park-visitor-centre-intro> ISSN 0719-8884

Built Project by
INTRO.+ Studio Gram

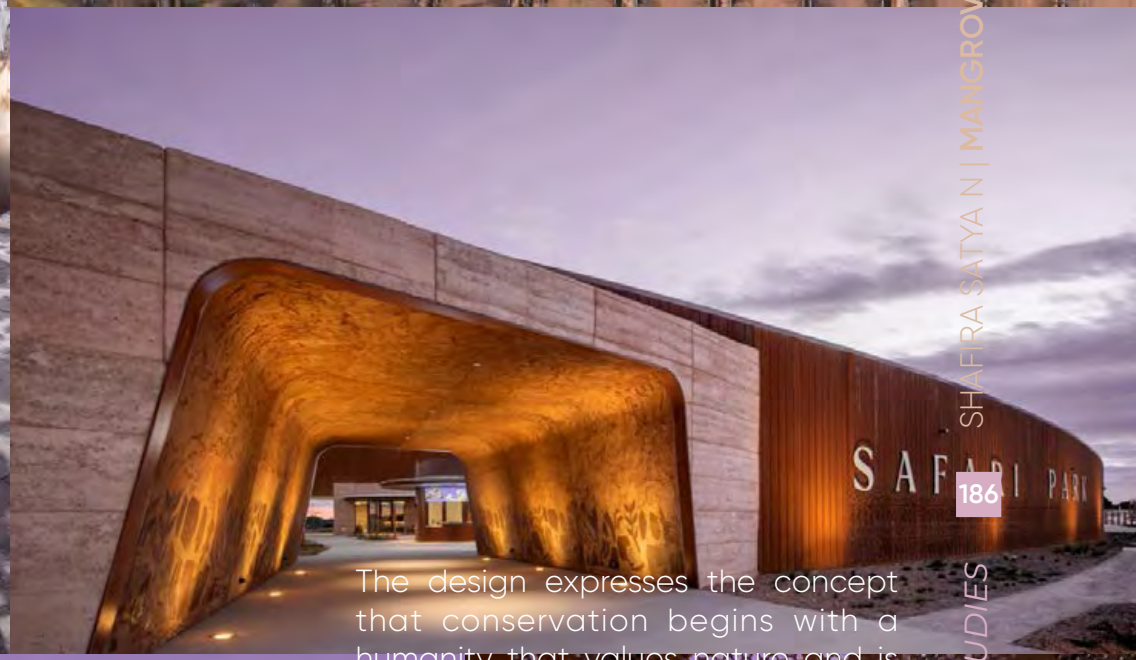
Project Year
@2022

Location
Adelaide, Australia

Project Background

This Gateway initiative exemplifies how history and education can link people to the environment. The project's heart—a focal point—is at its center. Before exposing guests to their voyage into Wild Africa, the heart serves as the community area. It offers cover from the inclement weather while affording brief glimpses of the wide surrounds. This welcome ceremony heightens interest in the upcoming event.

There are two main parts to the created form. Curved ribbons coming together symbolizes how indigenous and African cultures are entwined, expressing a natural connection to the soil, plants, and animals. Visitors are encouraged to interact with, interpret, and discuss the forms because of their iconic yet implicit expressiveness.



The design expresses the concept that conservation begins with a humanity that values nature and is enriched by their direct encounters with it. From Australia to Africa, the gateway representation offers a recognizable and unforgettable transitory experience. Every visitor should depart the park as a representative of the Monarto Safari Park.

Conservation Multisensory Experience **Mangrove Baros Sanctuary**

PRECEDENT STUDIES

CONSERVATION: Nishorgo Oirabot Nature Interpretation Centre

Built Project by
Vitti Sthapati Brindo Ltd

Project Year
@2008

Location
Teknaf, Balangdesh

The main goals of this center, which is situated in a protected forest area and reserve in the southern Bangladeshi district of Chittagong, are nature teaching and interpretation tours in an effort to raise awareness and knowledge of biodiversity, conservation, and ecotourism. The project's main idea—which is to value the sacredness of nature—is referred to as Nishorgo, which is Bengali for environment.

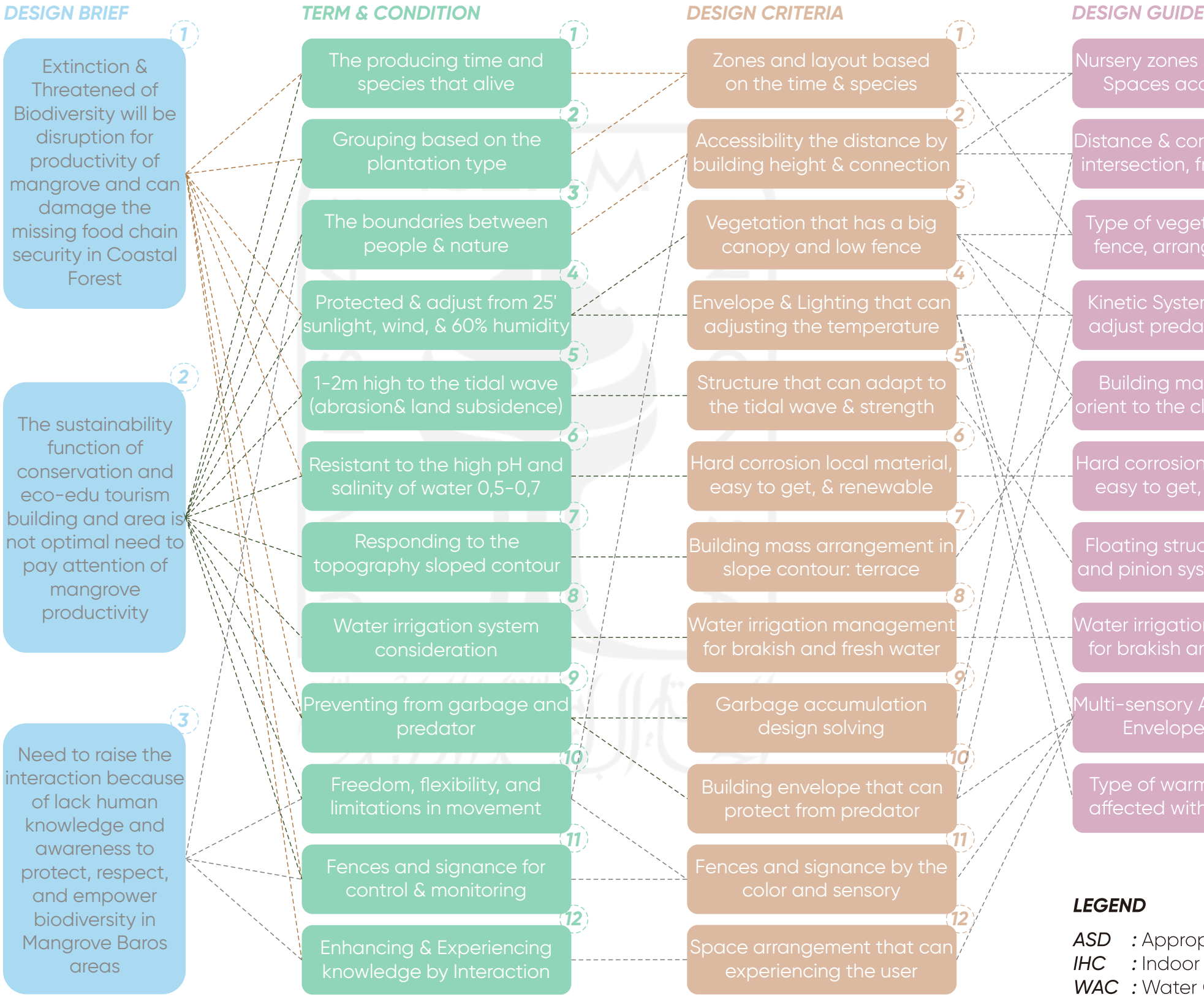
When appropriate, tree trunks are used to pierce the reinforced concrete slabs of the "pavilion shelter," reflecting the project's goal to have as minimal of an influence on the environment as possible. The building itself is sensitively positioned within the landscape. In order to examine the surroundings from a higher height, the visitor ascends the layers of platforms. A place for seeing films has walls made of exposed, burned clay brick, and an exhibition area is surrounded by a compositional arrangement of openings framed by wooden lattice.

"Nishorgo Safari Park Visitor Centre / INTRO. + Studio-Gram" 23 Jun 2022. ArchDaily. Accessed 3 Aug 2022. <https://www.archdaily.com/984139/monar to-safari-park-visitor-centre-intro> ISSN 0719-8884

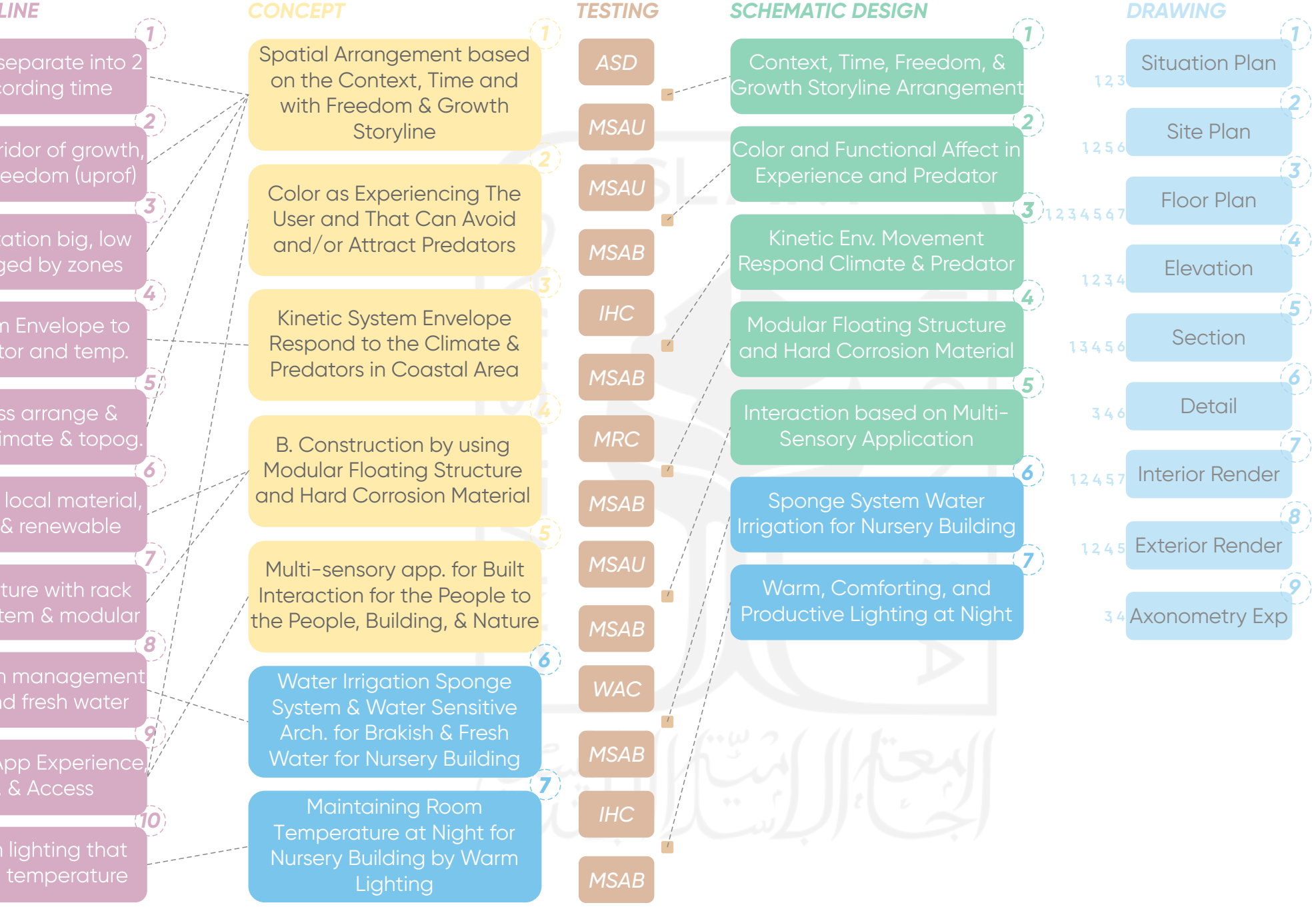
Conservation Multisensory Experience **Mangrove Baros Sanctuary**

SPECIAL ANALYSIS according to the problem

DESIGN THEME ANALYSIS CONTENT



RESPONDING TO THE MANGROVE LIFE-CYCLE



riate Site Development
Air Health & Comfort
Conservation

MRC **:** Material Resources & Cycle
MSAU **:** Multi-sensory Approach User
MSAB **:** Multi-sensory Approach Building

SPECIAL ANALYSIS according to the problem

DRAWING LIST CONTENT

SITUATION PLAN

1. Spatial Arrangement: Shape of Roof Growth and Freedom Storyline
2. Color: Roof Color and Functional Affect in User Experience and Predator
3. Building Envelope: Kinetic Movement in Respond to Climate and Predator

SITE PLAN

1. Spatial Arrangement & Zoning: Growth and Freedom Storyline
2. Accesability: Type, Function, and Size of Corridor & Patch
3. Landscape & Vegetation: Type, Time, Size, and Functional
4. Mass Arrangement & Layout: Mass & Orientation Respond to Climate
5. Color :Functional Affect in User Experience and Predator
6. Water Irrigation: Sponge System and Water Sensitive Arch.
7. Interaction: Multi-sensory Application For The User Effect

FLOOR PLAN

1. Spatial Arrangement & Zoning: Time, Freedom, & Growth Storyline
2. Accesability: User Flow and Circulation in The Corridor
3. Mass Arrangement & Layout: Mass & Orientation Respond to Climate
4. Color: Functional Affect in User Experience and Predator
5. Building Envelope: Kinetic Movement Respond to Climate and Predator
6. Water Irrigation: Water Flow and Distribution for Brakish and Fresh
7. Construction: Modular Floating Structure and Hard Corrosion Material
8. Lighting: Warm, Comforting, & Productive Lighting at Night
9. Interaction: Multi-sensory Application For The User Effect

SECTION

1. Spatial Arrangement & Zoning: Growth and Freedom Storyline
2. Building Envelope: Kinetic Movement Respond to Climate and Predator
3. Mass Arrangement & Layout: Climate Respond and Experience Height
4. Landscape & Vegetation: Type, Time, Size, and Functional
5. Construction: Modular Floating Structure and Hard Corrosion Material
6. Interaction: Multi-sensory Application For The User Effect and Experience
7. Water Irrigation: Sponge System, Water Flow, and Distribution Brakish & Fresh

ELEVATION

1. Spatial Arran Zoning: Situ Height Respo
2. Building Envel Color, and F Affect in Exp. a
3. Construction Floating Stru Hard Corrosi

	INTERIOR RENDERING	EXTERIOR RENDERING	EXPLODE AXONOMETRY	DETAIL
1	ngement & ation & B. nd Storyline	1 Context, Time, Freedom, & Growth Storyline User Activity	1 Context, Time, Freedom, & Growth Storyline User Activity	1 Kinetic Env. Movement Material & Function	1 Building Envelope: Kinetic Env. Movement Respond Climate & Predator
2	ope: Kinetic, unctional nd Predator)	2 Color and Functional Affect in Experience and Predator	2 Color and Functional Affect in Experience and Predator	2 Modular Floating Structure and Hard Corrosion Material	2 Construction: Modular Floating Structure and Hard Corrosion Material
3	n: Modular ucture and on Material	3 Modular Floating Structure and Hard Corrosion Material	3 Modular Floating Structure and Hard Corrosion Material		3 Water Irrigation: Sponge System Water Irrigation for Nursery Building
		4 Interaction based on Multi-sensory User Effect & Experience	4 Interaction based on Multi-sensory User Effect & Experience		
		5 Warm, Comforting, and Productive Lighting at Night			

LEGEND FLOOR PLAN & APPLICABLE SCHEMATIC

Community Space	: 1st Floor (1, 2, 3, 4, 5, 9)
Souvenir Shop	: 1st Floor (1, 2, 9)
Additional Facility	: 1st Floor (1, 2, 3, 4, 9)
Workshop	: 1st Floor (1, 2, 3, 9)
Mangrove Ecorium	: 1st Floor (1, 2, 3, 6, 7, 9)
Laboratorium	: 1st Floor, 2nd Floor (1, 2, 3, 6, 7, 9)
Interpretation Space	: 1st Floor, 2nd Floor (1, 2, 3, 4, 5, 6, 7, 9)
Storage	: 1st Floor, 2nd Floor, 3rd Floor (3, 6, 8)
Botanical Garden	: 1st Floor, 2nd Floor, 3rd Floor (1, 2, 3, 4, 5, 6, 7, 8, 9)
Mangrove Nursery Sowing	: 1st Floor, 2nd Floor, 3rd Floor (1, 2, 3, 4, 5, 6, 7, 8, 9)
Mangrove Nursery Weaning	: 1st Floor, 2nd Floor, 3rd Floor (1, 2, 3, 4, 5, 6, 7, 8, 9)
Observation Tower	: 1st Floor, 2nd Floor, 3rd Floor, 4th Floor (1, 2, 3, 7, 9)

03

“NURSERY are attracted to mangrove forests for the high food availability, cooler water with higher oxygen content and the refuge they provide.”

- IUCN and TNC -

SITE CONTEXT CONCEPT EXPLORATION
DESIGN THEME CONCEPT EXPLORATION
BUILDING FUNCTION CONCEPT EXPLORATION
FIGURATIVE CONCEPT EXPLORATION

DETERMINING THE DESIGN DIRECTION

Enriching the concept of architectural ideas from the analysis that has been done by providing various alternatives and ideas before going to the next stage.

CONCEPT BASED ON ANALYSIS

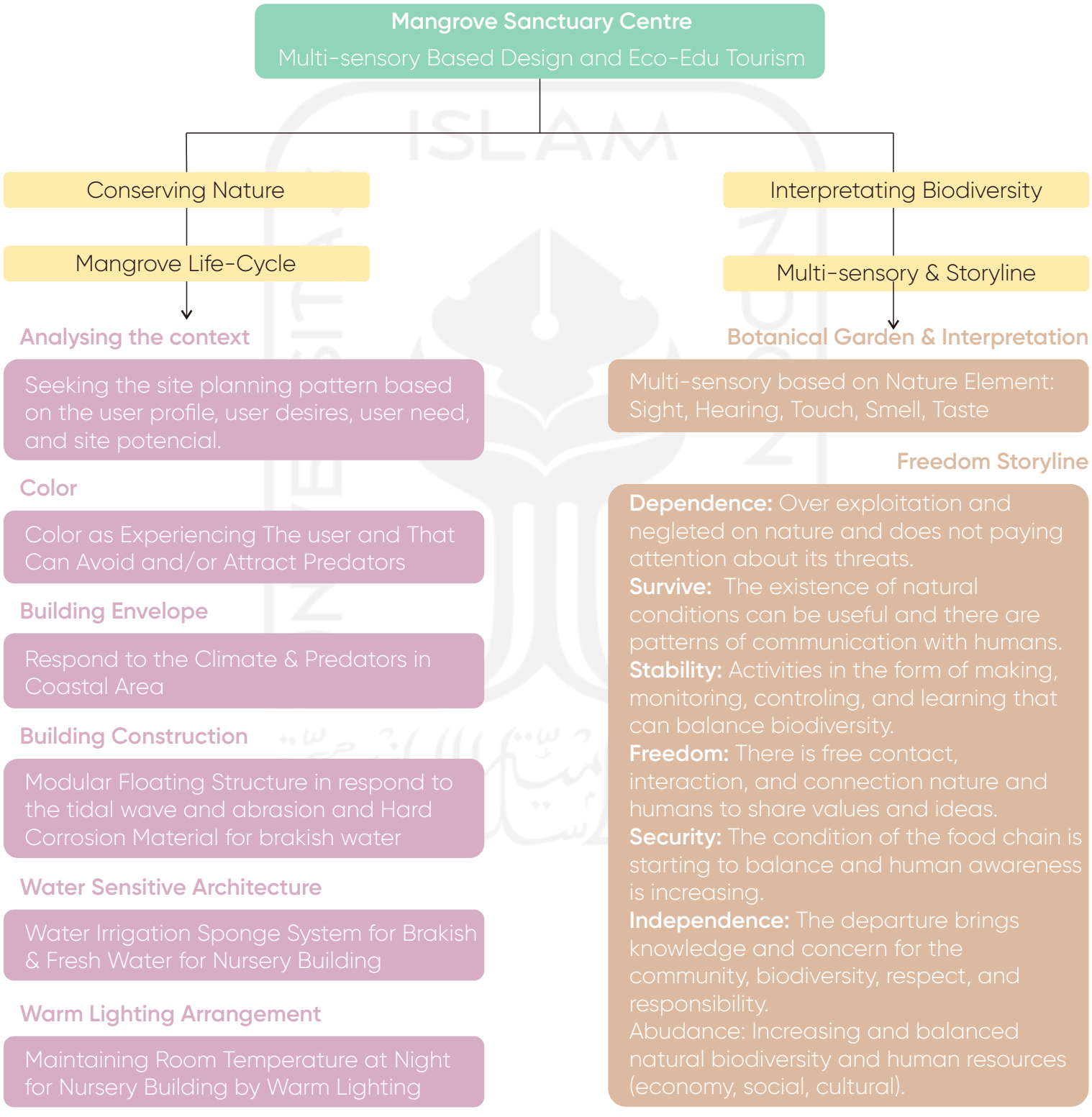
BUILDING CONCEPT DESCRIPTION

Figure 156. Building Concept Description Diagram
Source: Author
(proccessed on 27 June 2022)

Mangrove Sanctuary Center Building is grouped based on activity on site. The first is conservation. There are activities in the form of rehabilitation and restoration of mangrove plants as well as their habitats. This conservation is based on the sequence that occurs in the mangrove life-cycle, namely fertilization, seed, sowing, weaning, released, and adult. Second, the interpretation section is providing education and training by introducing nature to visitors. Third, Cultivation as a means of unifying the community to empower natural resources and human resources. Lastly, Recreation is meant to help marketing mangroves and many hands are involved in empowering them.

BUILDING MASS CONCEPT RESPONSE

Figure 157. Building Mass Concept Mapping
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

1.1 SPATIAL ARRANGEMENT: User Activity Flow

PROPERTY SIZE AND CONCEPT APPLICABLE (@) ROOM

Z: Zoning A: Accesibility V: Vegetation E: Envelope LA: Layout ST: Structure MA: Material
W: Water Irrigation LI: Lighting SI: Signance & Fence MU: Multi-sensory B: Building mass

No	User Capacity	0,6x0,6	0,36	m2	Calculation of Property Size and Design Concept														
	Furniture Capacity	0,6x0,6	0,36	m2															
	Zone	Space Need	User Capacity	Furniture Capacity	@	Area	Circulation	Total Area	Room Criteria										
									Z	A	V	E	LA	ST	MA	B	W	LI	SI	MU
1	Conservation Centre	Community Space	50	55	1	37,8	30%	49,14											
		Ticket Retribution Post	6	6	10	43,2	30%	56,16											
		Information Desk	4	4	1	2,88	30%	3,74											
		Lobby	10	2	1	4,32	50%	6,48											
		Corridor	200	0	1	72	100%	144,00											
		Corridor Garbage	200	0	1	72	100%	144,00											
		Warehouse	10	10	8	57,6	30%	74,88											
		Laboratorium & Research	50	10	1	21,6	100%	43,20											
		Soaking Space	50	1	50	918	100%	1836,00											
		Water Tank	4	2	1	2,16	30%	2,81											
		Management Room	10	10	2	14,4	100%	28,80											
		Office	20	20	1	14,4	50%	21,60											
		Nursery Lab (sowing bed)	200	400	2	432	100%	864,00											
		Nursery Lab (Weaning Bed)	200	200	1	144	100%	288,00											
		Sungkup	200	200	1	144	100%	288,00											
		Observation Tower	10	4	1	5,04	100%	10,08											
		Mangrove Ecorium	200	10	1	75,6	100%	151,20											
		Hall & Plaza	50	50	3	108	100%	216,00											
		Treatment Room	200	200	1	144	100%	288,00											
		Botanical Garden	200	200	1	144	100%	288,00											
	Eco-edu Tourism	Interpretation Gallery	200	200	1	144	100%	288,00											
	(Interpretative)	Gampling	50	1	10	183,6	50%	275,40											
		Souvenir Shop	50	10	1	21,6	50%	32,40											
		Workshop Space	50	100	1	54	100%	108,00											
		Mangrove Labirinth	100	200	1	108	100%	216,00											
		Port	50	20	1	25,2	100%	50,40											
		Mini-library	10	20	1	10,8	50%	16,20											
		Cafetaria or Foodcourt	20	25	1	16,2	50%	24,30											
		Gajebo	4	4	6	17,28	30%	22,46											
	Supporting Facilities	Parking Lot	50	50	1	36	100%	72,00											
		Locker Room	20	20	1	14,4	50%	21,60											
		Lavatory	10	10	3	21,6	50%	32,40											
		Toilet	10	10	3	21,6	30%	28,08											
		Mushola	50	50	1	36	100%	72,00											
		Security Room	2	2	1	1,44	30%	1,87											
		Janitor Room	4	4	1	2,88	30%	3,74											
		MEE Room	4	4	2	5,76	30%	7,49											
		Bicycle Rack Rent	10	10	1	7,2	50%	10,80											
Total								6087,24	17	17	12	9	12	**14**	**14**	**10**	**10**	**8**	**9**	**14**

USER ACTIVITY FLOW CONCEPT

The activity flow want to consider of arranging the spaces and connection (spatial arrangement) that could make the interactive learning and emphasize the user empathy for conserving the mangrove by giving the stimulation of multi-sensory experience. The sense should be enhancing and highlighted the nursery order based on mangrove Life-cycle. It can be divided on the 3 group consist of, Mangrove Community in term of cultivating and conserving, Public Visitor (Tourism) in term of give interpretating, and Management for supporting.

Mangrove Communities

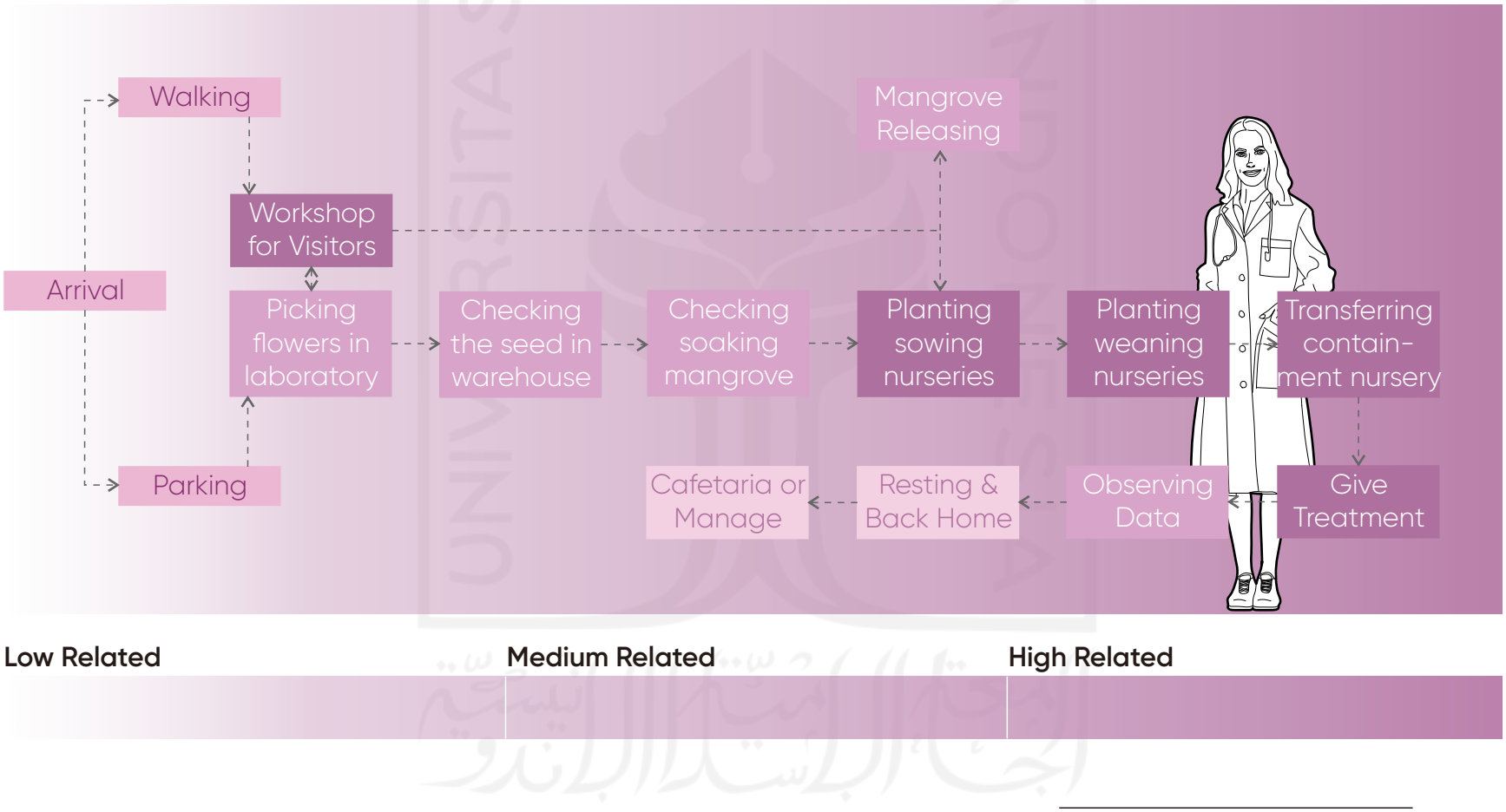
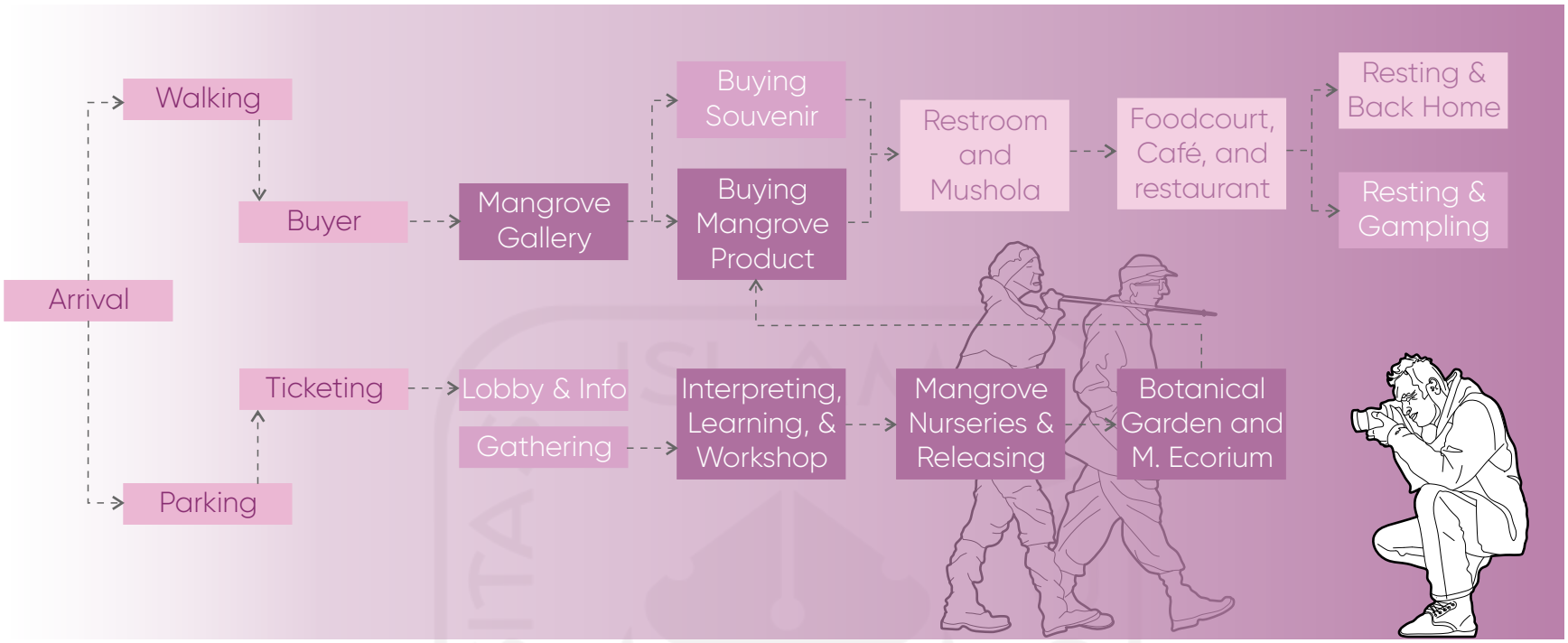


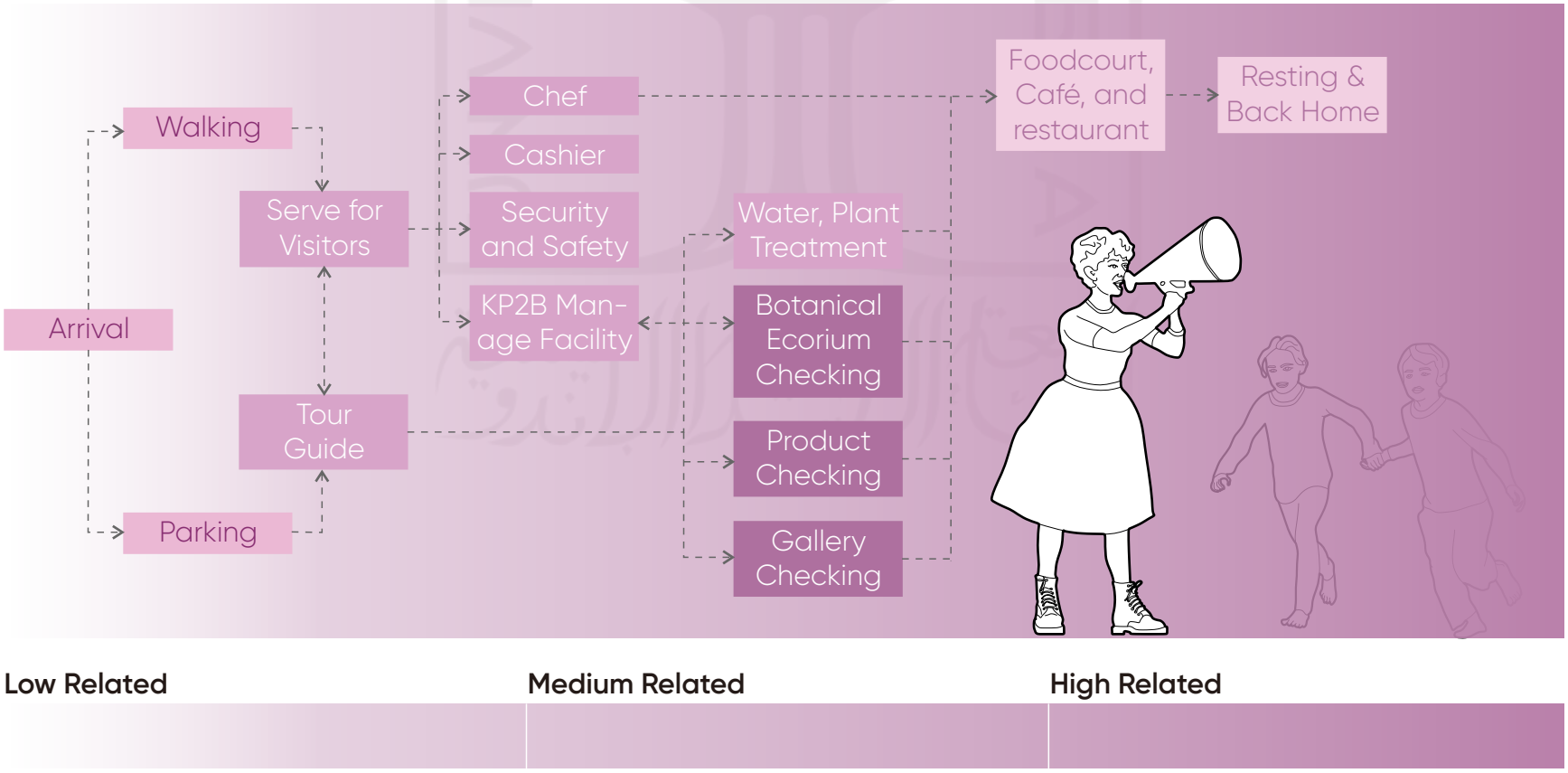
Figure 158. Property Size and Concept Application
Source: Author
(proccessed on 27 June 2022)

Figure 159. User Flow Concept
Source: Author
(proccessed on 27 June 2022)

Public Visitors (Tourism)



Management



1.2 SPATIAL ARRANGEMENT: Number of Seed and Planting Pattern Needed

DETERMINING HOW MANY SEED ARE NEEDED

1. Calculation how many seedlings are needed and how much space each seedling will require

If spaced at 25 cm apart, each seedling will take up 0.25 m x 0.25 m = 0.0625 m2

If spaced at 1 m apart, each seedling will take up 1 m x 1 m = 1 m2

2. Determine the proportions of the zones and then calculate the area of each zone

The total building module area is 1,000 m2, and half is going to be for Rhizophora/Avinecia/Nypa/Bruguira, then the proportion will be 50% and the area for that zone will be 50% x 14 m2 = 7 m2 and 50% x 6 m2= 3 m2. For the total module each building is 7 m2 x 6 = 42 m2 and 3 m2 x 6 = 18 m2. The total Nursery building Area is 180 m2 with whole building area 315 m2.

3. Divide the area of each zone by the area needed for each species to get the number of seedlings required per zone

If the species being planted requires 0,0625 m2 per seedling and the zone for that species is 14 m2 will need 14:0,0625 = 224 seedlings to fill the area.

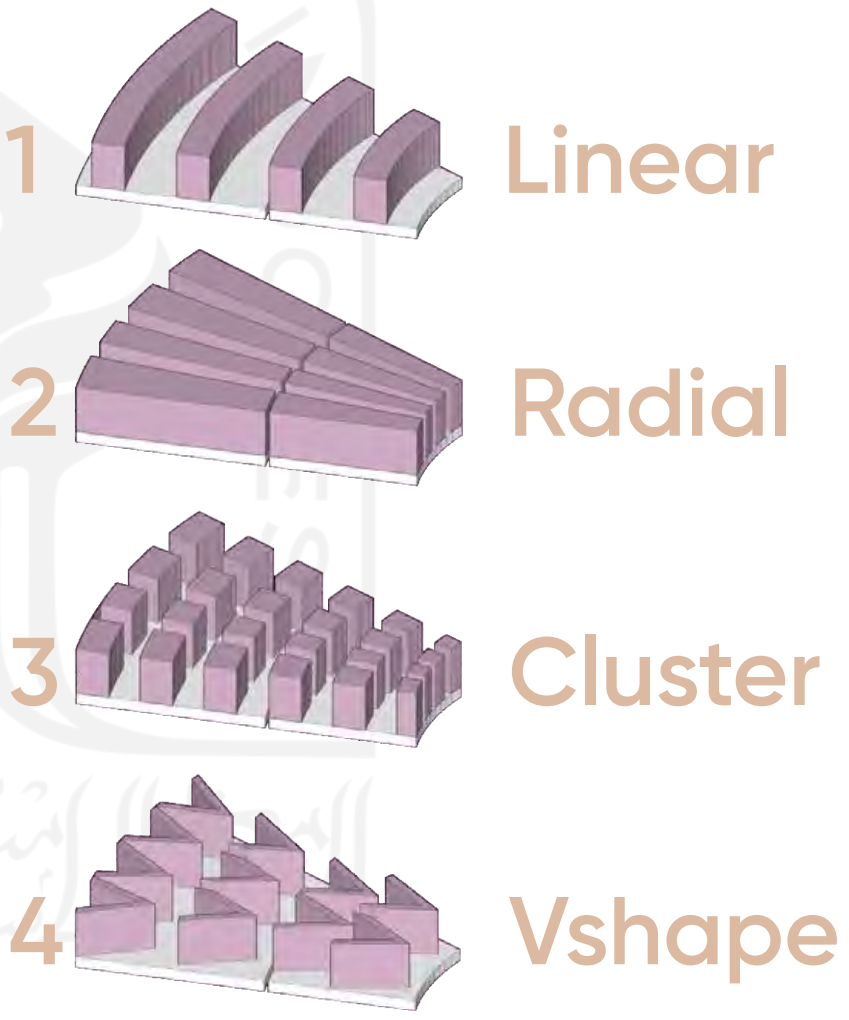
If the species being planted requires 0,0625 m2 per seedling and the zone for that species is 7 m2 will need 6:0,0625 = 96 seedlings to fill the area.

4. Estimate how many seedlings will survive the nursery phase (e.g., 80% will survive)

The survival rate is expected to be 80%, then 320:0.8 = 256 seedlings need to be raised.

DETERMINING KIND OF PLANTING PATTERN

In order to respond the site with moderate-high wind velocities and wave so the pattern planting should be have arrangement that distinguish and separate not blocking just in some part.



Number 2 and 3 will be selected pattern because it can separated the wind equally in every part.

Figure 160. Nursery Spatial Pattern
Source: Author
(proccessed on 27 June 2022)

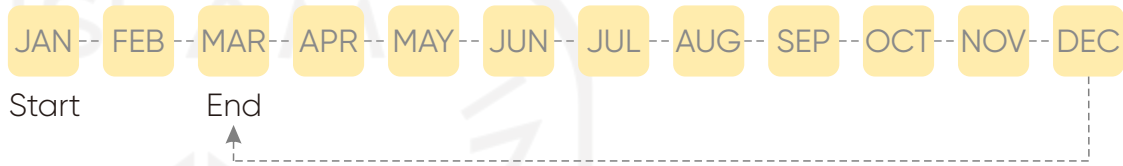
CONCEPT according to the problem

1.3 SPATIAL ARRANGEMENT: zoning & layout based on the time and species

Mangrove planting activities should not only rely on one type of mangrove, but various types (polyculture). Until now, it is still very rare for mass mangrove planting programs at the national level that put forward the concept of polyculture. In fact, by only planting one type of mangrove (monoculture), it will have a lot of losses for the mangrove ecosystem, one of which is vulnerable to damage if attacked by pests (Efendi. GR, Mangrovemagz, 2022). Based on the time, designer grouping the zones.

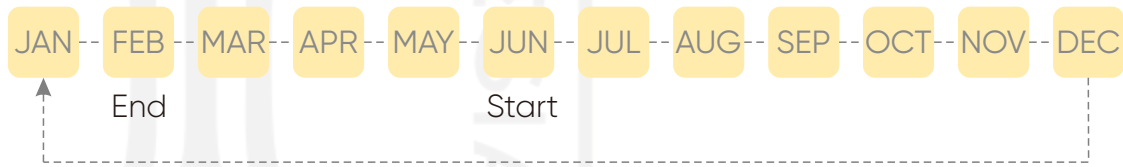
FRUIT PHASE

1. **MANGROVE API-API** ***(Avicennia marina)***
   61 weeks - 15 months - 1 year 3 months



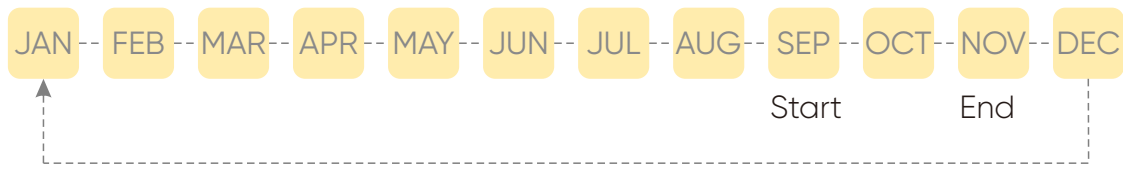
2. **PEDADA** ***(Sonneratia alba)***
   15 weeks - 4 months

3. **TANJANG** ***(Bruguira gymnariza)***
   36 weeks - 9 months



4. **TENGAL** ***(Ceriops tagal)***
   60 weeks - 15 months - 1 year 3 months

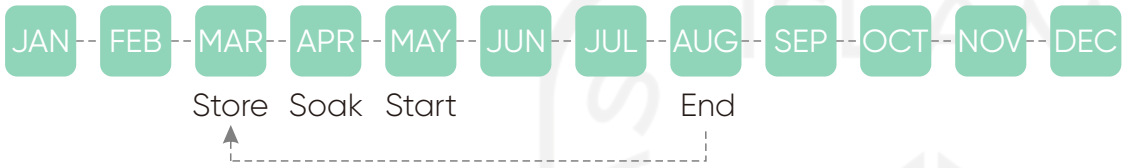
5. **BAKAU** ***(Rhizopora sp.)***
   61 weeks - 15 months - 1 year 3 months



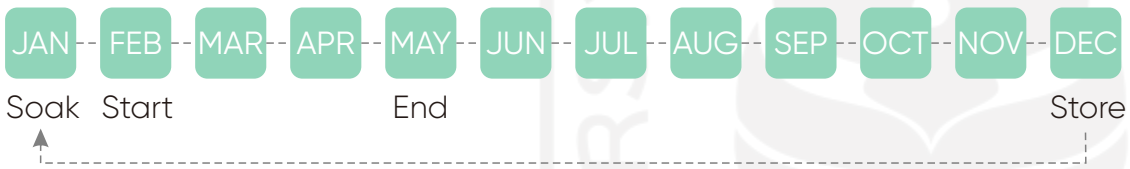
CONCLUSION: ALL+10 DAYS

NURSERY SOWING PHASE

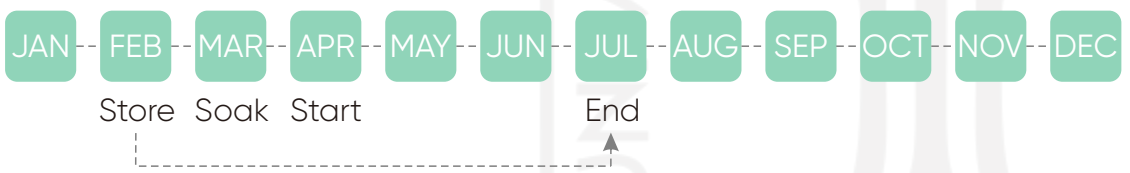
1. **MANGROVE API-API** *(Avicennia marina)*
   Storage 1 month, Soaking 1 month, End 4 month



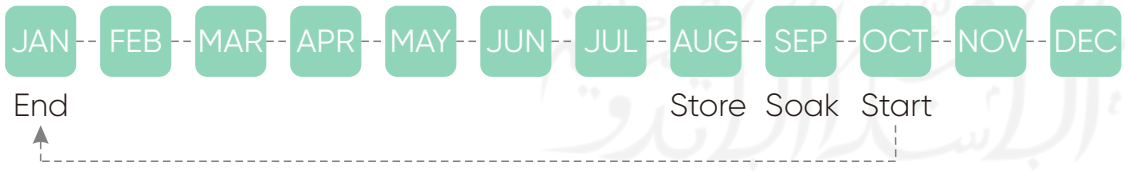
2. **PEDADA** *(Sonneratia alba)*
   Storage 1 month, Soaking 1 month, End 4 month



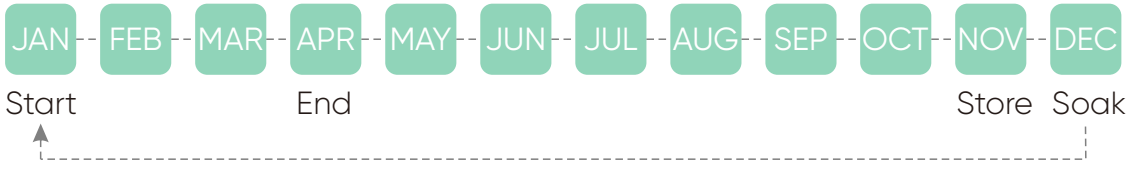
3. **TANJANG** *(Bruguira gymnariza)*
   Storage 1 month, Soaking 1 month, End 4 month



4. **TENGAL** *(Ceriops tagal)*
   Storage 1 month, Soaking 1 month, End 4 month



5. **BAKAU** *(Rhizopora sp.)*
   Storage 1 month, Soaking 1 month, End 4 month



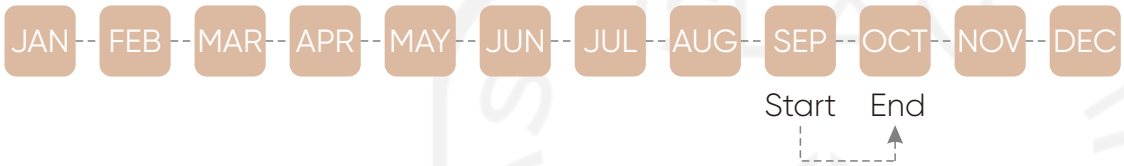
CONCLUSION: ALL and separate into 2 zones

Figure 161. Fruit Phase
Source: Author
(proccessed on 27 June 2022)

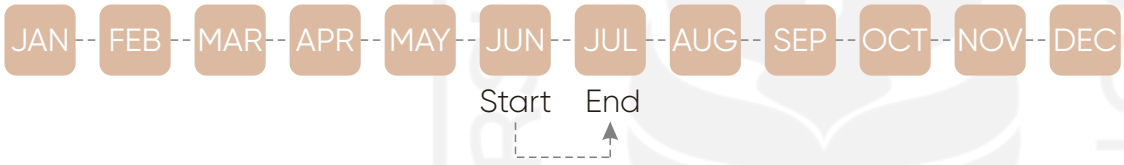
Figure 162. Nursery Sowing Phase
Source: Author
(proccessed on 27 June 2022)

NURSERY WEANING PHASE

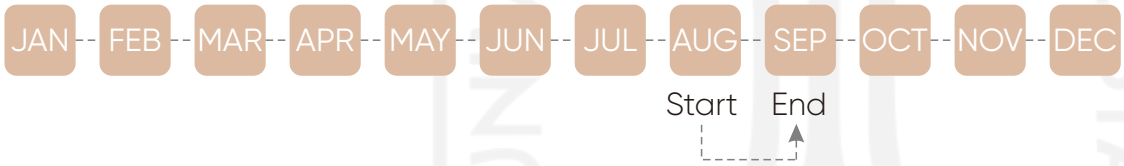
1. **MANGROVE API-API** *(Avicennia marina)*
   1-2 months



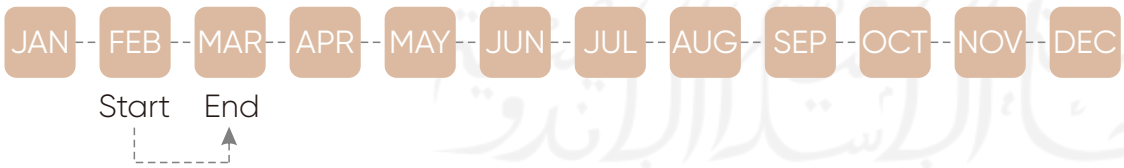
2. **PEDADA** *(Sonneratia alba)*
   1-2 months



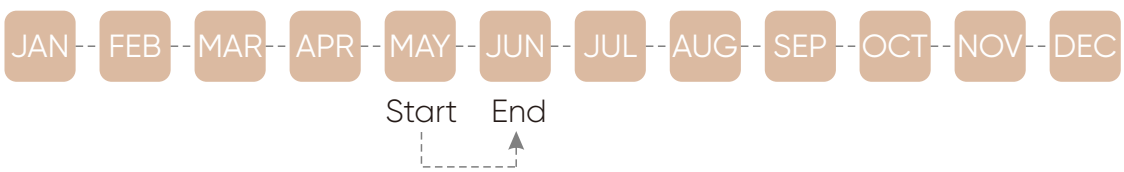
3. **TANJANG** *(Bruguira gymnariza)*
   1-2 months



4. **TENGAL** *(Ceriops tagal)*
   1-2 months



5. **BAKAU** *(Rhizopora sp.)*
   1-2 months

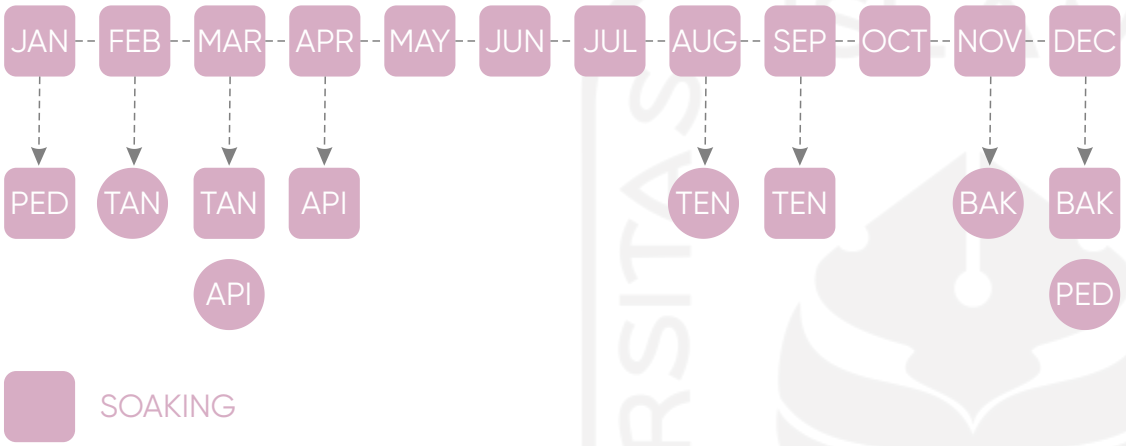


CONCLUSION: ALL if 1 zones, NOT ALL if separate into 2 zones

1
NON-ZONES

2
ZONES
X JAN, APR, NOV, DEC

SEED PHASE



MANGROVE RELEASED PHASE

DEC **1. MANGROVE API-API** *(Avicennia marina)*

OCT **2. PEDADA** *(Sonneratia alba)*

AUG **3. TANJANG** *(Bruguira gymnariza)*

APR **4. TENGAL** *(Ceriops tagal)*

JUL **5. BAKAU** *(Rhizopora sp.)*

X JAN, FEB, MAR, MAY, JUN, SEP, NOV

Figure 163. Nursery Weaning Phase
Source: Author
(proccessed on 27 June 2022)

Figure 164. Seed Phase
Source: Author
(proccessed on 27 June 2022)

CONCEPT according to the problem

1.4 SPATIAL ARRANGEMENT: zoning & layout based on storyline spatial flow

The functionally of Mangrove Baros Conservation Centre, Nursery Laboratory, and Interpretation Centre was defining as special type of building typology that have to maximixe the concept of rehabititating and restoring the mangrove plantation according to the life-cycle. In order to raised up the value, several points need to be consider such as learning, research, natural resources, infrastructure, management (community involvement), and user-nature interaction to fulfill the point of ***Integrating and Interfacing, Networking and Connecting, Growing and Inspiring.*** It was also have an additional function and facility to supporting tourism activity by Local KP2B Community that managing Mangrove Conservation to spread the knowledge, built an interaction, and introducing and promoting the advantage of mangrove.

Tomlinson (1986) and Wightman (1989) define mangroves as plants found in tidal areas and also as communities. Mangroves are also defined as a typical littoral plant formation on protected tropical and subtropical coasts (Saenger et al, 1983). Based on that theory, the designer decided to explore growth scenarios to protect mangroves. The freedom of the user.

Stage 0 : Dependence
Stage 1 : Survive
Stage 2 : Stability
Stage 3 : Freedom
Stage 4 : Security
Stage 5 : Independence
Stage 6 : Abundance

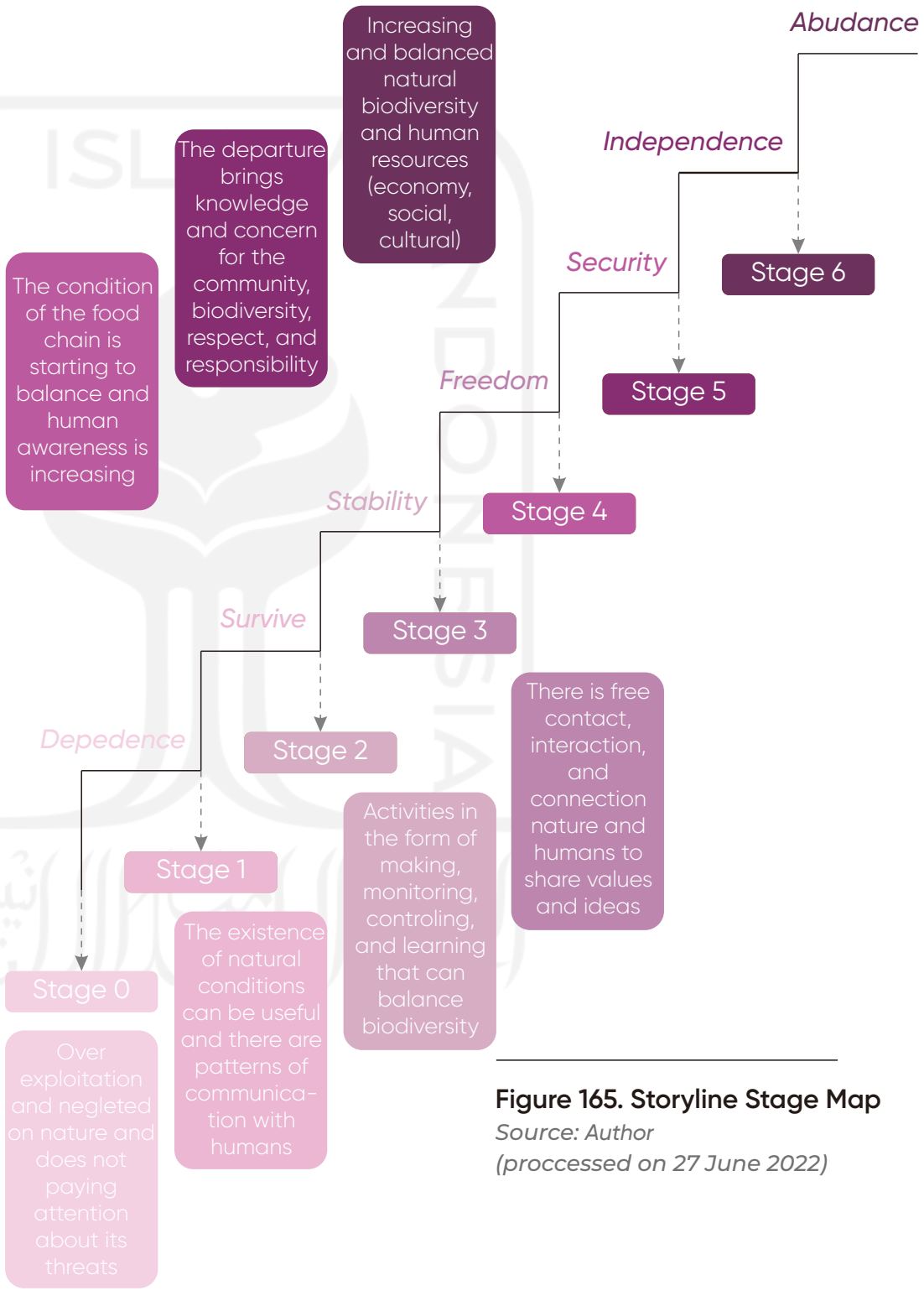


Figure 165. Storyline Stage Map
Source: Author
(proccessed on 27 June 2022)

CONCEPT according to the problem

SPATIAL ARRANGEMENT: experience scenario based on storyline

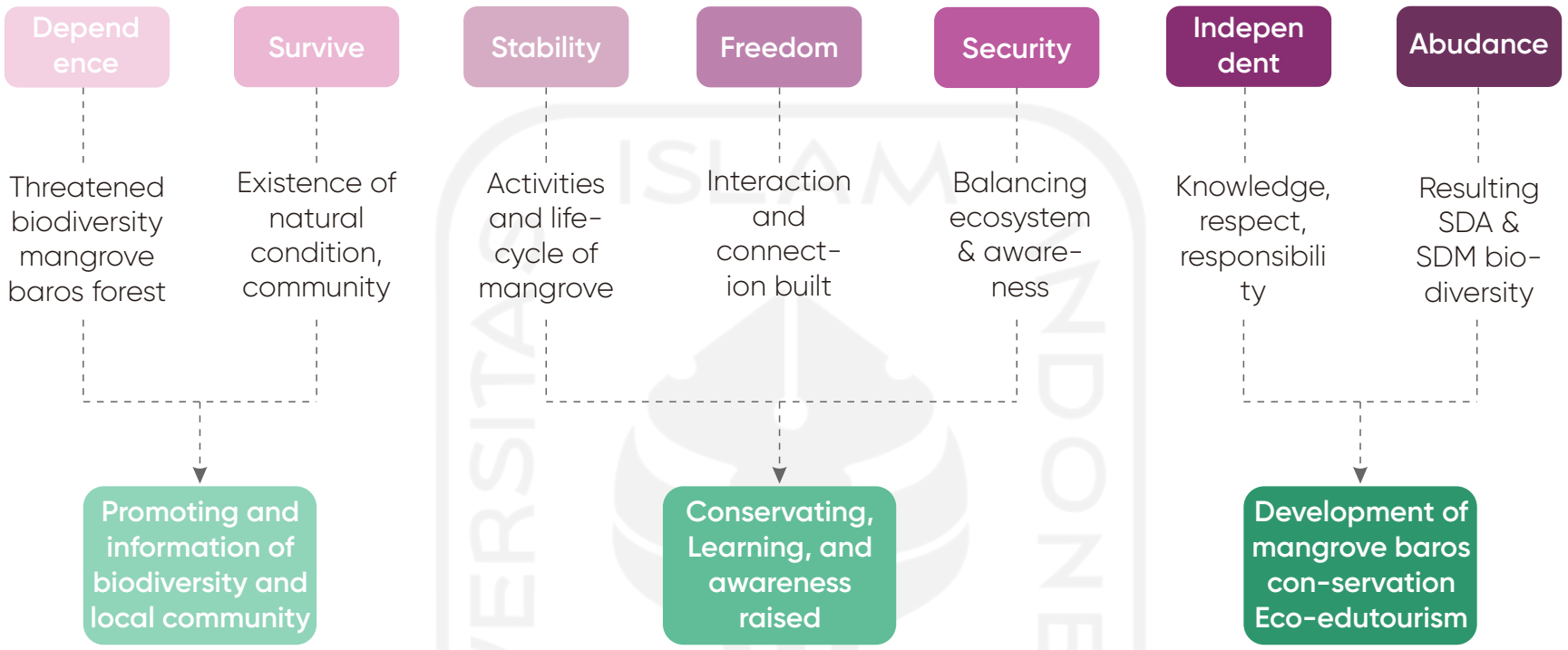
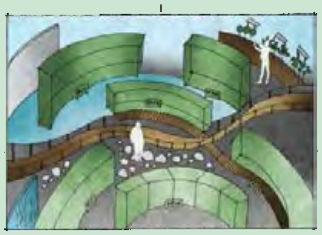


Figure 166. Experience Scenario Based on Storyline

Source: Author
(proccessed on 27 June 2022)

Figure 167. Storyline Mapping in Siteplan
Source: Author
(proccessed on 27 June 2022)



STAGE 5

STAGE 2

STAGE 5

STAGE 2

LEGEND

Stage 6: Abudance

Increasing and balanced natural biodiversity and human resources (economy, social, cultural)

Stage 5: Independence

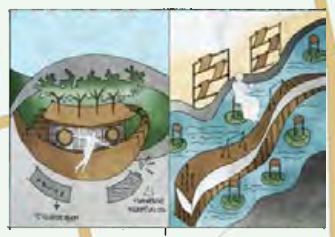
The departure brings knowledge and concern for the community, biodiversity, respect, and responsibility

Stage 4: Security

The condition of the food chain is starting to balance and human awareness is increasing

Stage 3: Freedo

There is fre interaction, ar nature and hu values and idea



STAGE 6

STAGE 0

STAGE 3

STAGE 4

STAGE 5

STAGE 6

STAGE 3

CONCEPT according to the problem

SPATIAL ARRANGEMENT: storyline mapping in whole siteplan

Stage 2: Stability

Activities in the form of making, monitoring, controling, and learning that can balance biodiversity

Stage 1: Survive

The existence of natural conditions can be useful and there are patterns of communication with humans

Stage 0: Dependence

Over exploitation and negleted on nature and does not paying attention about its threats

DESIGN CONCEPT: SPATIAL ARRANGEMENT

SENTRA SATWA MANGROVE SERENITY

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CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 0 - DEPENDENCE (ENTRANCE GATE)
Over exploitation and negleted on nature and does not paying attention about its threats. Threatened biodiversity Mangrove Baros Forest. Promoting and give information about biodiversity and local community.

Muddy soil, Water, Rough Stone, Wood

Splashy Water, Mangrove Wood, Hinoki cypress

Color, Rhytm, Texture, Nature, Elevation, Shape, Shadow

Water, Bird, People, Swaying tree

Color, Shape

Introducing and welcoming with the story of lost in mangrove forest with increase the sense of coriousity and mysterious journey by using the element of mangrove baros forest. Those instalation and color will make a shadow and represent a gap in the light. The user can feel the hope as well as threatened at the same time.

Romantic Silhouette Gaps
Walls with holes that will let in light and create shadows and increase the romance when walking because of the gaps.

Breathing Ivy Hanging
Hanging plants that signify mangroves have a breathing and hanging root system.

Humanity Shape Arches
Arch form as a symbol of humanity that blends with nature.

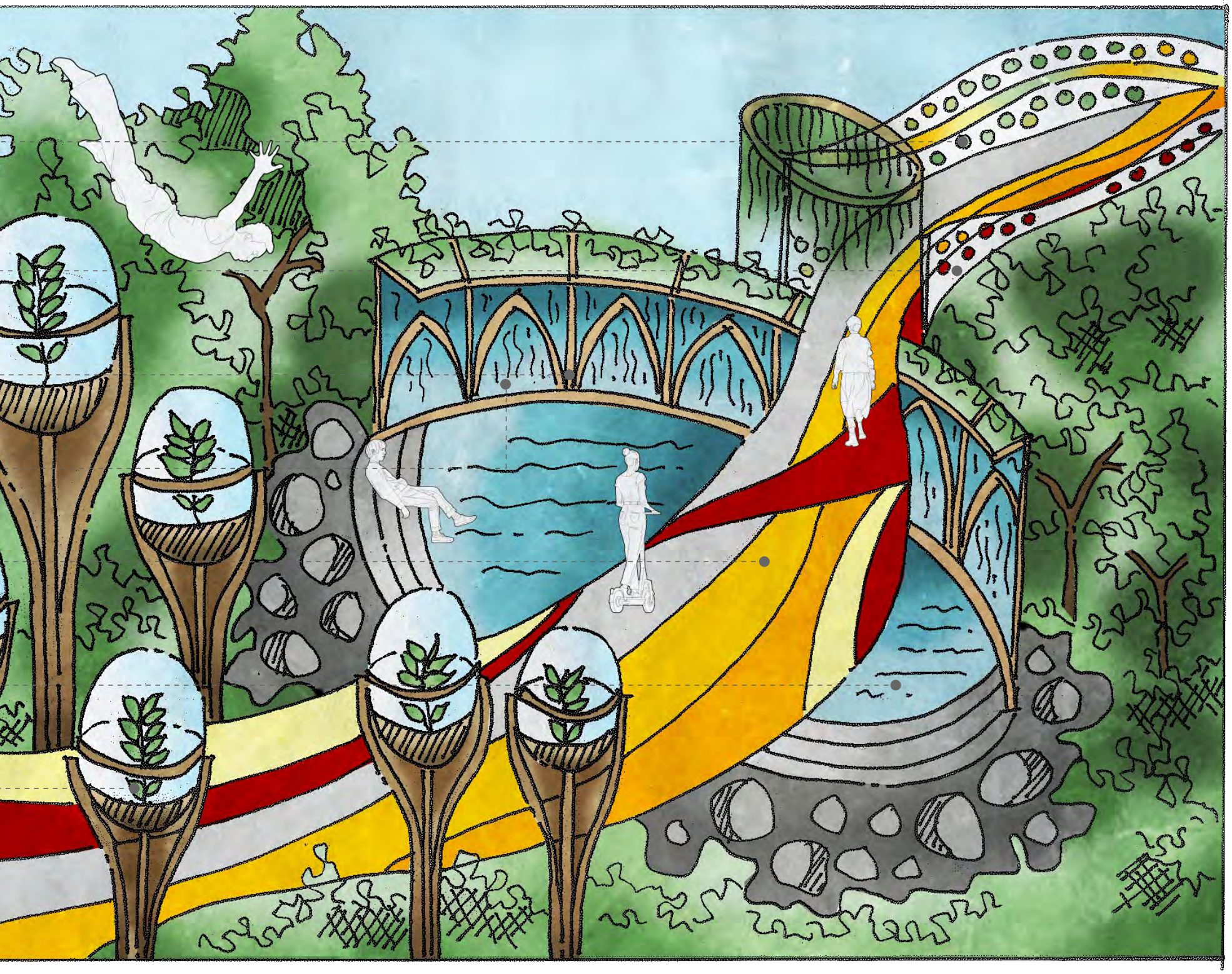
Splashes Water
The polycarbonate flowing waterfall with pool will produce sounds and splashes.

Spirit Embracement Through Color
Color pavement that could help people to see direction and embrance the spirit from warm color (red, orange, yellow)

Muddy and Rough Texture
Soft mud texture unites people with their surroundings.

Misterious Growth Plan
Mangrove seedlings planted in glass balloons and supported by wood of various sizes and arranged according to rhythm will show the growing process and produce a silhouette in the landscape.

Figure 168. Stage 0 - Dependence (Entrance Gate) Illustration
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 0 - DEPENDENCE (DELIVERING THE SPACE)
Over exploitation and negleted on nature and does not paying attention about its threats. Threatened biodiversity Mangrove Baros Forest. Promoting and give information about biodiversity and local community.

Muddy soil, Water, Rough Stone, Wood

Water, Mangrove Wood, Lemongrass

Color, Texture, Nature, Elevation

Water, Bird, People, Swaying tree

Flow along with the bridge that is surrounded by water. Visitors will be made to feel like they are drifting into nature with the game of elevation and the elements that surround it.

Experience From Surrounding
Existing mangrove trees and round lotus shape are maintained that are located in estuary river.

Walking Split The Water
Muddy river water surrounds the road with the same height as the railing.

Intimating Space
Solid wall railing with a depth and height of approximately 1 meter to give an intimate impression.

Self-Reflection
Aquatic plants that can live in brackish water and sea water function to add oxygen during the day, have broad leaves, and are low so that people can see their reflection from the surface of the water.

Raw Material Impression
Wood parquet with dark color and rough texture will give a rough impression that has not been processed properly.

Elevated Contour
To be on a different elevation, visitors will pass the stairs to go down the road. Stairs are used to slow down the walk of visitors.

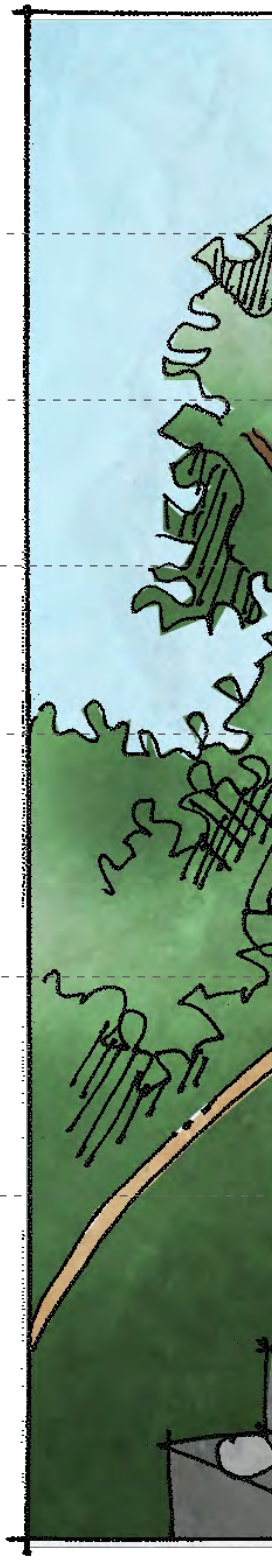
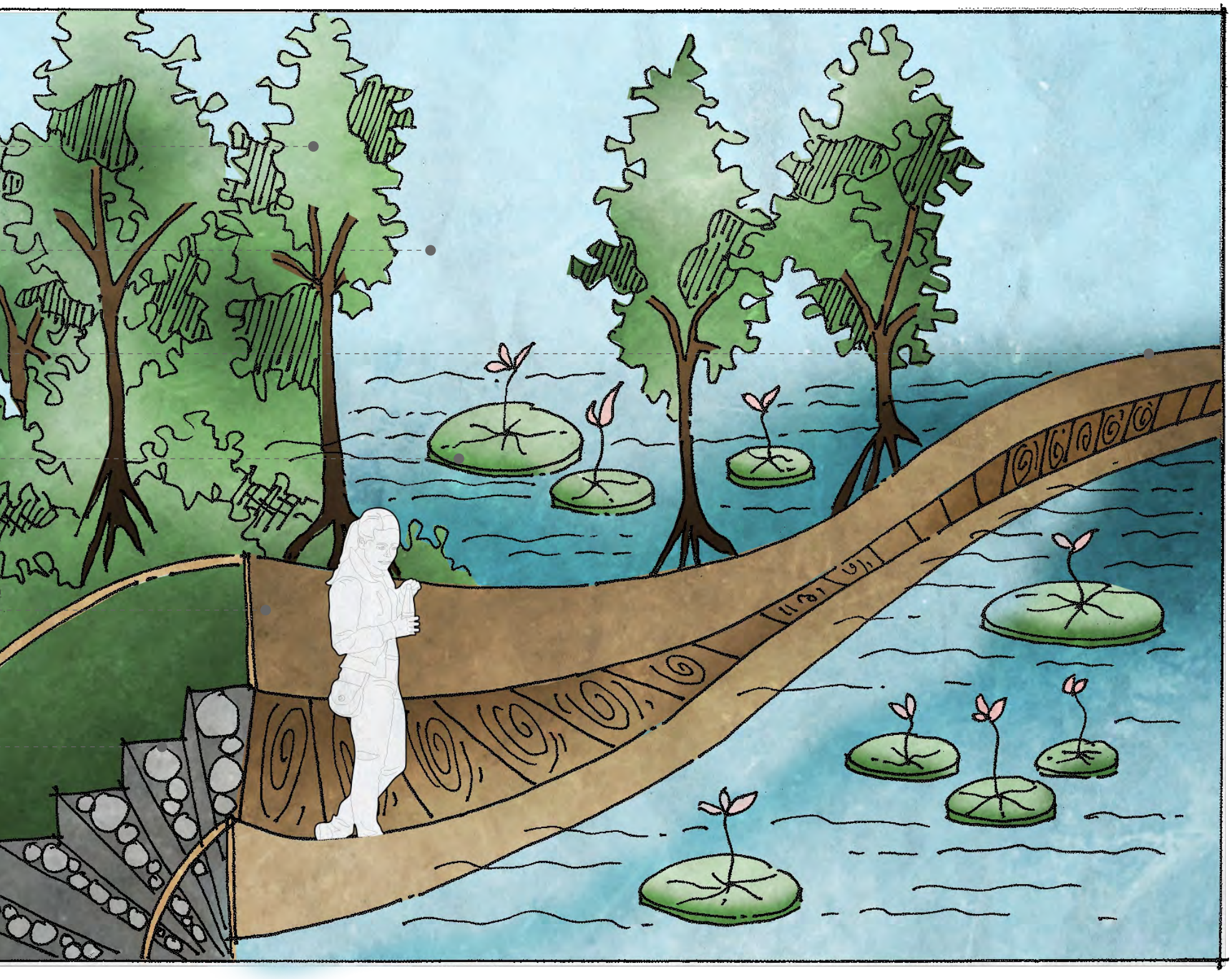


Figure 169. Stage 0 - Dependence (Delivering The Space) Illustration
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 1 - SURVAVE (ICONIC GATE)

The existence of natural conditions can be useful and there are patterns of communication with humans. Promoting and information of biodiversity and local community. Raise the impression and awareness of visitors about the importance of biodiversity in mangrove forests.

Muddy soil, Water, Rough Stone, Wood, Mangrove Leaf

Mangrove Wood, Lemon, Mangrove Leaves

Color, Rhytm, Texture, Nature, Shape

Water, Bird, People, Swaying tree

In between nature, a friendly welcome that embraces nature and a smooth and dynamic curve from all sides as an effort to welcome visitors. The arrangement of different sizes will feel more flexible. Connecting road directions from various facilities to signify the existence of the natural condition of mangroves.

Stepping in Ricefield
Natural road stepping from rice fields wrapped with stones to make walking easier and slow down so that visitors enjoy the view.

Rural Experience
The residents' rice fields are maintained according to existing conditions while providing a rural experience.

Enjoying Type of Mangrove Leaf
The user can feel the different of mangrove leaves by form, color, and texture with the many types of mangrove.

Water that falls in the wall
The user can touch and feel the temperature while listening to the gurgling sound and soothing effect of falling water.

Point of View
The mangrove tree in the middle marks the main point to be explored, rehabilitate, and restored.

Texture of Mud and Wood
The texture of the muddy soil and the distinctive smell of mud are combined with the slippery texture of the mangrove wood.

Bring Coastal Element
Rocks and sand as natural elements are often found in coastal areas.

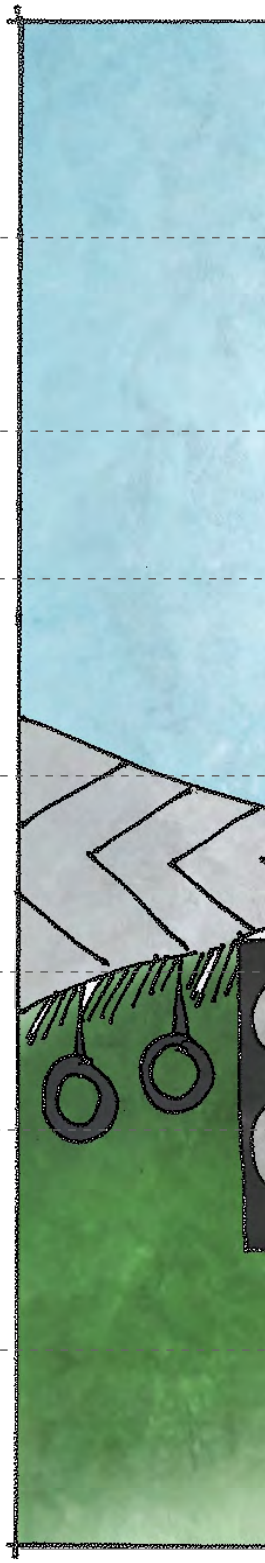
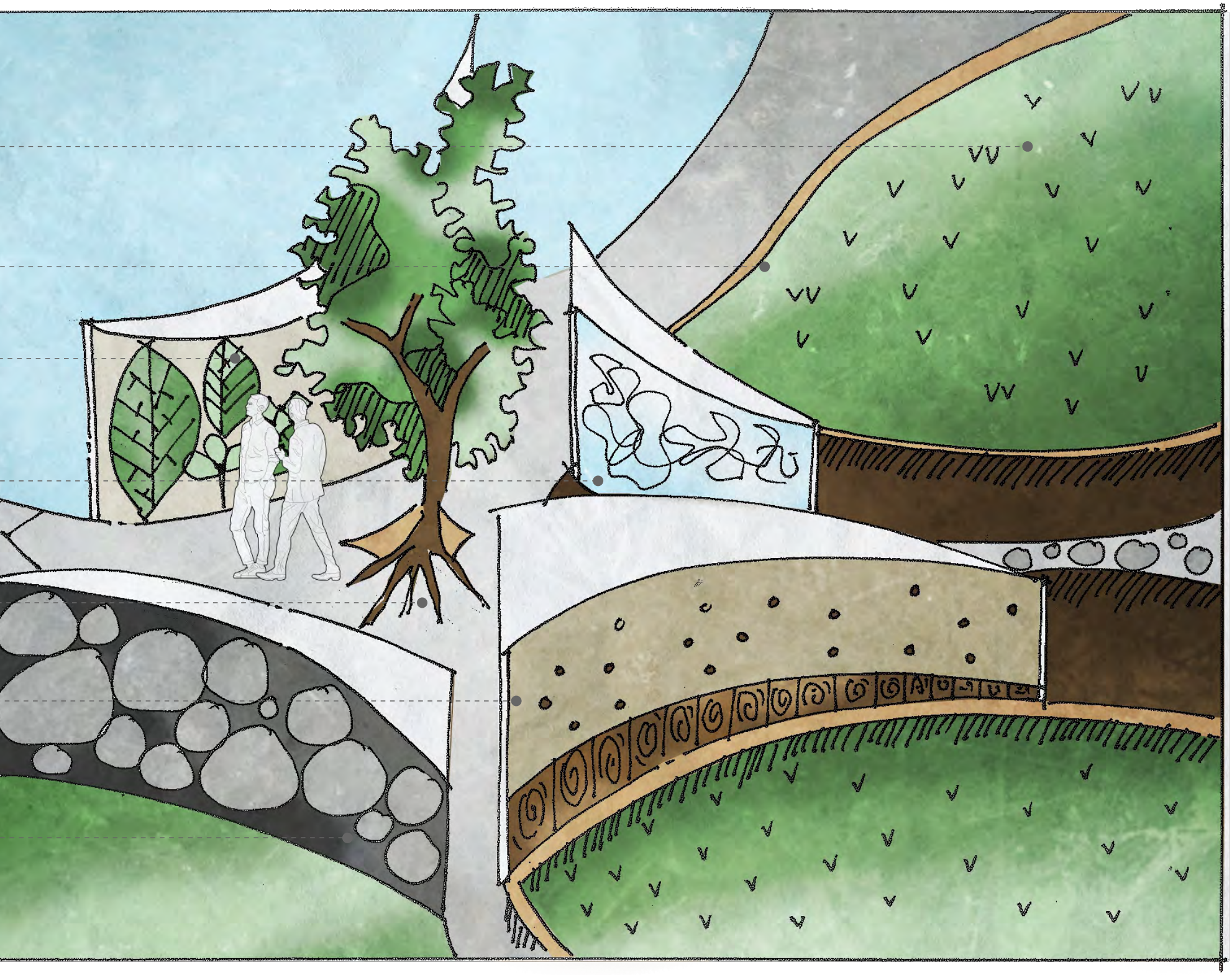


Figure 170. Stage 1 - Survive (Iconic Gate) Illustration
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 1 - SURVIVE (ALLEY)

The existence of natural conditions can be useful and there are patterns of communication with humans. Promoting and information of biodiversity and local community. Raise the impression and awareness of visitors about the importance of biodiversity in mangrove forests.

Water

Color, Rhytm, Texture, Nature, Elevation, Shape

Water, Bird, People

Intimacy and warmness shows a view of community and nature that collaborate. When entering this passage, the user will reflect on himself through the reflection of the water. Introducing visitors along the way before entering the building with curved glass that shows directly the activities that occur in a concave curved shape that can be enjoyed at every phase.

Beauty of Making

The workshop room featured mangrove distillation activities for essential oils, making drinks from mangrove fruit, dyeing batik cloth with mangrove leaves, and cloth exhibitions on display.

Slowly Move

Curved path with the material that can produce sound and have rough texture to get people move more slowly.

Rest and Therapy

Gajebo as a temporary resting place for visitors when tired, floats on the water and there is fish therapy.

Communicative Learning

Gallery displaying various products from mangroves and photos of planting activities made visually communicative with visitors.

Clear Envelope

Transparent building envelopes are used to display honestly the activities that occur in the building as direct displays.

Self-reflection

Before being taken to a building that will provide a lot of inspiration and knowledge, visitors will be missed a place to reflect on themselves in the puddle of water in a round pool.

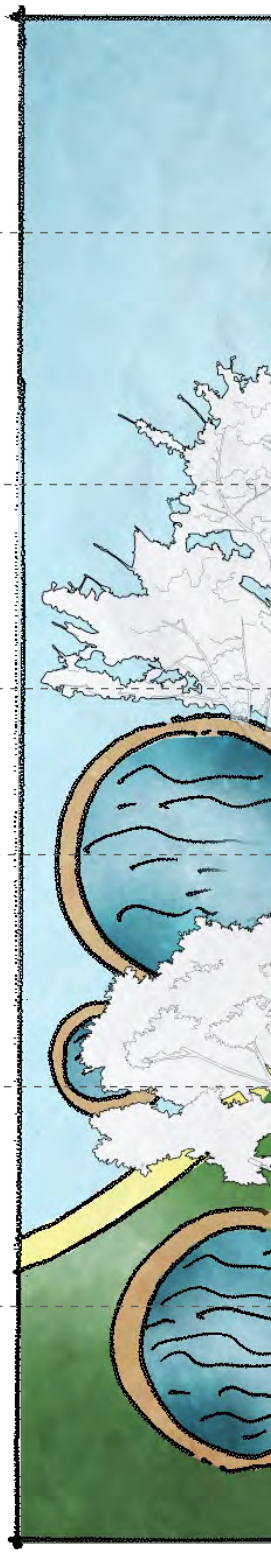
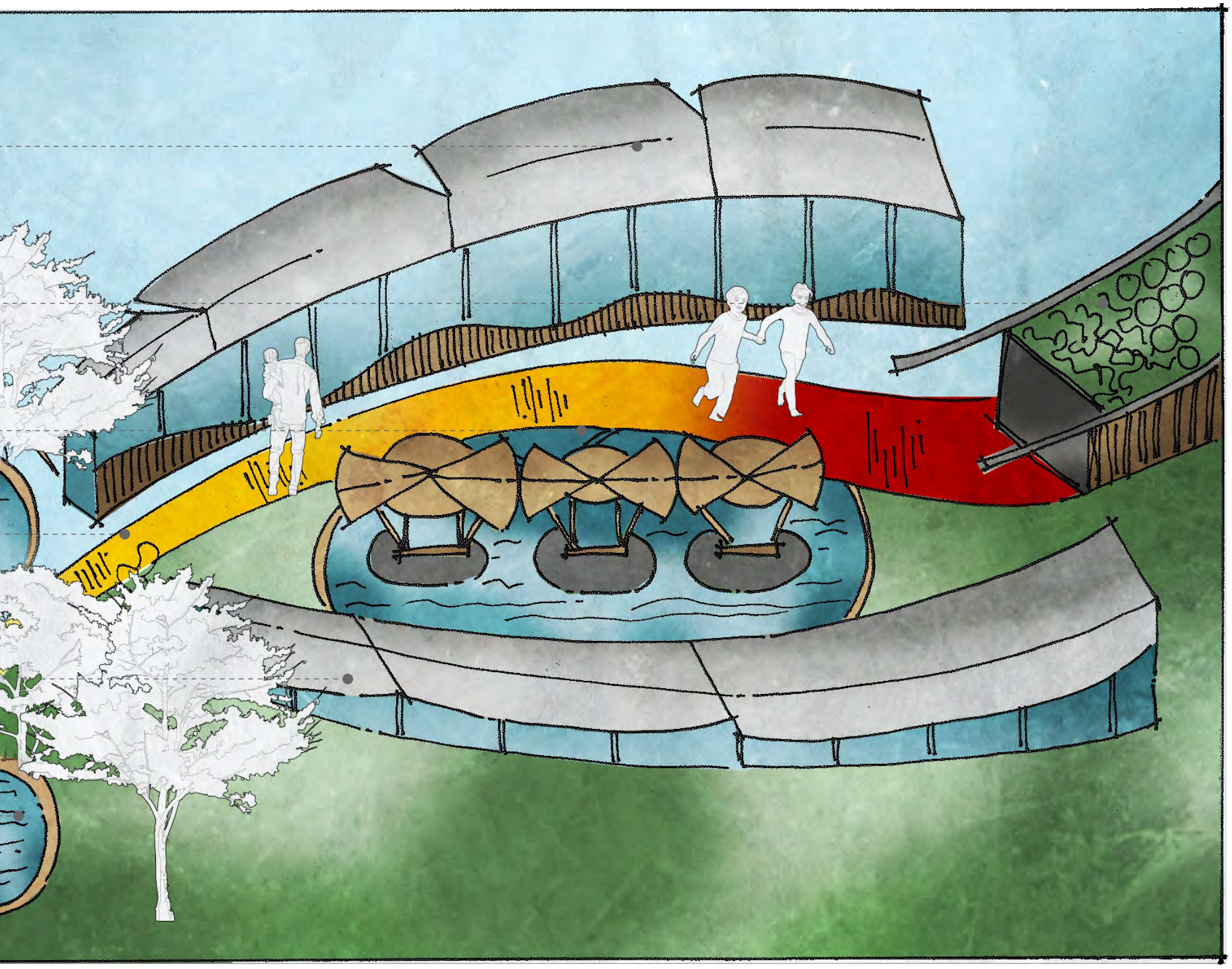


Figure 171. Stage 1 - Survive (Alley) Illustration
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 1 - SURVIVE (LOBBY)

The existence of natural conditions can be useful and there are patterns of communication with humans. Promoting and information of biodiversity and local community. Raise the impression and awareness of visitors about the importance of biodiversity in mangrove forests.

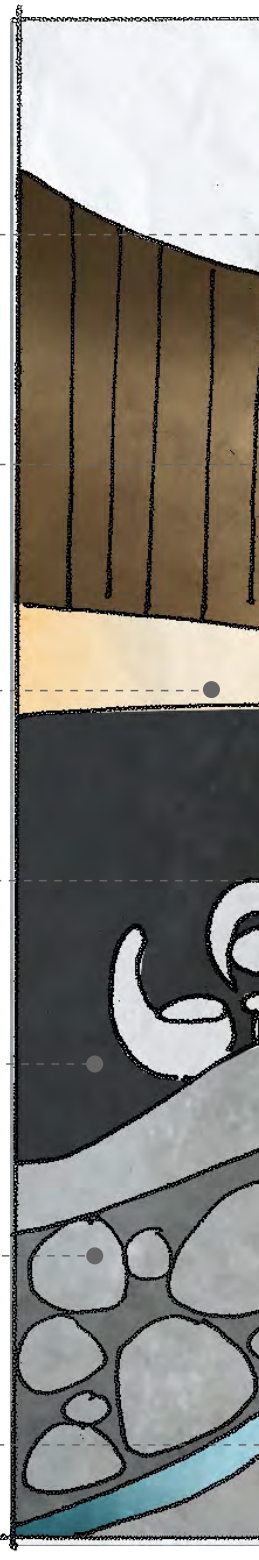
Water, Rough Stone, Wood

Hinoki cypress, Wood, Leaves, Rosemary

Color, Texture, Nature, Elevation, Shape, Shadow, Lighting

Water, People

The water flowing on the terraced path beside it is flowing with water. It is set with dark and mysterious lighting but gets a warm impression on several layers. The linear path shows the direction that is directed at the mirror and is designed to be symmetrical, indicating that humans are in between nature.



Hanging Ivy Leaves
Designed to be straight and curved to find a one-point perspective on the mirror. The room will be dark and feel like in the middle of a forest with dangling leaves.

Clean White Ceiling
The white ceiling is used to flank and is symmetrical as an intermediary on the hanging leaves, which will give a brighter and wider impression so that visitors are not cramped when crossing the lobby corridor.

Straight Warm Lighting
Apart from being warm lighting, this lamp is also designed to be linear to show direction and add to the firmness of the space.

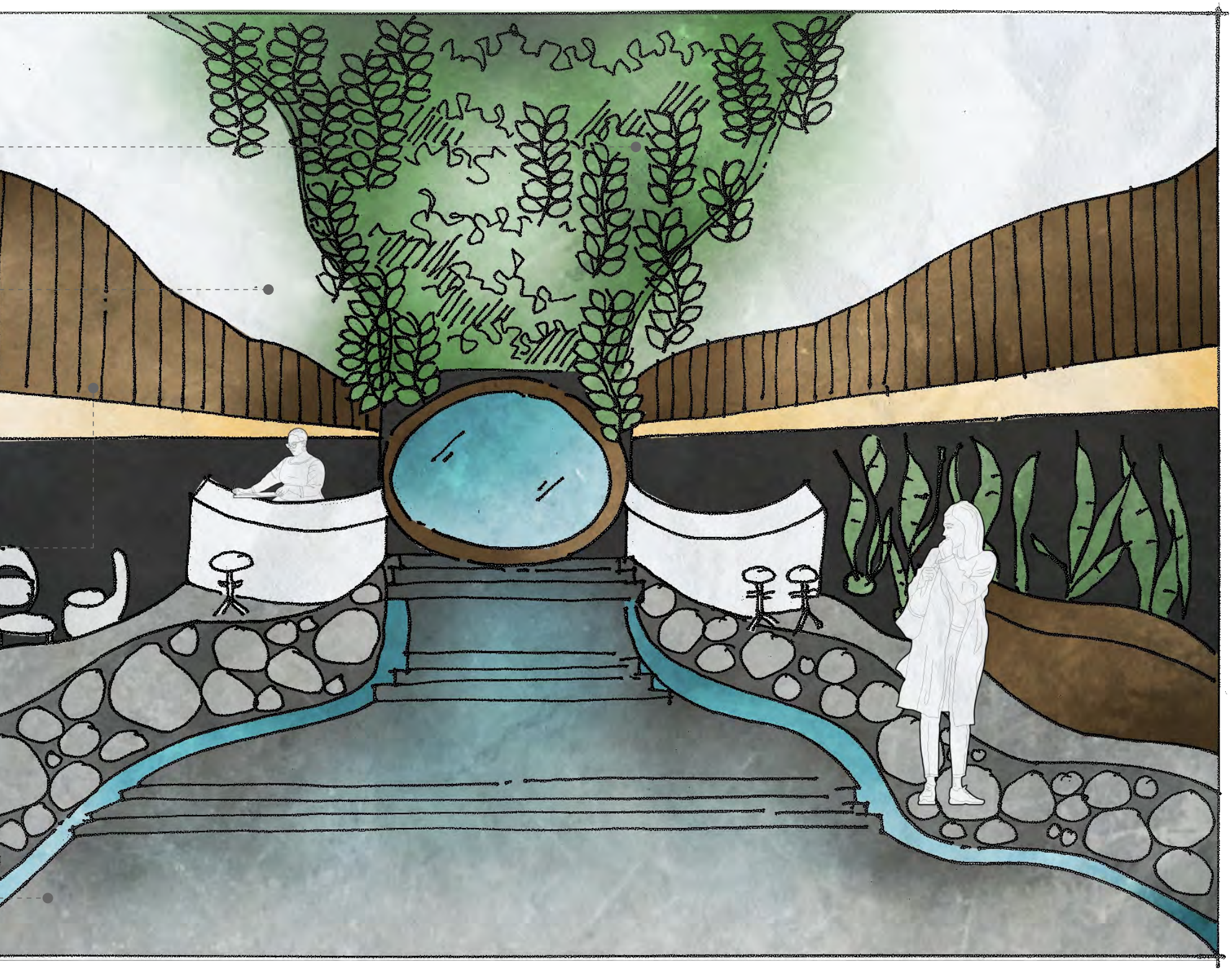
Wooden High Wall
Wooden walls are used to define the room and give a sense of warmth. Eyes will be drawn closer when you see the texture of the wood.

Dark Black Wall
The black wall is used so that visitors move their focus to one point and follow the direction that has been made by the natural element.

Rough Ramp Stone
Wet dark black stone used as a path gives a more natural impression like after the rain, this will also trigger odors on the ground.

Stepping Water
Water flows on the concrete designed with steps will give the impression of calmness on visitors.

Figure 172. Stage 1 - Survive (Lobby) Illustration
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 2 - STABILITY (MANGROVE LIFE-CYCLE)

Activities in the form of making, monitoring, controling, and learning that can balance biodiversity. Lifecycle of mangrove concept will be applied here. As a sharing the knowledge about mangrove conservation and the community.

Mangrove Nursery, Water

Mangrove Avinnecia

Color, Nature, Elevation, Shape, Shadow

Water, Bird, People, Swaying tree

Color, Shape

Time travel will be shown through the mangrove life-cycle. Visitors will be taken around the site according to the stages of the mangrove during its life.

Seedling to Storage

This phase is shown in the tube chamber in order to facilitate the retrieval that is centered in one place. The room is designed to be closed with artificial lighting that is needed if storing or taking seeds only.

Soaking

In the Soaking phase, it requires a place filled with water because it is the phase of soaking the seeds before being transferred to nursery planting.

Sowing

The sowing area which is the nursery stage 1 will be designed elevated to respond to water. This also makes it easier for managers to control nursery results.

Sungkup

In the containment phase it will be placed outside the room and terraced. Wrapped in plastic and will be designed in a terrace to make it easier to check and spread temperature, wind, and sun exposure.

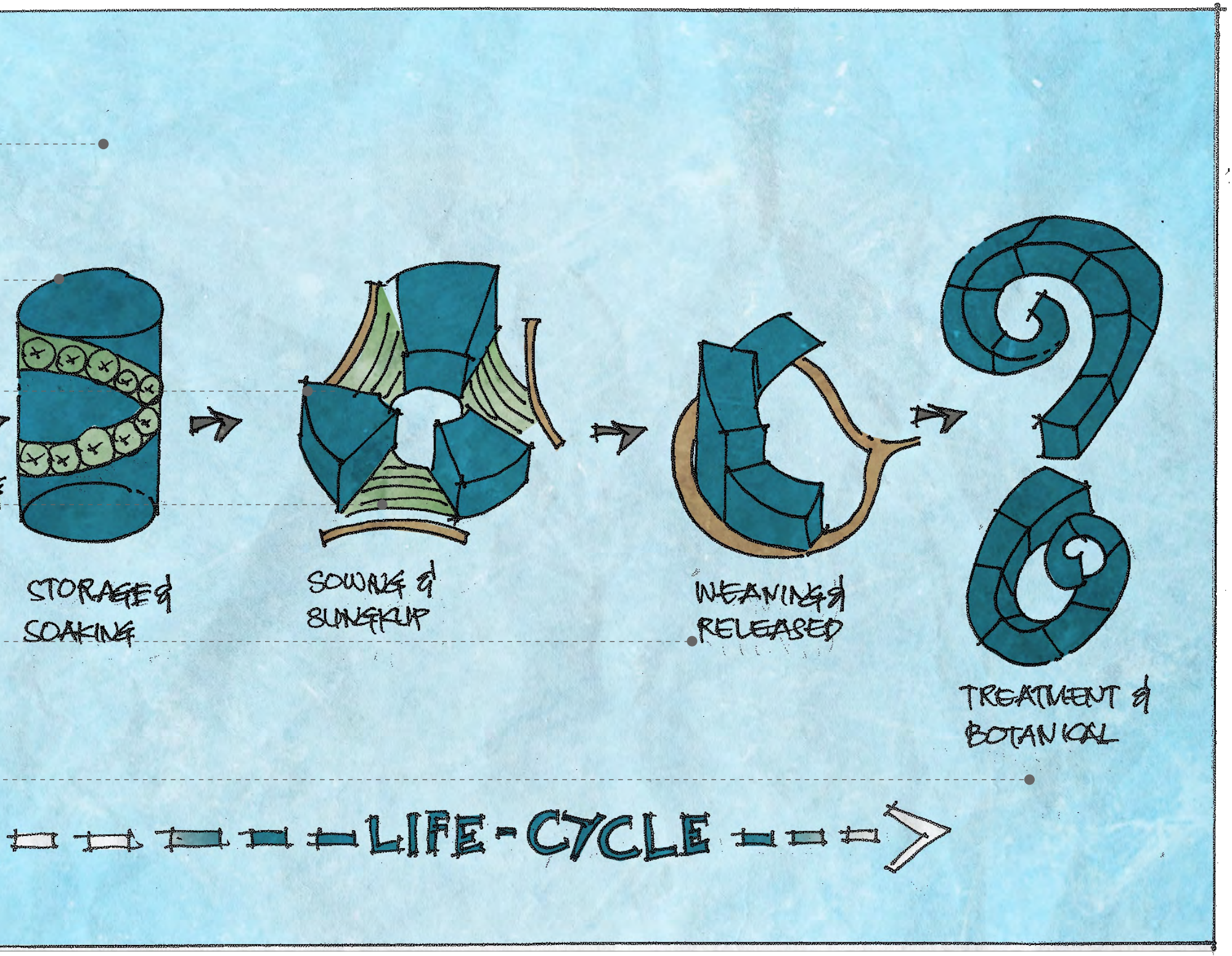
Weaning

The modules are arranged linearly and separately to respond to tidal waves. In this phase, visitors will know how to live mangroves when they are trained before heading to nature.

Botanical & Treatment

The Botanical Garden is a place for cultivating and caring for mangroves that have been released. Plants are arranged to produce a suitable arrangement for learning activities.

Figure 173. Stage 2 - Stability Mangrove Life Cycle Illustration
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 2 - STABILITY (NURSERY: SOWING PHASE)
Activities in the form of making, monitoring, controling, and learning that can balance biodiversity. Lifecycle of mangrove concept will be applied here. As a sharing the knowledge about mangrove conservation and the community.

Mangrove Nursery, Water, Kinetic Facade

Mangrove Avinnecia, Mangrove Rhizopora, Brakish Water, Soil

Color, Rhytm, Texture, Nature, Elevation, Shape, Shadow

Water, Bird, People, Swaying tree

Color, Shape

The nursery planting process will be presented to visitors both during the planting process and only for observational research. Visitors will be taught to plant mangroves from seed and some of the controlling factors that will affect mangrove life. Visitor will also learn about the movement of wave in the coastal area.

Wood Water Catchment
The use of column installations can also be used to capture and collect rainwater which can then be used for irrigation water at the time of seedling.

Curved Flat Colored Roof
Predators in nursery areas will be very detrimental and delay the success of planting 100% of mangrove seedlings. To overcome this, use colors that are feared by bird predators, namely warm colors and water predators, namely cool colors. Thus color can also influence the user mood.

Kinetic Facade
The building facade is designed kinetic which will respond and adjust the indoor temperature so that the success of the seeds can be achieved. This will also affect user movement related to a comfortable space.

Sowing Pattern
Planting will use beds and will use polybags as needed. The media and patterns that will be used are varied enough so that they are not monotonous.

Sungkup
The hood is designed with terraces and is surrounded by walking paths for easy control.

Elevated Deck
To be able to increase the flexibility of spaces and layout, each of mass will be separate and more interactive. The user will be able to explore each of mass with different height.

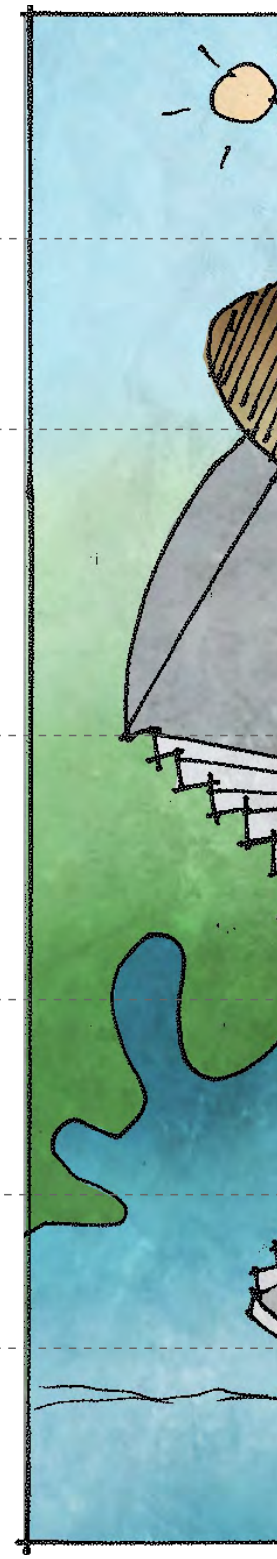
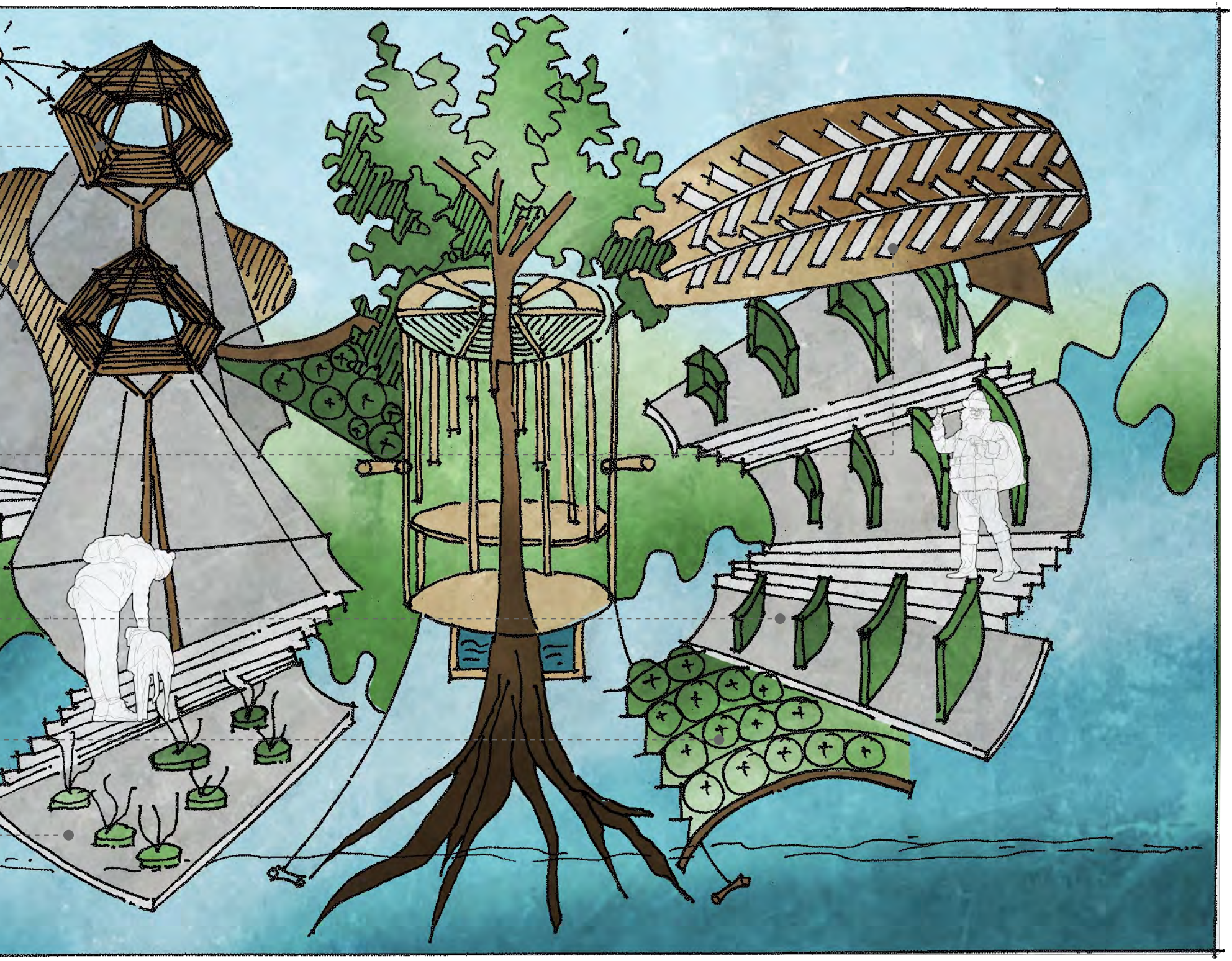


Figure 174. Stage 2 - Stability (Nursery: Sowing Phase) Illustration
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 2 - STABILITY (NURSERY: WEANING PHASE)

Activities in the form of making, monitoring, controling, and learning that can balance biodiversity. Lifecycle of mangrove concept will be applied here. As a sharing the knowledge about mangrove conservation and the community.

Mangrove Nursery, Water, Kinetic Facade

Mangrove Avinnecia, Mangrove Rhizopora, Brakish Water, Soil

Color, Rhytm, Texture, Nature, Elevation, Shape, Shadow

Water, Bird, People, Swaying tree

Color, Shape

The nursery planting process will be presented to visitors both during the planting process and only for observational research. Visitors will be taught to plant mangroves from 1m of mangrove and some of the controlling factors that will affect mangrove life. Visitor will also learn about the movement of wave in the coastal area.

Curved Flat Colored Roof

Predators in nursery areas will be very detrimental and delay the success of planting 100% of mangrove seedlings. To overcome this, use colors that are feared by bird predators, namely warm colors and water predators, namely cool colors. Thus color can also influence the user mood.

Kinetic Facade

The building facade is designed kinetic which will respond and adjust the indoor temperature so that the success of the seeds can be achieved. This will also affect user movement related to a comfortable space.

Road Elevated Walkway Wheel

In order to make easier for user access, there are a wheel for transportation around the weaning nursery area because the distance is quite far.

Elevated Deck

To be able to increase the flexibility of spaces and layout, each of mass will be separate and more interactive. The user will be able to explore each of mass with different height.

"Di Air Air" Plant

During the weaning phase, mangroves will be better receptive to light medium but are still resistant to waves so that some will be placed on the water surface and get shadow from the mass above. Visitors can enjoy two types of weaning that will be offered.

Figure 175. Stage 2 - Stability (Nursery: Weaning Phase) Illustration
Source: Author
(proccessed on 27 June 2022)

CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 3 - FREEDOM (AMPHITEATERE COMMUNITY TRAINING)

Interaction and connection built. There is free contact, interaction, and connection nature and humans to share values and idea.

Color, Rhytm, Texture, Nature, Elevation, Shape, Shadow

Water, Bird, People, Swaying tree

Before the visitor go to the planting proccess. They will meet community first to give the educated learning directly from the actor. This place also can be use for gather the community if there is no visitor came.

Skylight

Natural lighting is allowed in the center of the building which will bring up spotted light in round to oval shapes. Skylights also function to spread light throughout the building without solar radiation entering inside. As a symbol of hope in the midst of collaborating nature.

Membrane Curved Roof

Flexible movement will be supported by a form that is not rigid. By utilizing the membrane as a roof that has the character of being easily curved and flexible. Layered with a center.

Water and Tree Pointed

Natural elements such as wooden boards, water in the middle of the grass, and mangrove trees planted as markers and reminders of our position in the middle of nature.

Round Amphiteatre

The circle shape is a symbol of association and is a form of layout that increases interaction with users because they are face to face.

Sightseeing Ramp

If there is a shortage of amphitheater seats, visitors can feel a different sensation when discussing while standing and watching people explain on the rising ramp.

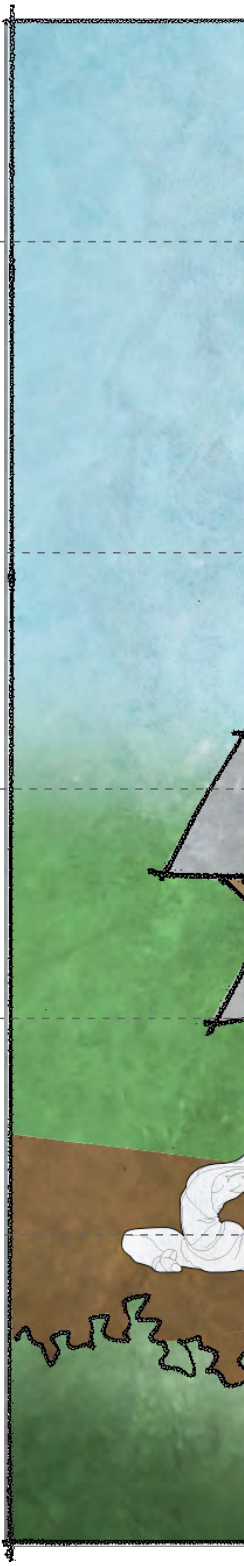
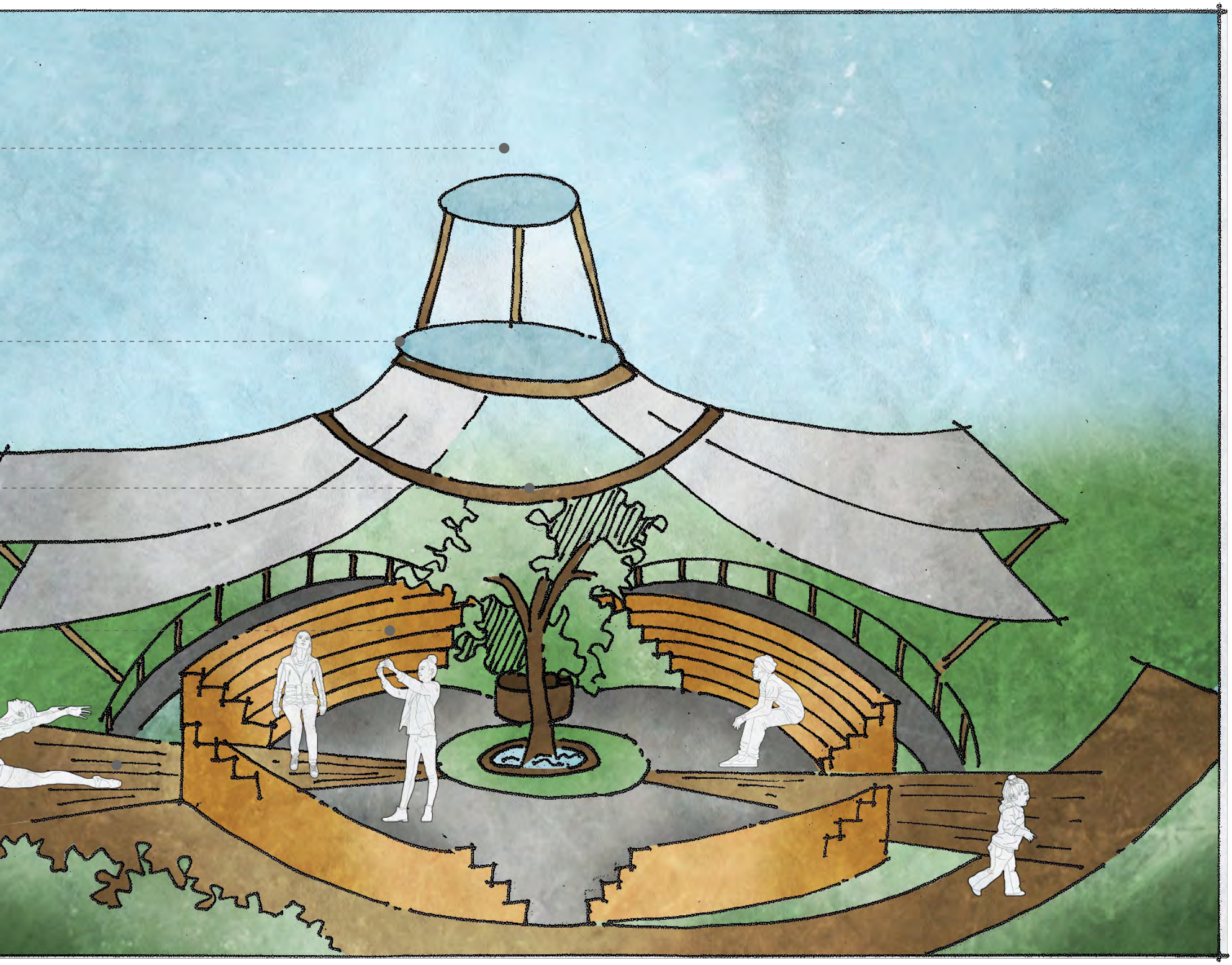


Figure 176. Stage 3 - Freedom (Amphitheater Community Tranining) Illustration
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 3 - FREEDOM (OBSERVATION TOWER AND PORT)

Interaction and connection built. There is free contact, interaction, and connection nature and humans to share values and idea.

Coastal

Color, Mangrove Nursery, Coastal, River, Elevation, Shape, Shadow

Water, Bird, People, Swaying tree

A space that functions as a port where people cross from one direction to another. Plus an observation tower to control the situation and the height of the waves. In addition, it can be used as a place for birds to perch.

Tower of Plants

Plants planted at the end of the observation tower are used to attract birds so that visitors can enjoy watching birds from a height.

Plaza

Plaza as a place to gather, relax, and wait for ships that come in the middle of the waters. In addition, this space can be used as a fishing spot.

Rounded Column

The towering columns are exposed transparently so that visitors can easily see the surrounding scenery without any disturbance.

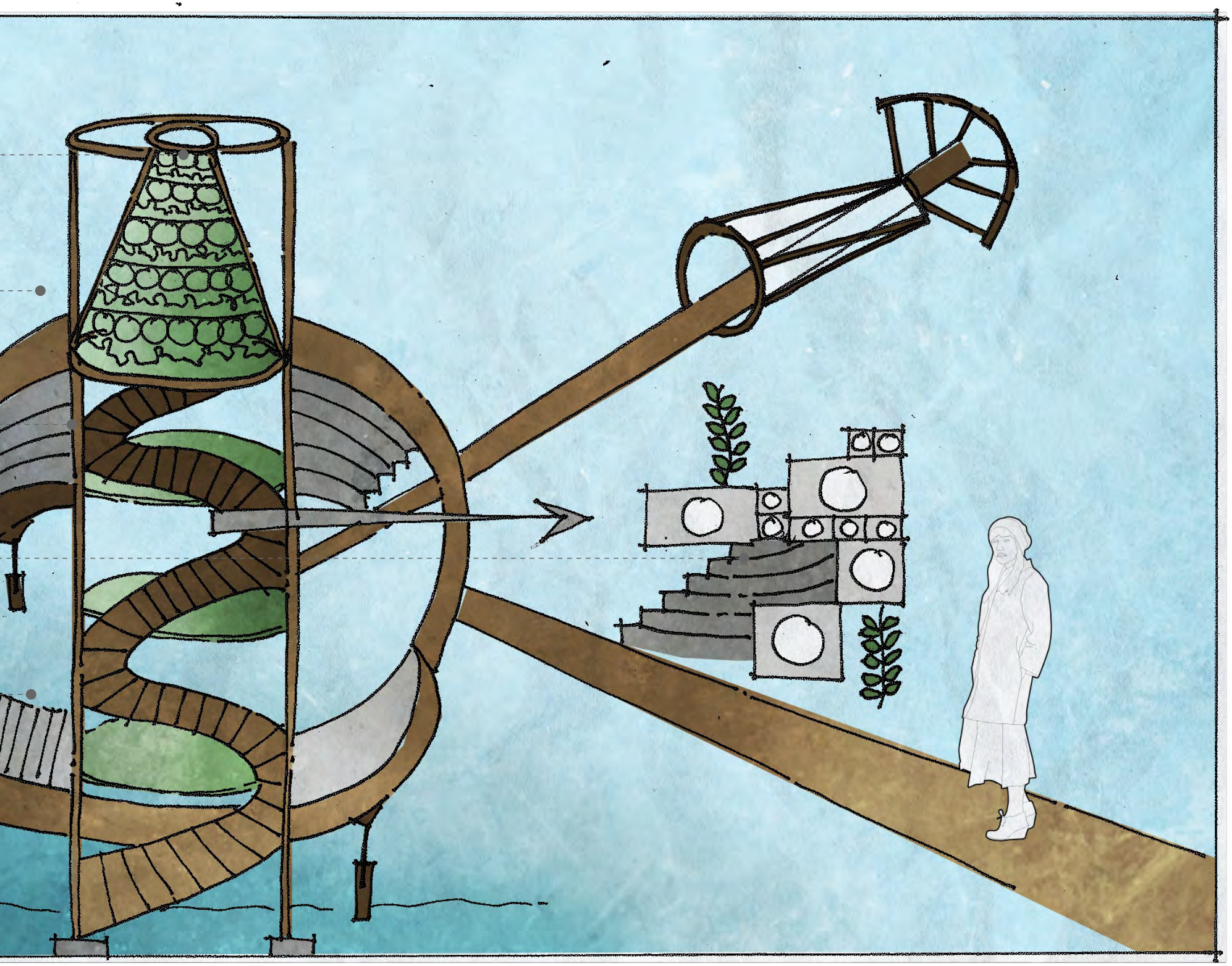
Hole Solid Void Facade

The game of solid voids on the facade creates harmony to play with the eyes of visitors so that they are more enthusiastic.

Pile Foundation and Spiral Forms

Coastal conditions make the building must be able to adapt to the waves so that the type of pile foundation can go up and down and is supported by a spiral shape that can break the waves.

Figure 177. Stage 3 - Freedom (Observation Tower and Port) Illustration
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 4 - SECURITY (FOCAL POINT OF BOTANICAL HABITAT)

The condition of the food chain is starting to balance and human awareness is increasing. This is indicated by the concern of visitors and the community to care for the mangrove from the stage it begins to live. Visitors also get to know about mangroves and their environment as a whole.

Muddy soil, Water, Rough Stone, Wood, Grass, Animals, Mangrove

Splashy Water, Mangrove Wood, Avinnecia Mangrove

Color, Rhytm, Texture, Nature, Elevation, Shape, Shadow

Water, Bird, People, Swaying tree, Insect

Color, Shape, Water, Mangrove Fruit

The situation that results from the unification of several food chains in one place is the botanical habitat. There is the availability of various kinds of mangroves as a source of food for producers such as birds, crabs, and insects such as dragonflies and bees. The series can be enjoyed by visitors by exploring each side of the building as well as an effort to balance the ecosystem in the mangrove area in the coastal and estuary areas. Visitor can interprating directly through the animal and plant that alive in Mangrove Baros Forest.

Openess Wood Curved Roof

The roof, which is designed with irregular arches and uses wood material, gives visitors the impression of being organic, flexible, and growing.

Bring The Outdoor into Indoor

The use of a transparent sheath in the building will make the building blend with the outdoor environment. This condition will influence the user got two point of view with blurry background.

Elevated Walkway

Walking across from above will get an overall view and get a different experience from a bird's perspective. The distance will approach infinity.

Arch Wall and Column

As a response to human anthropometry and giving an inviting and friendly impression, arches are used for walls and columns.

Starting The Journey Within Boat

If the user looks down at objects that are close, and up at those like far away. This is a game of the eye through heights. In addition, users can feel the experience of traveling through the wilderness on a boat.

Food Tower Arrangement

As a place that can attract the attention of living things in the mangrove food chain, a special tower is provided as an interaction point.

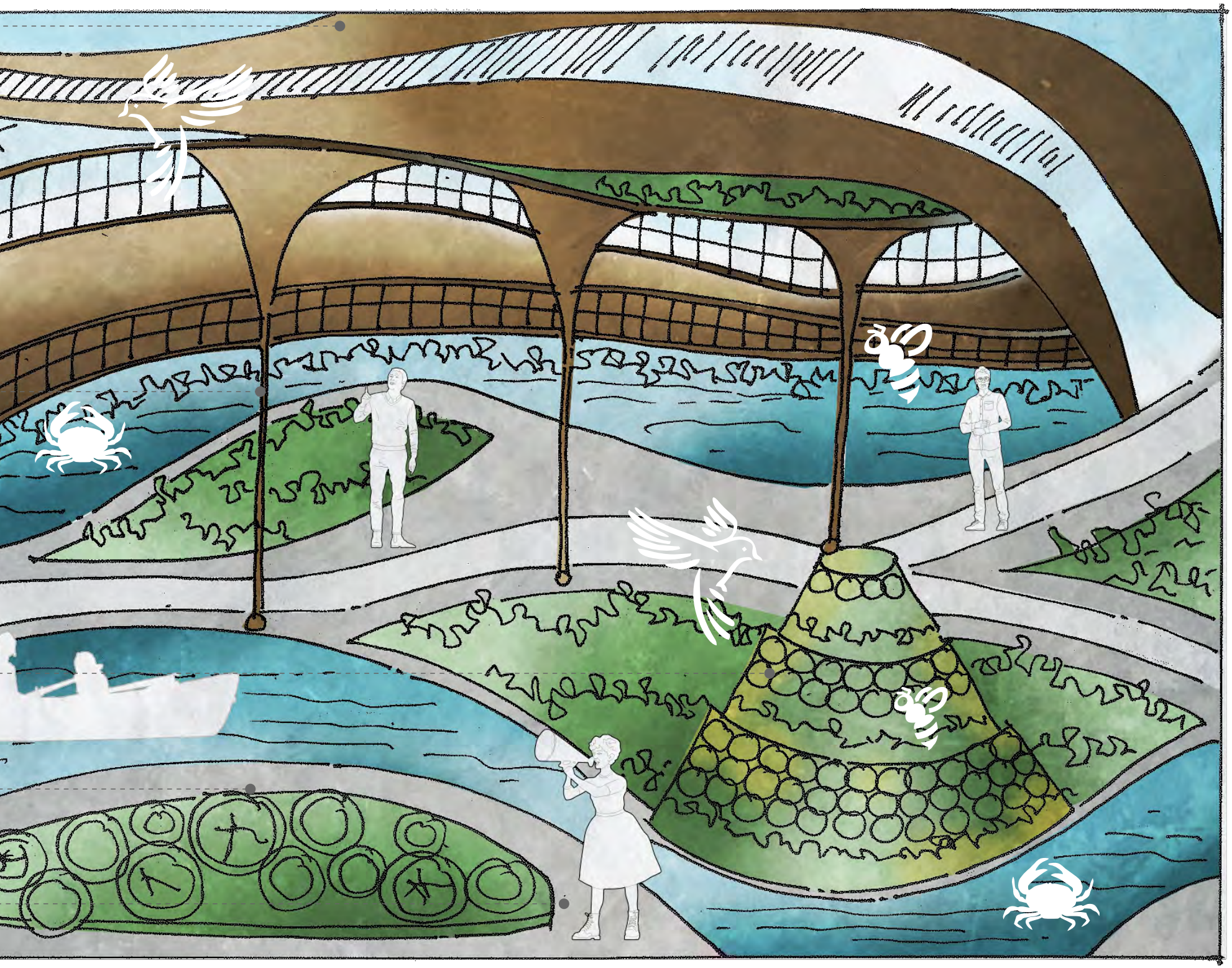
Lotus Wide Leaf Circle

To provide oxygen to the water and buildings, lotuses that live in brackish water are used. It also provides user experience.

Neutral Color

Bright colors and too dark can not attract animals so use neutral colors and natural material.

Figure 178. Stage 4 - Security (Focal Point of Botanical Habitat) Illustration
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 4 - SECURITY (FOCAL POINT OF BOTANICAL HABITAT)

The condition of the food chain is starting to balance and human awareness is increasing. This is indicated by the concern of visitors and the community to care for the mangrove from the stage it begins to live. Visitors also get to know about mangroves and their environment as a whole.

Mangrove Wood, Avinnecia Mangrove

Color, Rhytm, Texture, Nature, Elevation, Shape, Shadow

A welcome greeting attractive that begins with stairs and ramps. Supported by a relaxing area to gather while waiting for their turn (hall). In this section there is also a lobby for registration before entering the botanical habitat.

Relative Upward Visual Ramp

Sending the stories and journey by an elevated ramp so the user can interprets by itself and slows down when moving.

Rate of Motion

Giving intimate distance with nature. Overlapping object do not shift positions relative to each other when the user changes position.

Motion From Curved Stairs

The stairs look moving at uniform speed appear to be moving slower as distance increases.

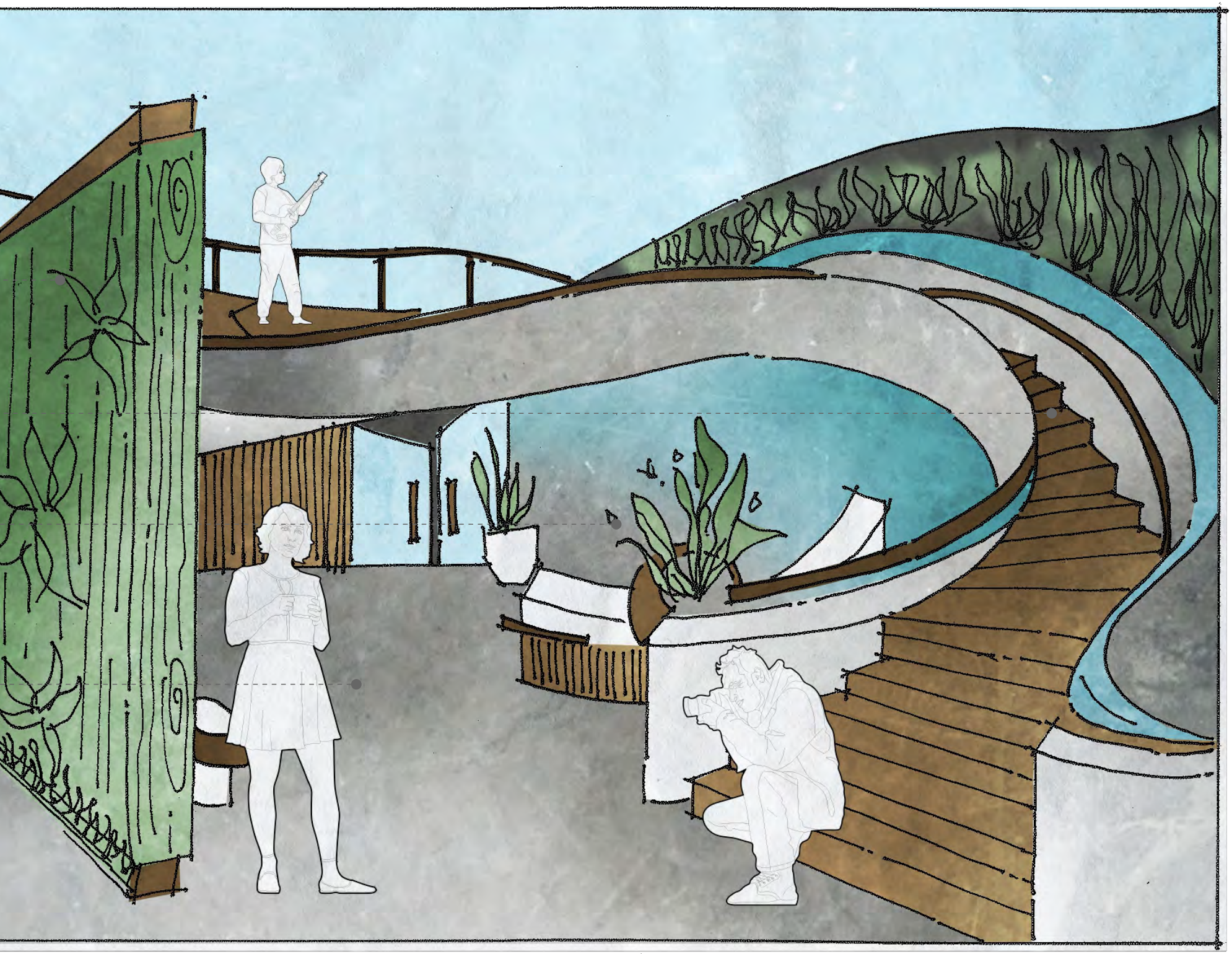
Lobby and Receptionist

As a facility to serve visitors, this section is designed to respond to the desires and passions of visitors with colored wooden walls wrapped in a bright background to spark the spirit.

Hall and Waiting Space

The light and dark atmosphere is equipped with a sitting place and a large yard that can be used to rest for a while while chatting and gathering.

Figure 179. Stage 4 - Security (Focal Point of Botanical Habitat) Illustration
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 4 - SECURITY (MANGROVE LABORATORY)

The condition of the food chain is starting to balance and human awareness is increasing. This is indicated by the concern of visitors and the community to care for the mangrove from the stage it begins to live. Visitors also get to know about mangroves and their environment as a whole.

Mangrove Plants, Mangrove Seeds, Water, Material

Avinnecia Mangrove

Color, Rhytm, Texture, Nature, Elevation, Shape, Shadow, Lighting

This laboratory nursery is a sterile place that is used as a learning and research facility for students and the community. Visitors can experiment with mangrove seeds and seedlings to produce maximum offspring or no defects.

Approaching The Mangrove Rack Research

Having the distant view. Inviting, seeing, feeling, and utilizing space to get to the point of achievement for the user. It is use the shape of frontal.

Concrete Table Trapesium

The user can be easier to distinguish the color of object that they are use and the color of table. The shape also have an ergonomic shape toward human.

Hanging Plant

Some plants are displayed hanging by the Japanese method, namely kokedama to produce stronger plant roots.

Spiral Stairs

There is a people that have the assignment to handle and monitor the course of activities to avoid troublesome things. To overcome this, observations were made from a higher place to make it easier to reach the visual senses.

Research Tube

The tube that can be manage the temperature inside to help plantation grow more faster and optimal.

Figure 180. Stage 4 - Security (Mangrove Laboratory) Illustration
Source: Author
(proccessed on 27 June 2022)

CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 4 - SECURITY (STORAGE AND SIGHTSEEING)

The condition of the food chain is starting to balance and human awareness is increasing. This is indicated by the concern of visitors and the community to care for the mangrove from the stage it begins to live. Visitors also get to know about mangroves and their environment as a whole.

Splashy Water, Mangrove Wood, Avinnecia Mangrove

Color, Rhytm, Texture, Nature, Elevation, Shape, Shadow

Water, Bird, People, Swaying tree, Insect

In this section it is functioned into two, namely as a storage place for fruit, flowers, and mangrove seeds which will then be planted and placed on the lower floor in a closed room. Then above it there is a substation as a place of observation and enjoying the conditions around the Baros Mangrove area.

Cantered Circle Curved Roof

Shade in the hot sun so that it is not hot and as a focal point in the building is characterized by its circular shape. To give a more elegant impression, on the edge of the roof there is a wooden frame covered by polycarbonate.

Trees in The Middle

Trees are placed on top of the building as a support for the structure as well as a symbol of the freedom provided by nature.

Wood Symphony

The wooden facade is designed up and down in harmony to give the impression of movement and growth to visitors. In addition, it gives a different look on each side.

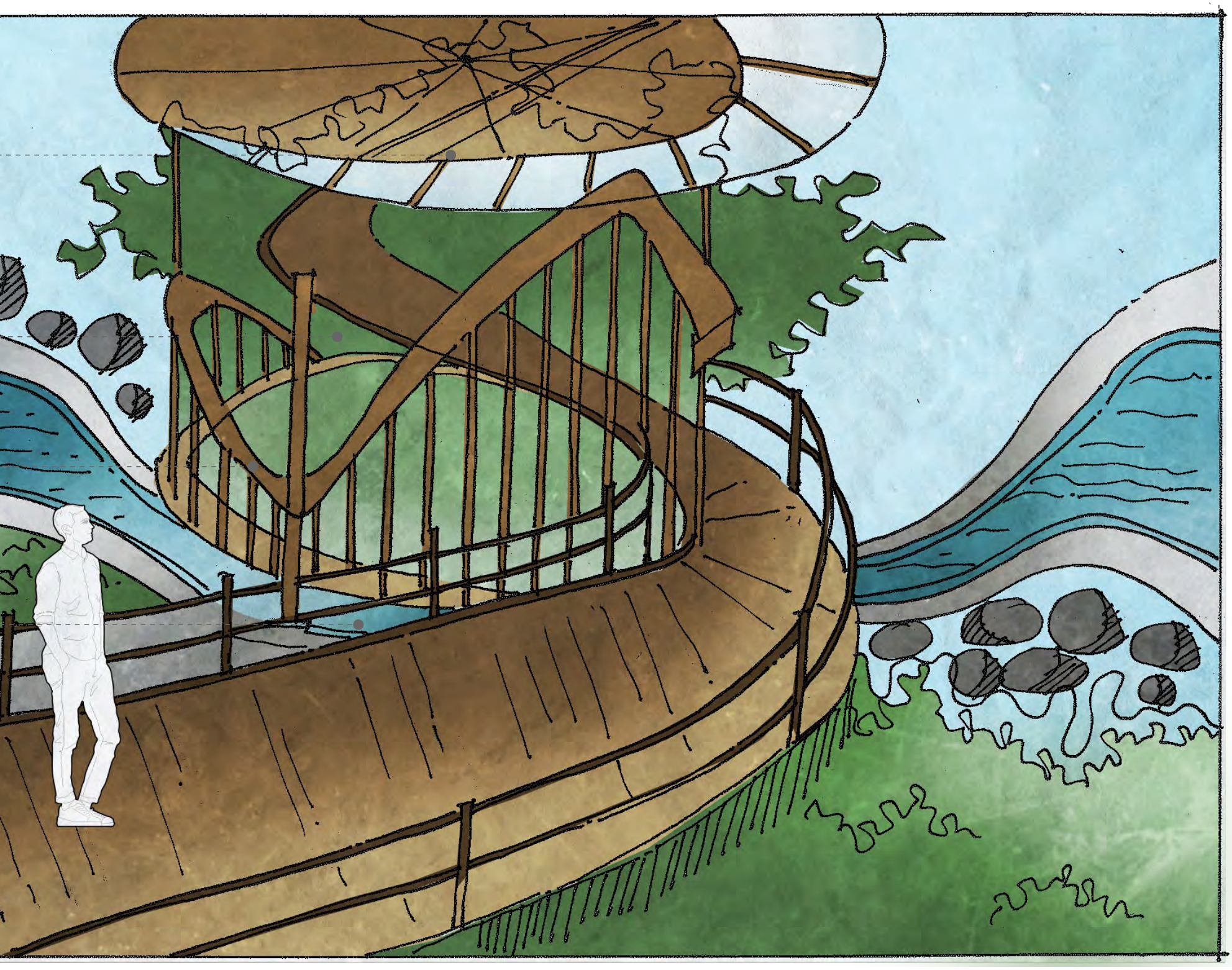
Water Transportation

Visitors can pass the space via water transportation as a means of connecting with the space.

Wooden Ramp Skywalk

In order to deliver whole experience for a whole building, wooden ramp skywalk are needed. The user can walking through the different elevation with slow movement around while enjoying the surroundings.

Figure 181. Stage 4 - Security (Storage and Sightseeing) Illustration
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 4 - SECURITY (INTERPRETATION SPACES)

The condition of the food chain is starting to balance and human awareness is increasing. This is indicated by the concern of visitors and the community to care for the mangrove from the stage it begins to live. Visitors also get to know about mangroves and their environment as a whole.

Splashy Water, Mangrove Wood, Avinnecia Mangrove

Color, Rhytm, Texture, Nature, Elevation, Shape, Shadow, Digital Machine

Water, Bird, People, Swaying tree, Insect, Digital Machine

Learning how to interpret the description of mangrove areas and the problems they face using digital methods offers artificial intelligence, mobile installations, and holograms to provide a futuristic new experience about what will happen to mangroves in the future if they are preserved.

Water Catchment Harvesting

There is a rainwater reservoir on the roof of the building, besides that it can also provide a shadow from water that is exposed to sunlight to enter the space.

Artificial Inteligence

In providing new experiences for visitors to enjoy mangroves, artificial intelligence can be used to provide a three-dimensional experience.

Light Sequence

The space when entering will be delivered by a light sequence so that visitors are curious and give refreshness.

Hanging Instalation

Installing pictures and writing with lighting that is hung on the ceiling will be attractive, making visitors look at various sides.

Installation Abrasion Disaster Demonstration

Circle Cone Roof with Mirror

In expressing the space which is centered from various directions. The circle cone shape is also chosen as a dynamic form for the future.

Binocular Hologram

Visitors can enjoy a fantastic auditory and visual experience using the hologram method designed to enlarge the image.

Walking Upper The Water & Mozaic

This approach will increase the user fantasy thinking.

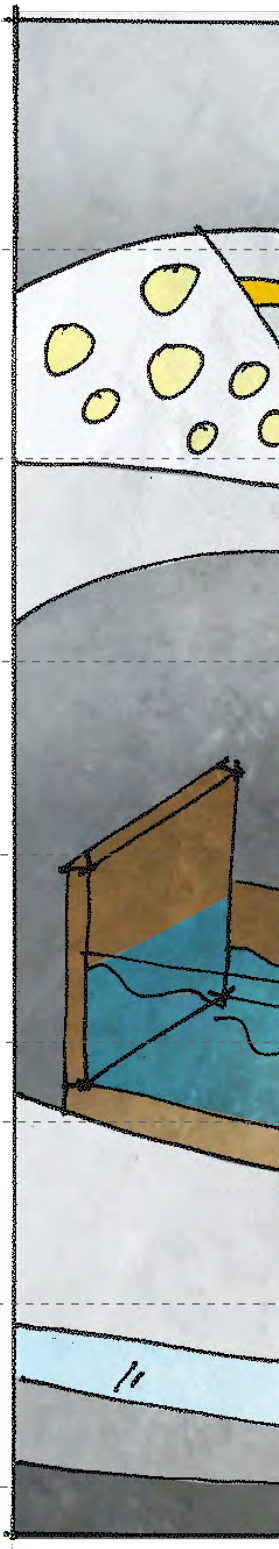
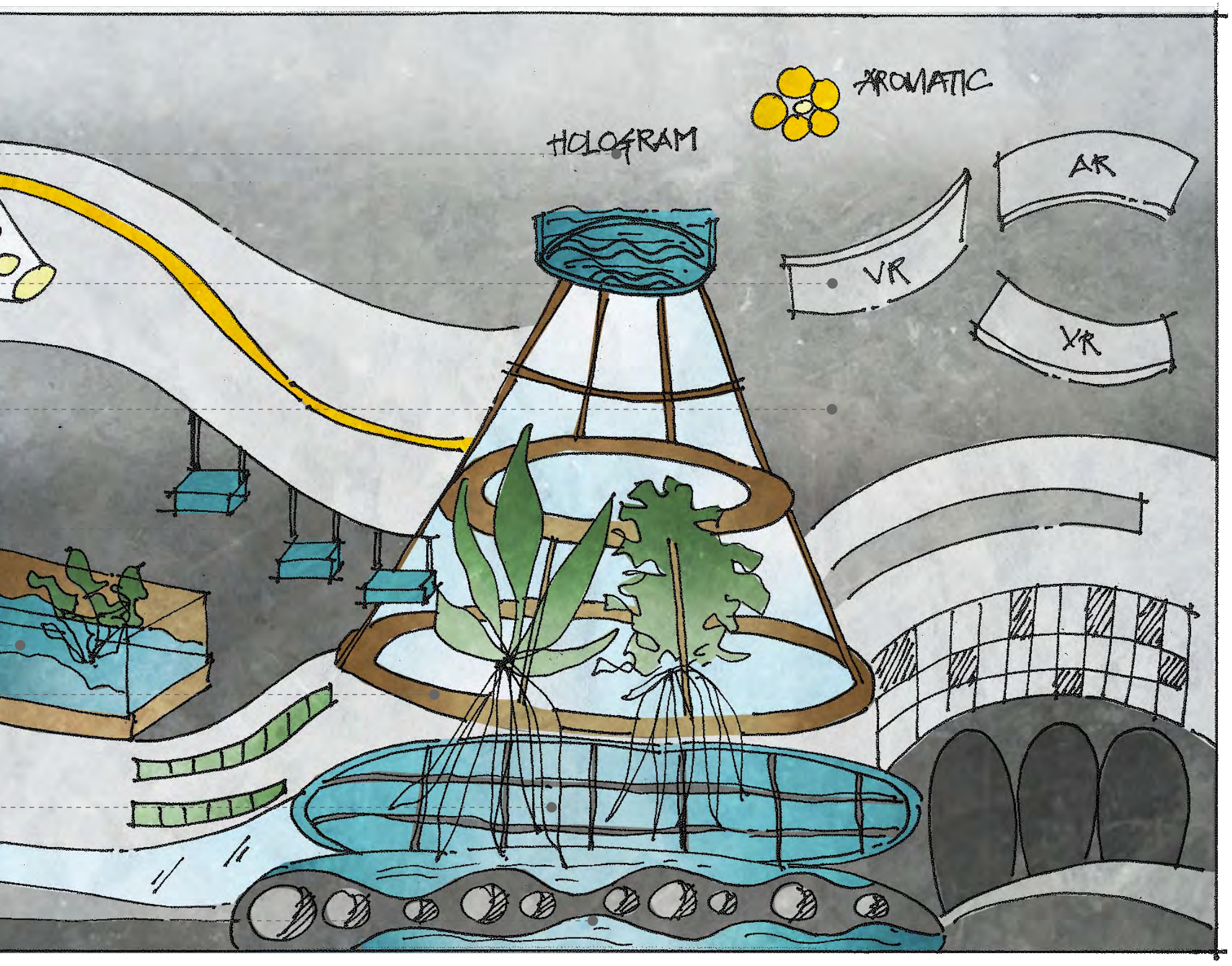


Figure 182. Stage 4 - Security (Interpretation Space) Illustration
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 5 - INDEPENDENCE (MANGROVE ECORIUM)

The departure brings knowledge and concern for the community, biodiversity, respect, and responsibility after they collect all of the learning activities of Mangrove life-cycle.

Muddy soil, Water, Rough Stone, Wood, Grass, Animals, Mangrove

Splashy Water, Mangrove Wood, Avinnecia Mangrove

Color, Rhytm, Texture, Nature, Elevation, Shape, Shadow, Lighting

Water, Bird, People, Swaying tree, Insect

Mangrove ecorium is a mangrove aquarium. Mangroves are planted in a giant aquarium with water media. Presented with various heights and different elevations to respond to the view out of the building in the direction of the flyover. Visitors can feel the experience of being in water filled with biota and mangrove plants. It is also hope give a peacefull mind and calmness while doing.

Mangrove Aquarium
Mature mangrove trees and some that are still seedlings are arranged in a pond with high walls and covered with glass to provide an experience of the types and characters of mangrove roots when submerged in water.

Estuary Habitat
An aquarium display that displays several aquatic creatures such as crabs, fish, and shrimp.

Taper Curved Roof
The taper roof is used as an iconic point that can give a firm impression and attract visitors to come.

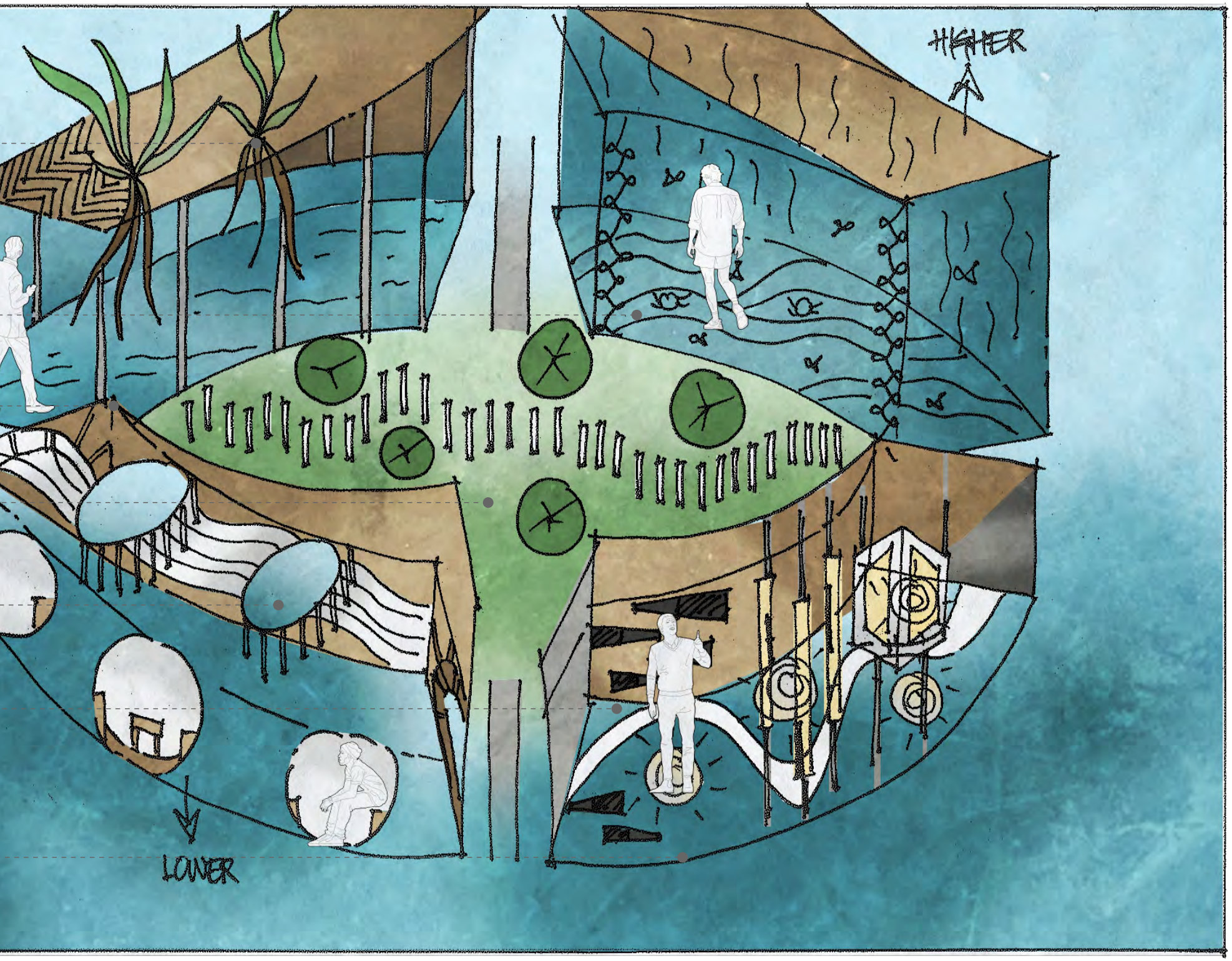
Dynamic Landscape
Layered landscapes are arranged in response to existing trees to produce dynamic irregular shapes.

Circle Sitting and Flow Ceiling
As a spot and giving a solid void to the room, it makes this room feel like a peaceful place.

Name to Wonder
Displaying the name of the mangrove with the essence produced so that visitors can get a flashback and remember what has been experienced.

Lighting Games
The game of lights arranged irregularly together with the lattice gives a romantic impression so that visitors can enjoy and stay longer in this space.

Figure 183. Stage 5 - Independence (Mangrove Ecorium) Illustration
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 5 - INDEPENDENCE (MANGROVE LABIRINTH)

The departure brings knowledge and concern for the community, biodiversity, respect, and responsibility after they collect all of the learning activities of Mangrove life-cycle.

Muddy soil, Water, Rough Stone, Wood, Grass, Animals, Mangrove

Splashy Water, Mangrove Wood, Avinnecia Mangrove, Rhizopora Mangrove

Color, Rhytm, Texture, Nature, Elevation, Shape, Shadow, Lighting

Water, Bird, People, Swaying tree, Insect

Color, Shape, Water, Mangrove Fruit

Various types of mangroves will be displayed with a labyrinth arrangement that displays the types and types of mangroves. In addition, the arrangement is also based on the zone and function of the depth of the water so that visitors can easily undergo the learning process. Not only mangrove species are displayed, partitions are also presented that can increase empathy for the environment. Promotes flexible layout.

Type of Mangrove

Display of mangrove trees with access arrangements similar to a labyrinth according to the characteristics of the place where they live. Avinncia in the overall submerged zone. Rhizoporan exposed to several inundations. Bruguiera in wetland areas. Nypa on dry soil.

Water Transportation

In this section, the river flows directly, so to respond to this the river is used as a waterway that can be enjoyed by the user.

Paving Floor with Stone

Adapting from the existing natural conditions, the ground surface is designed to be covered with stones to make it easier for visitors to walk.

Sitting Place

Sitting surrounded by mangroves gives a calm impression but is a little bit scary because of the darkness in the middle of the forest.

Partition Instalation

Some partitions are designed with elements so that the layout does not create a monotonous impression and gives a different feeling to each place.

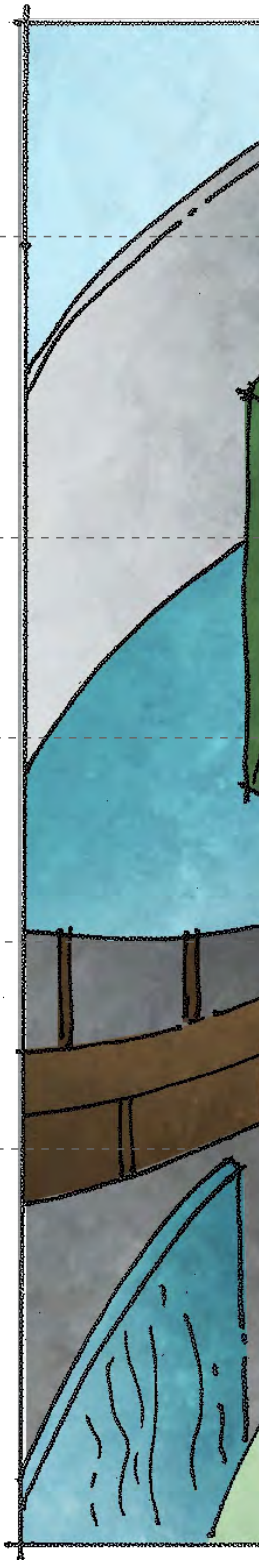
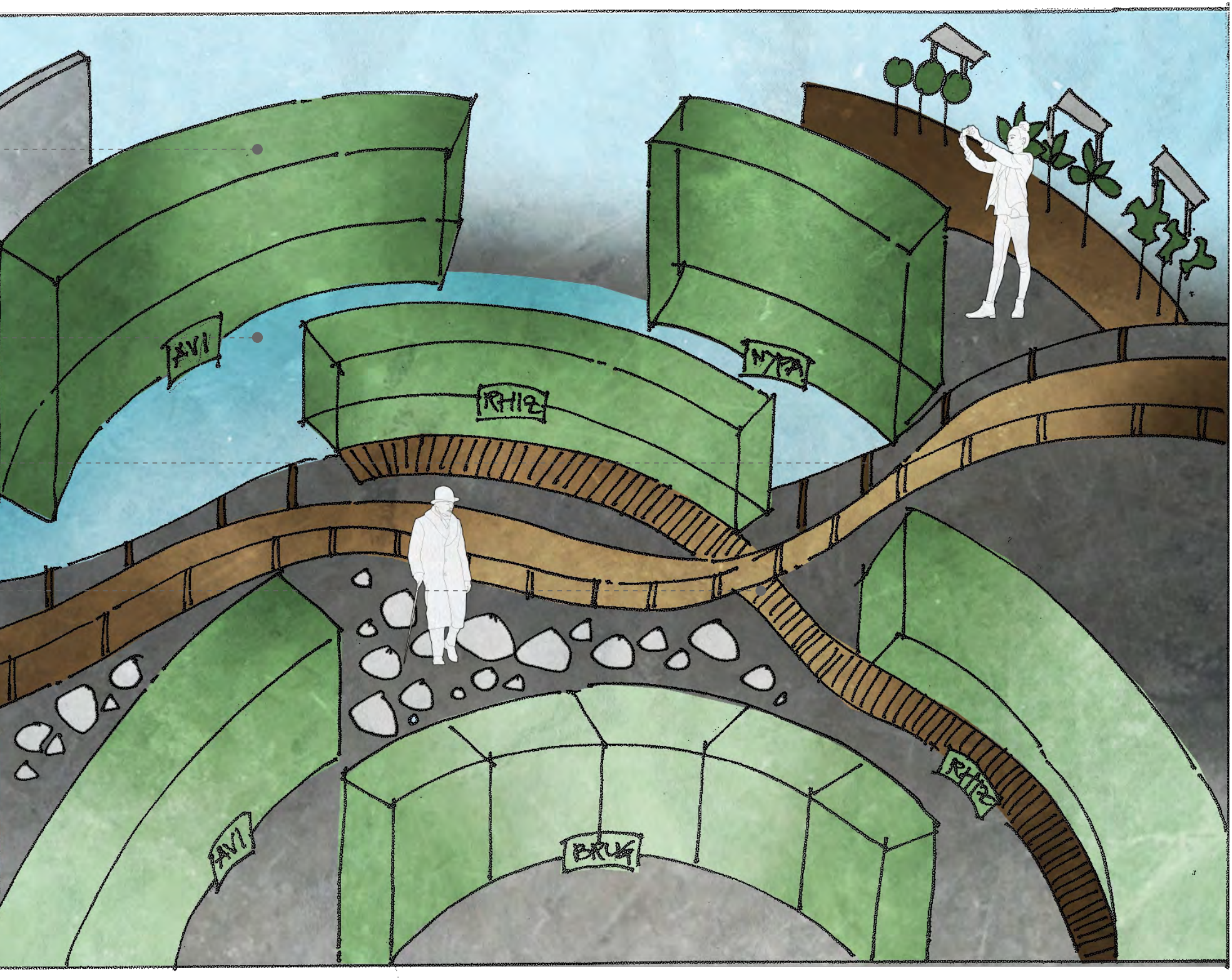


Figure 184. Stage 5 - Idependence (Mangrove Labirinth) Illustration
Source: Author
(proccessed on 27 June 2022)



Conservation Multisensory Experience **Mangrove Baros Sanctuary**

CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 5 - INDEPENDENCE (MINI-LIBRARY AND WORKSHOP)

The departure brings knowledge and concern for the community, biodiversity, respect, and responsibility after they collect all of the learning activities of Mangrove life-cycle.

Digital, Media, Water, Leaves, Clothes

Avinnecia Mangrove, Rhizopora Mangrove, Essence Oil

Color, Rhytm, Texture, Nature, Elevation, Shape, Shadow, Lighting, Digital

Visitors get literacy in two ways, the first is a workshop as a direct interaction with objects. The workshops offered are the process of making batik to coloring from batik leaves, making essential oil from extracts of various types of mangrove leaves, and making syrup drinks from mangrove fruit. The second is through reading books and interactive hearing and smell media the result of making essential oil distilation.

Hanging Board to Display Mangrove Batik

A perforated frame is used which will memngemphasis the batik cloth on display. In addition, it can display a solid void mosaic pattern between the wall and the fabric.

White Wall with Warm Light

The use of bright colors wrapped in warm lights on the walls will give a clean impression and warm feeling when in the room.

Work in The Middle of Water

In order to deliver the peaceful of mind and calming sensation, the furniture layout is in the middle of the water.

Round Sitting Place Book Rack

Providing an intimate reading room is needed to increase focus when studying so that users will more easily absorb what is given. The attractive shape also makes visitors feel full of joy while learning.

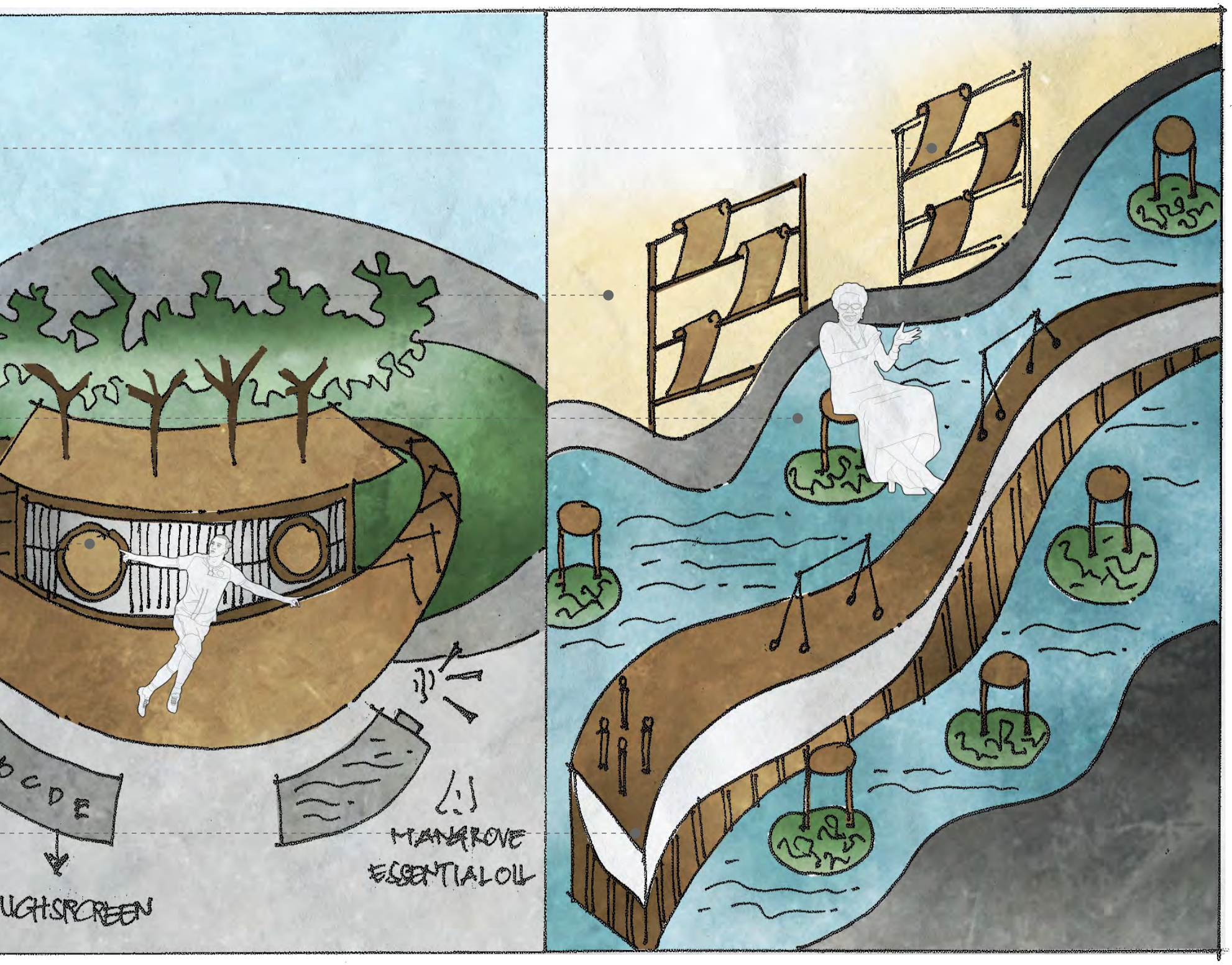
Interactive Learning

A new learning method using a touchscreen screen is like playing an archades game which also displays sound while explaining.

Essential Oil Distiler

Displayed and provided with equipment to distill the odors to be extracted from mangrove plants.

Figure 185. Stage 5 - Independence (Mini-Library And Workshop) Illustration
Source: Author
(proccessed on 27 June 2022)



CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 6 - ABUDANCE (MEMORY OF NATURE)
Increasing and balanced natural biodiversity and human resources (economy, social, cultural). Resulting SDA & SDM bio-diversity.

Color, Rhytm, Texture, Nature, Elevation, Shape, Shadow, Lighting

The closing journey presents a stage of elegance wrapped in a room that hugs visitors and is surrounded by warm colors as a greetings. The arrangement through curved and ryhtmical form can attract visitor to get closer.

Oval Ceiling
Space that can make people feel secure and give them a warm feeling. Incorporating a glimmer of light as natural ventilation in the building.

Split Wooden Beam
Gives a romantic impression through the light that is divided and casts shadows on the floor.

Wall of Thanks Greetings
Walls with a tiered arrangement indicate that you have grown. Served with warm colors and curved shapes like hugging the occupants.

Nature Wondering
As a reminder, the main point of this room is a tree that is planted at a higher elevation than where humans stand to give a more magical impression to visitors.

Lighting Sequence
Artificial lighting that flows into the beam wrapped around the wood will cause the light to fall sideways a few degrees.

Stages Stone
Stepping stages stones are used to make the surface higher. River stone as a material will give a natural impression as if trees grow from the surface without soil.

Figure 186. Stage 6 - Abudance (Memory Of Nature) Illustration
Source: Author
(proccessed on 27 June 2022)

CONCEPT according to the problem

SPATIAL ARRANGEMENT: freedom, growth, and multi-sensory storyline experience

STAGE 6 - ABUDANCE (SOUVENIR SHOP AND GALLERY)
Increasing and balanced natural biodiversity and human resources (economy, social, cultural). Resulting SDA & SDM bio-diversity.

Muddy soil, Water, Rough Stone, Wood, Grass, Product, Glass

Splashy Water, Mangrove Wood, Avinnecia Mangrove, Rhizopora Mangrove

Color, Rhytm, Texture, Nature, Elevation, Shape, Shadow, Lighting

Water, Bird, People, Swaying tree, Insect

Mangrove Fruit Drinking

Visitors will be taken out by getting the memory of feeling want to come back with a warm demeanor and gracefully as a thanks greeting through the products that are displayed and offered. The shape and coloring of the interior also supports the slow release of visitors to return. By passing through the rice fields that are flowing with water as a sign that they have finished their journey.

Surrounding Village Ricefields
Ricefiels in the existing surrounding was maintaned in order to respect and respond to the nature and community. It is also to give experience of rural environment to the visitor. As a sign they already back to home.

Stones Pathway
This stone road is used so that conditions are not muddy and slippery. So that when the water level rises, visitors can still cross this road.

Water River Flows
This flow of water is provided to provide directions for the way home and also offers the sound of splashing water which is said to be "river water is a guide to land".

Glass Envelope
As a giver of transparency to nature and giving a broad impression of bringing the outside environment into the building, an envelope made of glass is used.

Display Product
The product on display is transparent with the open nature so it looks like the background is blurry and floating. Laying on the flowy shape is expected to be attractive to the user.

Consultation and Cashier
The curved shape of the furniture responds to the user's anthropometry to keep the user comfortable and blends with the shape of the building.

Figure 187. Stage 6 - Abudance (Souvenir Shop And Gallery) Illustration
Source: Author
(proccessed on 27 June 2022)

1.5 SPATIAL ARRANGEMENT: Room Programming

No	Design Ideas Need	User	Activity	6	7	8
1	Conservation Centre	Community and Visitor	Directing, Sharing, Discussing, Meeting			
2			Buying ticket, Visitor Data			
3			Receptionist, Information Space			
4			Waiting, Meeting, Welcoming			
5			Accessibility, Circulation, Sightseeing			
6			Garbage Accumulation Prevention			
7			Storage			
8			Monitoring, Research, Experiment, Study			
9			Germinating Seed Nursery			
10			Watering, Sowing, Irrigating			
11			Managering, Consultation, Data Making			
12			Employee working			
13			Planting, Caring, Managering, Displaying			
14			Weaning, Planting, Controlling, Caring			
15			Monitoring, Controlling			
16			Observating, Research			
17			Cultivating			
18			Learning, Sharing, Directing, Gathering			
19			Watering, Nursing, Caring			
20			Mutualism, Exploring, Research, Learning			
21	Eco-Edu Tourism (Interpretative)	Community and Visitor	Learning, Awarening, Experiencing			
22			Resting, Staying, Sleeping			
23			Buying, Selling, Product Displaying			
24			Workshop, Studying			
25			Experiencing, Learning, Research			
26			Crossing, Accessibility, Sightseeing			
27			Reading, Learning, Studying			
28		UMKM	Resting, Eating, Drinking			
30		Visitor	Resting, Gathering			
31	Supporting Facilities	Community and Visitor	Bicycle, Motorcycle, Car Parking			
32			Store stuff			
33			Cleaning, Washing			
34			MCK			
35			Praying			
36		Management	Protecting, Monitoring			
37			Storaging tools			
38			Management system			
39			Rentaling bike			

Table 5. Spatial Arragement: Room Programing

Source: Author
(proccessed on 27 June 2022)

Activity Time														Space Need	Requirement
9	10	11	12	13	14	15	16	17	18	19	20	21	22		
														Community Space	Semi-outdoor, Public, View
														Ticket Retribution Post	Indoor, Private, Welcoming
														Information Desk	Indoor, Public, Introducing
														Lobby	Semi-outdoor, Public
														Corridor	Outdoor, Public, Experience
														Corridor	Outdoor, Public, Floating
														Warehouse	Indoor, Private, (-) Sunlight
														Laboratorium & Research	Indoor, Private, Scientific
														Soaking Space	Indoor, Public, Water Irrigation
														Water Tank	Indoor, Private, Under Ground
														Management Room	Indoor, Private, Layout
														Office	Indoor, Private, Comforting
														Nursery Lab (sowing bed)	Indoor, Public, Temperature
														Nursery Lab (Weaning Bed)	Indoor, Public, Temperature
														Sungkup	Indoor, Public, Humidity
														Observation Tower	Indoor, Public, Scientific
														Mangrove Ecorium	Semi-outdoor, Public, Water Irr.
														Hall & Plaza	Semi-outdoor, Public, Experience
														Treatment Room	Indoor, Public, Water Irrigation
														Botanical Garden	Semi-outdoor, Public, Experience
														Interpretation Gallery	Indoor, Public, Storytelling exp.
														Gampling	Outdoor, Public, Privacy
														Souvenir Shop	Indoor, Public, Attractive
														Workshop Space	Indoor, Public, Interactive
														Mangrove Labirinth	Outdoor, Public, Experience
														Port	Outdoor, Public, Floating
														Mini-library	Indoor, Public, Scientific
														Cafetaria or Foodcourt	Semi-outdoor, Public, View
														Gajebo	Semi-outdoor, Public, View
														Parking Lot	Outdoor, Public, Accesibility
														Locker Room	Indoor, Private, Layout
														Lavatory	Indoor, Private, Layout
														Toilet	Indoor, Private, Water Manage
														Mushola	Indoor, Private, Layout
														Security Room	Indoor, Private, Safety
														Janitor Room	Indoor, Private, Safety
														MEE Room	Indoor, Private, Safety
														Bicycle Rack Rent	Indoor, Private, Safety

CONCEPT according to the problem

SPATIAL ARRANGEMENT: zoning and for vegetation based time and type

LEGEND

Nypa Fructicane (Mainland Zone)

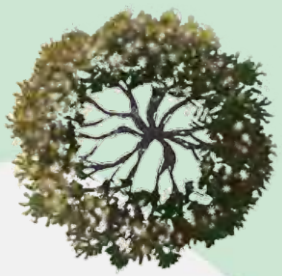
The area where mangrove forest and lowland forest meet is typically overgrown. Can survive optimally in areas of low salinity in comparison to other areas.

Bruguiera sp. (Brakish Zone)

Grows optimal and most effectively on tougher substrates, like clay.

Rhizopora Apiculata (Middle Zone)

Zone for planting Rhizopora sp. is in the central, landward zone. Get sea water with a pH intensity that is not too high.



Avinnecia sp. (Open Zone)

Located in the sandy substrate nearest to the ocean because the seeds can't thrive in shaded conditions and thick mud, areas that face the sea or an estuary are ideal. Despite the high salinity, optimally.

OPEN ZONES
(Avinnecia sp.)

Because each variety of mangrove requires a different set of circumstances to be supported, planting zoning is required in response to site conditions. It should be decided by a number of crucial variables: Soil foundation which substrate can be used depends on how exposed it is to tidal surges, factors from the land such as freshwater influx, the osmotic link between mangrove plants and salinity tidal waves that control how often plants are flooded.

Figure 188. Vegetation Zoning and Planning
Source: Author
(proccessed on 27 June 2022)

MAINLAND ZONES
(Nypa fructicane)

BRAKISH ZONES
(Bruguiera sp.)

MIDDLE ZONES
(Rhizopora Apiculata)

OPEN ZONES
(Avinnecia sp.)

Waterland

Mainland

Height (m)

6
5
4
3
2
1
0

Conservation Multisensory Experience **Mangrove Baros Sanctuary**

Avicennia sp.
Sonneratia sp.

Rhizopora Apiculata

Bruguiera sp.

Nypa Fructicane

CONCEPT according to the problem

SPATIAL ARRANGEMENT: zoning and layout based on spatial planning

In an effort to protect and preserve biodiversity in the Baros mangrove ecosystem, this zone was created as a result of the amalgamation of site and building functions with the Regent of Bantul Regency's Decree Number 284 of 2014 concerning Reserves for Coastal Park Conservation Areas. It consists of three zones: the core zone (10 ha), other zones (94 ha), and the limited use zone (28 ha). This zone will be based on the conservation and eco-edu tourism activity.

LEGEND

Central Zones (Planting & Released)
A core zone that serves as a spawning ground, nesting place, nursery area, a feeding ground for biota, and a distinctive and vulnerable coastal area.

Central Zones (Experience)
Using the old mangrove that has been released and is now free to serve as a guide for visitors learning about mangroves without damaging the mangrove environment.

Restricted Zones
A location that promotes tourism, recreation, scientific study, and conservation of fish populations and habitat.

Buffer Zones
Serves to breed unusual wildlife and anything else beneficial to the core zone. Migratory animals live in the area, which is also used to preserve natural

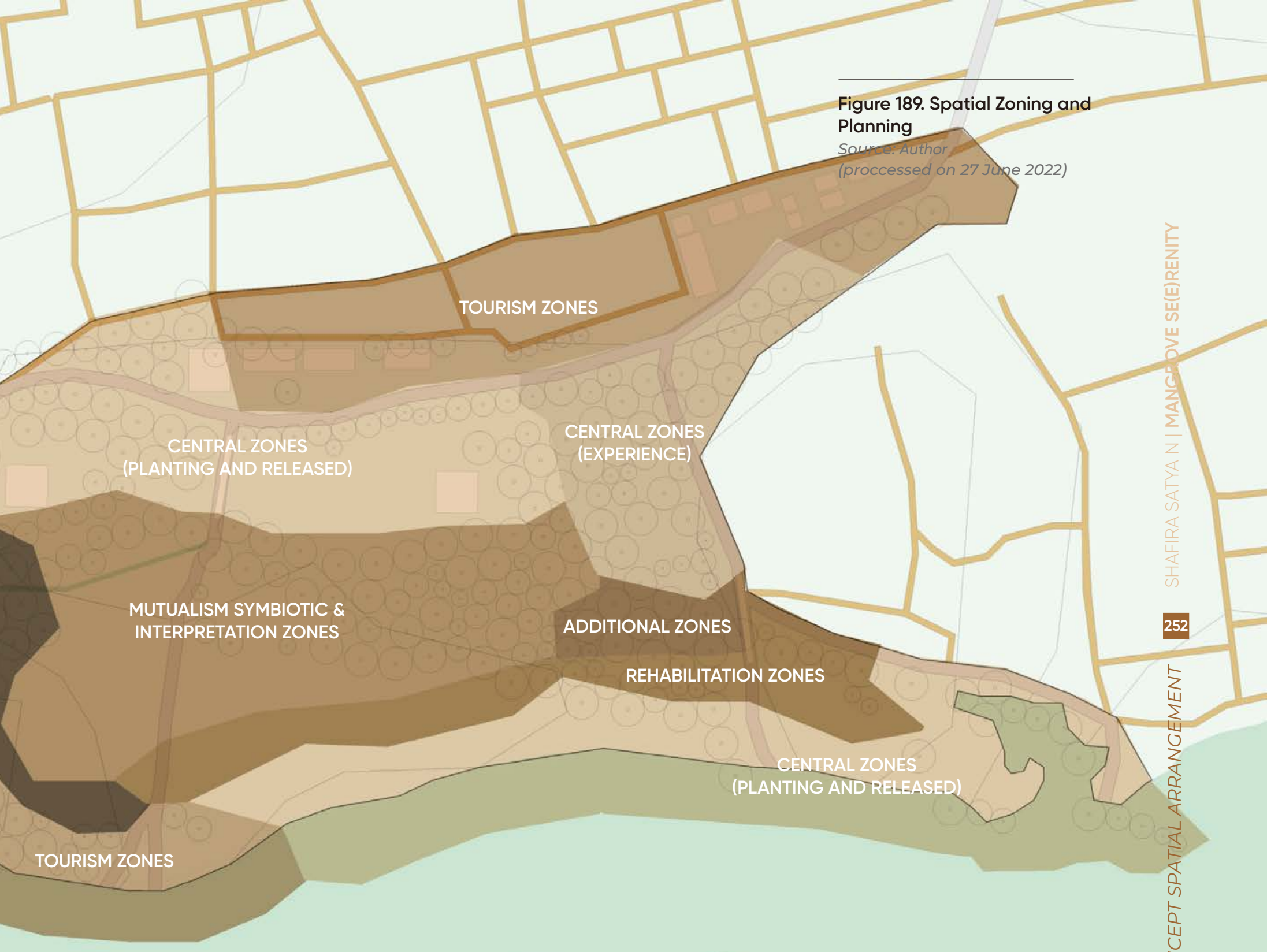


Figure 189. Spatial Zoning and Planning

Source: Author
(proccessed on 27 June 2022)

Tourism Zones

The tourist-friendly facilities and attractions are all located in this area. Based on how close the area is to current infrastructure, this zone was created.

Mutualism Symbiotic & Interpretation Zones

Zones where the breeding and education of living creatures is employed to benefit all living things.

Additional Zones

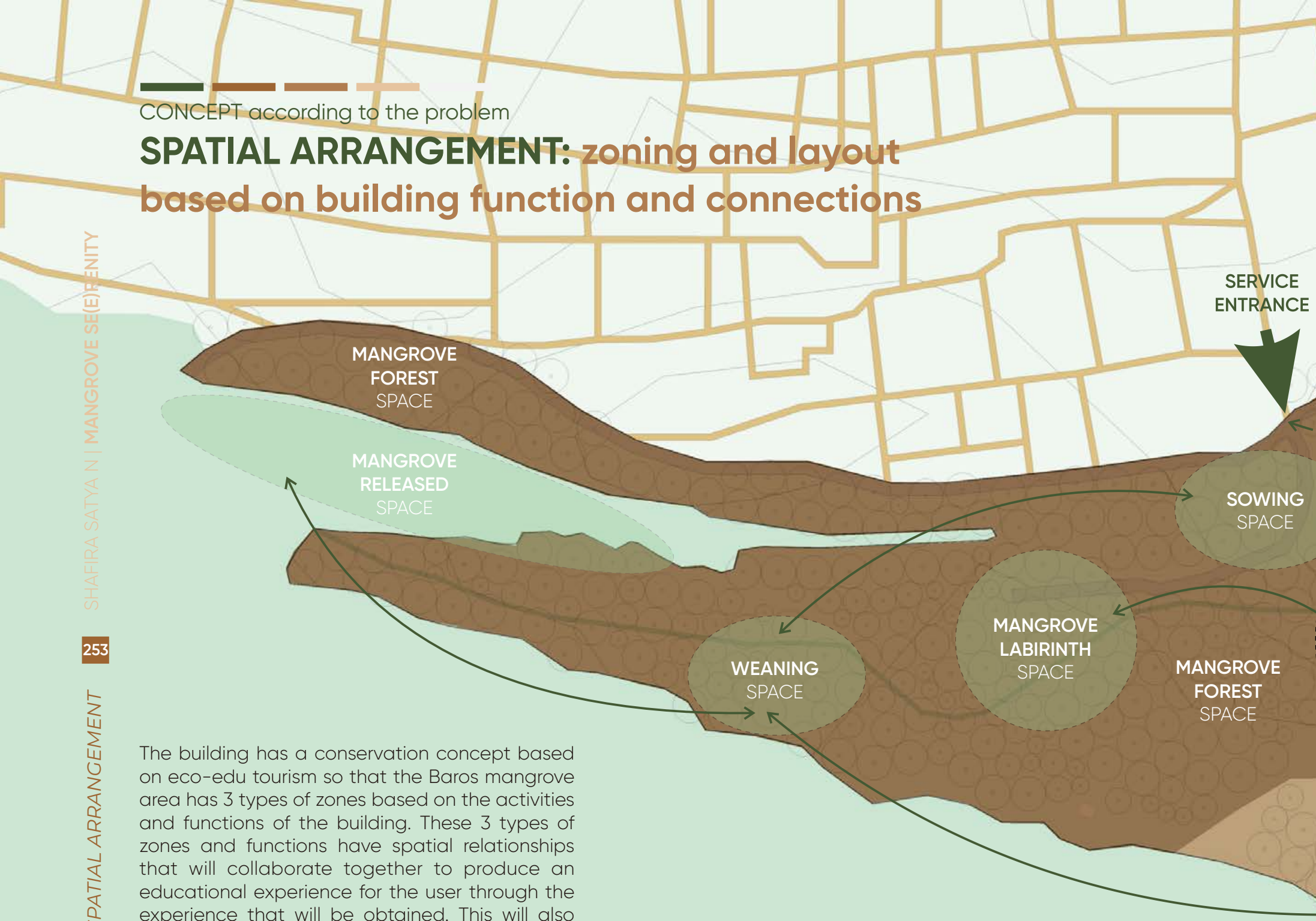
Extends beyond the core zone and a zone with limited use, defined as a particular zone depending on its function and state. Addition of building support facilities is possible.

Rehabilitation Zones

An area with abrasion damage requires restoration efforts necessary to restore the ecology of the injured area to its pre-damage form.

CONCEPT according to the problem

SPATIAL ARRANGEMENT: zoning and layout based on building function and connections



The building has a conservation concept based on eco-edu tourism so that the Baros mangrove area has 3 types of zones based on the activities and functions of the building. These 3 types of zones and functions have spatial relationships that will collaborate together to produce an educational experience for the user through the experience that will be obtained. This will also increase the user's awareness and empathy for nature.

LEGEND

Conservation Zones

The conservation zone is used for cultivating, rehabilitating, and restoring mangrove plants as wildlife habitat.

Tourism Zones

As a means of supporting conservation for visitor activities in Baros Mangrove which is useful for promoting and receiving regional income.

Interpretative Zones

Interpretation is an educational tool needed to increase people's awareness of nature and local communities so that they can be preserved.

Figure 190. Building Function and Connection Zoning and Planning

Source: Author

(proccessed on 27 June 2022)

CONCEPT according to the problem

SPATIAL ARRANGEMENT: accessability corridor and patch arrangement

Continuous corridor for conduit function a movement through landscape. Give the gaps for effectiveness to allow plans, animals, pollutans, and wind to accross. Wider coridor by 2m can increase overall mortality, barrier, and population source. Natural connectivity corridor in the watershed in preventing fragment by adding vegetation.

LEGEND

Water Transportation Platform

A buffer platform that will accommodate the need for transportation via water is useful for crossings to other crossing points. In addition, it can be a place to stop water sports games.

Along Coastal Skybridge

Corridor that connects the coast with the user. Inviting satisfication neighborhood, visitors, and nature. The organic pattern to symbolize an organic movement of nature.

Possibility of Encounters

Multiply the entry point to increase the possibilities for the user and even out the density so that it doesn't get stuck on a single point.

Connect The Do

Access that is make movemen user. Therefore provide the experience, circulations are

Large patches, capture diversity and habitat quality.

Connected patches, as a functional source and a filter. It is also place for exotic plants and animals movement.

Unified patch and biodivers

MAIN ENTRANCE

Figure 191. Accessability Corridor and Parch Arragement
Source: Author
(proccessed on 27 June 2022)

ts

too long can
nt tiring for the
e, in order to
e maximum
alternative
provided.

a Branch of Linear Movement

Maintaining the existing path with linear composition to deliver experience along mangrove boundaries.

Junction terminal

As a meeting place for several road lanes that have intersections to unite communities and visitors at one point that will support interactions when they pass each other.

Village Ricefields

Access from the village is a rice field area with road covers that are still rice fields and are still narrow. This access will be used to develop a circulation that provides a village experience.

nes, increase positive area
sity.

Redudancy patches, in order to make healthy ecosystem and provide greater genetic biodiversity.

Nearness patch, making it near and not separate also not contrast in order giving distance for various species.

CONCEPT according to the problem

SPATIAL ARRANGEMENT: accessability corridor form and mass arrangement

The form of circulation and placement of buildings on the site responds to the location of existing trees and the motion of seawater. With several compositions taken from the characteristics of mangrove plants, namely as ecosystem balancing, two masses are placed in the middle which reflect each other, dynamic, irregular, growth, radial, and centered.

LEGEND

Radial Balancing Mass

Taking the principle of the character of the mangroves and also placing the mass module in response to the existing vegetation so as to damage the damage.

Trees Point Mass

The form of centered mass as a response to vegetation and the same canopy shape as a tree is meaningful as a place where activities occur.

Linear Way Existing

Maintaining the composition of the existing site circulation, which is linear elongated at the site as a one way circulation.

Connect Village

To increase the
nature with
community. Give
that connects t
the sea.

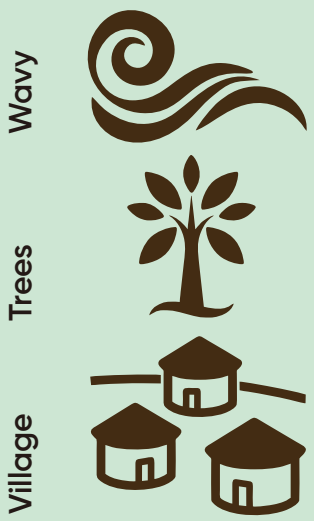
Figure 192. Accessability Corridor Form and Mass Arragement
Source: Author
(proccessed on 27 June 2022)

and Nature

e interaction of
the village
en a circulation
he rice fields to

Wave Breaker Way

Irregular and dynamic shapes around the site will provide the experience of walking along nature. This shape responds to the motion of ocean waves.



CONCEPT according to the problem

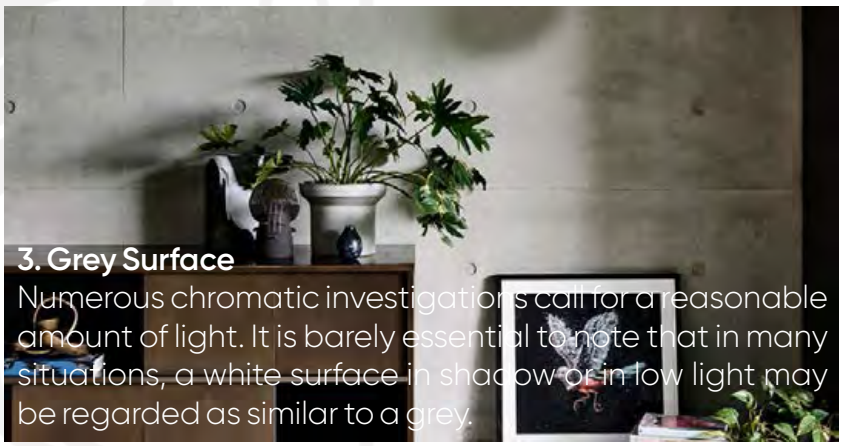
2.1 COLOR: as experiencing the user and that can avoid and/or attract predators

GENERAL COLOR & EFFECT

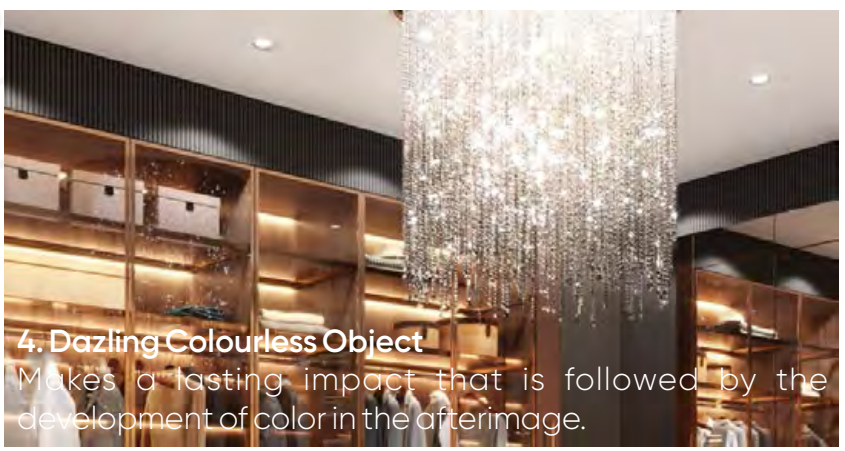
Color has an influence on feelings, moods, and emotions. Not only a matter of emotion, color can also affect human behavior and mind physiological reactions. In 1840, Johann Wolfgang van Goethe in his book entitled "Theory of Colors" stated that every color can give a positive or negative impression on a person's emotions. More than that, color also have important role to manage human body temperature.

1. White Color
White, strongly illumined surface, the eye is dazzled, and for a time is incapable of distinguishing objects moderately lighted.

2. Dark Color
a certain sense of privation is experienced. Stimulating and grateful contact is wanting by means of which it is connected with the external world, and becomes part of a whole.



3. Grey Surface
Numerous chromatic investigations call for a reasonable amount of light. It is barely essential to note that in many situations, a white surface in shadow or in low light may be regarded as similar to a grey.



4. Dazling Colourless Object
Makes a lasting impact that is followed by the development of color in the afterimage.

Figure 193. Color and The Effect
Source: Pinterest
(proccessed on 02 July 2022)

YELLOW

In its highest purity it always carries with it the nature of brightness, and has a serene, gay, softly exciting character. Excites a warm and agreeable impression. Hence in painting it belongs to the illumined and emphatic side.

YELLOW-RED

Increases in energy, and appears in red-yellow more powerful and splendid. Gives an impression of warmth and gladness.

RED-YELLOW

The agreeable, cheerful sensation and powerfull. The active side is here in its highest energy, and it is not to be wondered at that impetuous, robust, uneducated

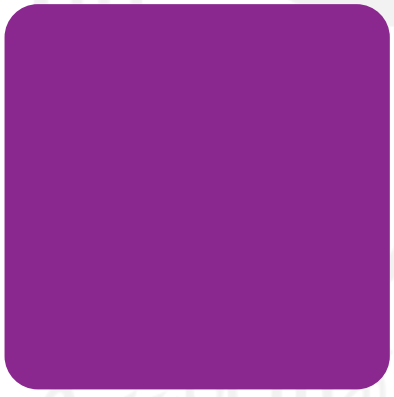
RED

Extremes, a feeling of satisfaction. The effect of this colour is as peculiar as its nature. It conveys an impression of gravity and dignity, and at the same time of grace and attractiveness.

BLUE

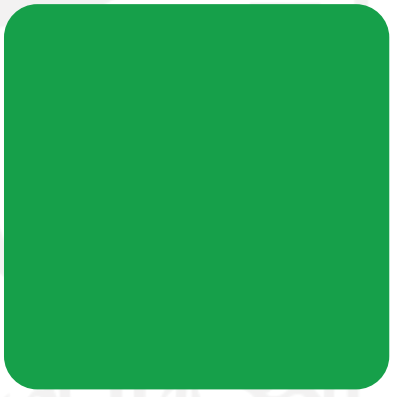
As a hue it is powerful, but it is on the negative side, and in its highest purity is, as it were, a stimulating negation. Its appearance, then, is a kind of contradiction between excitement and repose. Empty and cold. in glass is Gloomy and melancholy.

RED-BLUE



Active character, although it is on the passive side. Increase in the active sense, but to find a point to rest in. Lively without gladness.

GREEN

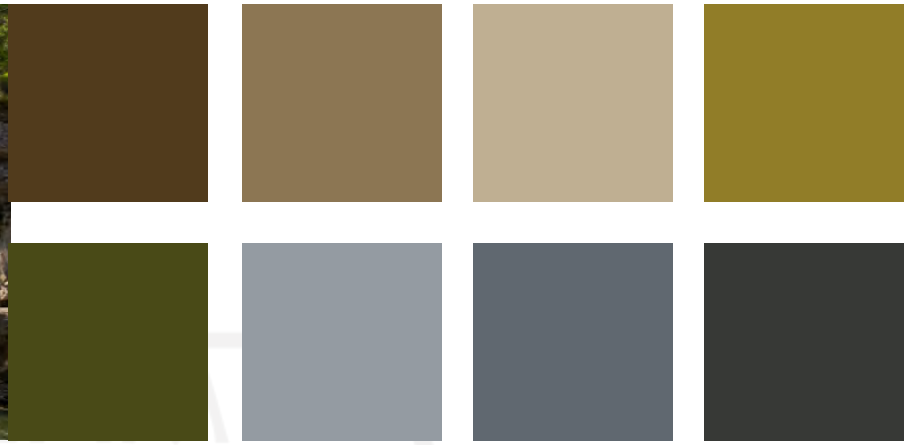


The eye experiences a distinctly grateful impression. The beholder has neither the wish nor the power to imagine a state beyond it caled a harmony.

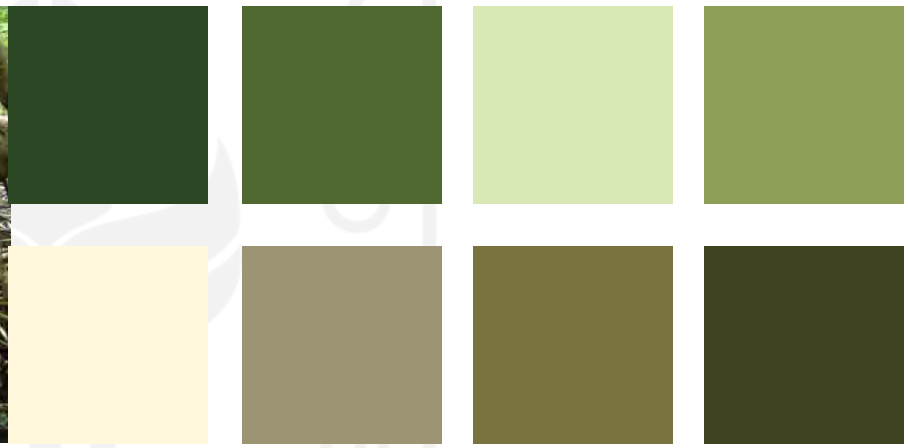
YELLOW-BLUE

May be called poor, and as the two contrasting elements are in their lowest state, may be said to be ordinary

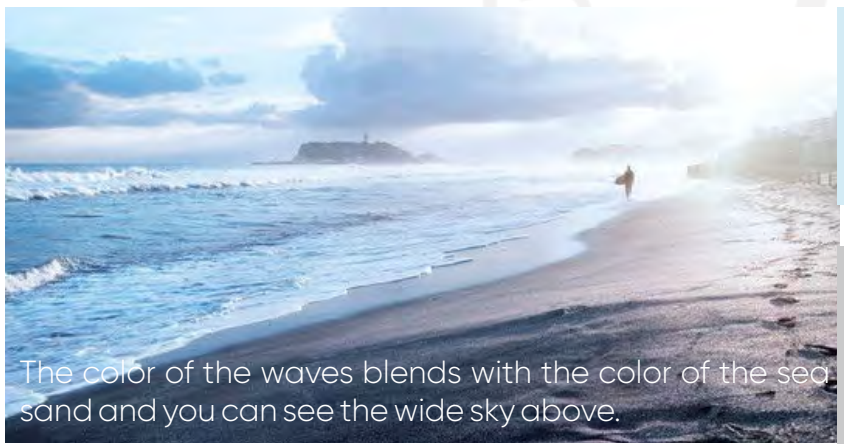
NATURE COLOR & EFFECT: RIVER



NATURE COLOR & EFFECT: MANGROVE



NATURE COLOR & EFFECT: COASTAL



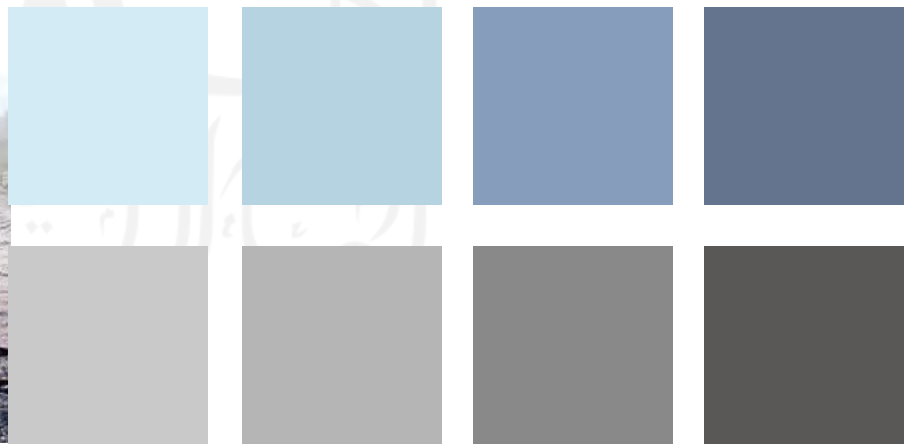


Figure 194. Nature Color and The Effect

Source: Pinterest
(proccessed on 02 July 2022)

One of the success of mangroves is influenced by the presence of predators because they interfere in the nursery process. Predators can prey on all levels of development of their prey, causing mangrove seedlings to die. To overcome this a solution is needed, namely by giving the use of color to architectural design ideas.

PREDATOR COLOR & EFFECT: ATTRACT

To attract predators or it can be said to create a symbiotic mutualism in a place to balance the food chain, neutral colors can be used which are usually accepted by the animal's eye.

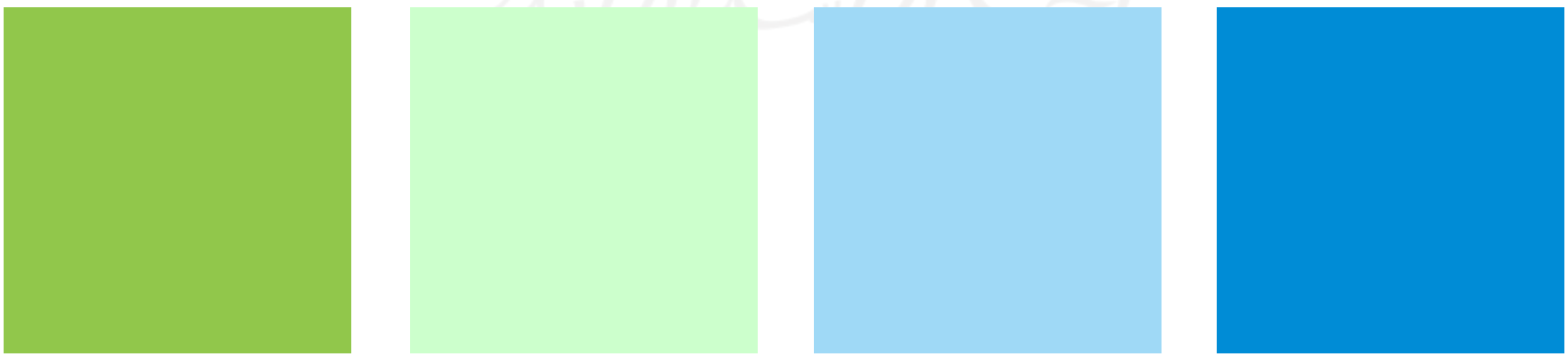
PREDATOR COLOR & EFFECT: AVOID

1. Bird

From several research retrieved that birds have a fear of bright colors like yellow and red. In addition, they also can not capture the shimmering and dazzling colors.

2. Crab

Crabs can't pick up too many greens and blues. They are used to capturing colors in dark light. Therefore, the use of green or blue lights is necessary so that the crabs do not approach the nursery area.



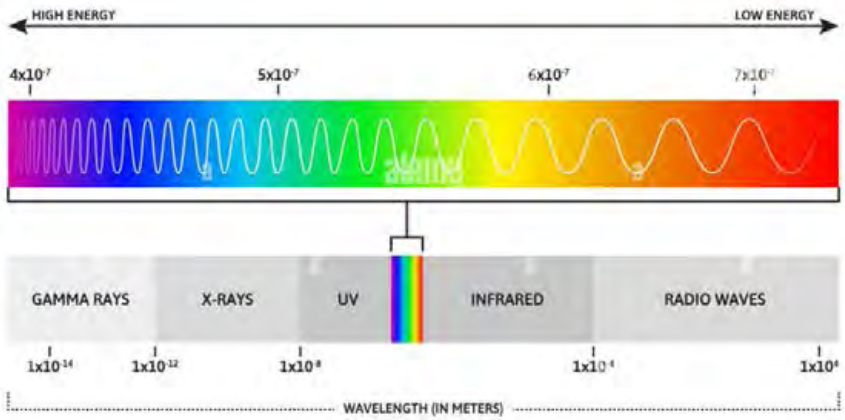


Figure 195. *Color Spectrum Wavelenght*
Source: alamy.com/visible-color-spectrum-sunlight-wavelength-and-increasing-frequency (proccessed on 02 July 2022)

CONCEPT according to the problem

3.1 MULTI-SENSORY: applications for built interaction between people, building, & nature

NATURE BASED ELEMENT

"Nature-based learning is a conceptual framework, which basically describes a concrete structure of learning experience by utilizing nature as the material, the media, and the learning environment" - Rahmawati, I. Y. (2017)

As a natural element forming the mangrove baros area, eco-edu tourism that forms a space experience can stimulate space users to provide sensory experiences such as sight, touch, smell, taste, and hearing. Nature itself has been formed from various elements. Therefore, it can be exploited by designing sensory collaboration to support multiple activities and improve user memory.

Based on this methodology, suggested activities will also take into account the surroundings, the people, and those that are created using local knowledge. These activities undoubtedly improve both daily living and the features of the local society.

SAND BEACH

The texture feels rough and scattered. Small array of particles.

The smell of beach sand is like the smell of salt because it is mixed with salt and algae.

Can sparkling, lighting distort, and have clear-yellow color according to the water base.

When stepped on the sand will make a sound because it is under pressure and the particles will fall.

Tastes salty but should not be eaten because it is an inorganic substance.

FRESH WATER

Different temperatures (can be cold and hot) and have flexible character in term of places.

The smell of this water is refreshing and sometimes mixed with the smell of earth.

Can sparkling, lighting distort, and have clear-yellow color according to the water base.

Moving water can produce a loud gurgling sound depending on the water flow.

Fresh water as the name suggests will have no taste but is refreshing.

OCEAN WAVES

Different temperatures (can be cold and hot) and wavy have movement (Flexibility).

The smell produced by the waves will feel refreshing to the mind.

Can distort light, repetitive motions in a diffused pattern. When the waves come, will feel an excited sensation.

The waves crashing like a big roar based on the flow of water that comes.

The taste of sea water is salty because it contains salt.

SALT/BRAKISH WATER

Different temperatures (can be cold and hot) and have flexible character in term of places.

The smell of this sea water is salty and has a characteristic odor.

Can sparkling and have clear-blue color according to the water base.

Moving water can produce a loud gurgling sound depending on the water flow.

The taste of sea water is salty because it contains salt.

STONE

The texture humid rough that can make people feel peacefull with cool surface.

Does not have a striking odor but can make the air fresh and cool.

Dark color w/ gives a rough texture to the irregular shape of the stone, while the regular one has a smooth texture.

Able to muffle sound and will make a sound when there is a collision.

Can not be felt with the tongue but the psychological effect is dark.

MANGROVE WOOD

Mangrove wood has a slippery texture on the inside and rough on the skin.

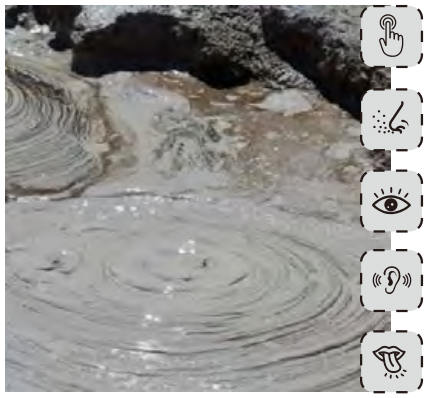
The smell of mangrove wood can be extracted into essential oils that can improve focus.

The color of the mangrove wood is brown which makes people feel warm.

The sound produced when 2 sticks collide with each other is "Tek".

Can not be felt by the tongue, can only be felt by color.

MUDDY SOIL



The texture is sticky and soft which if over time produces cold to hot temperatures.

Has an odor with its own identity due to a mixture of water and soil as well as other components.

The color is gray, glossy, and cloudy. Cannot reflect light.

A soft sound like something is sucking from inside the surface due to stickiness characteristic.

Can not be felt with the tongue but the psychological effect is ansiousness.

MANGROVE LEAVES

The texture of the leaves is smooth and the leaves do not feel the cleavage of the leaves.

Produces a fragrant pungent odor and can increase focus if processed into essence.

Yellowish green color that will shine when exposed to sunlight.

Will produce a sound when some leaves are passed by the wind and rub depending on the speed.

Will produce a sour and sweet taste when processed into syrup and flour.

GRASS

The texture is rough and taper. Sometimes dry or wet.

The smell of grass is very refreshing and smells like leaves. If after the rain it will smell like dirt.

The green color and linear shapes are combined into a refreshing impression if you have a wide expanse.

The sound emitted by the grass hung from the wind blowing through the gap.

The grass will taste bitter and is very representative of the wild.

BAMBOO

The surface of the bamboo is rather rough and has a partition on each part. While the leaves will feel itchy.

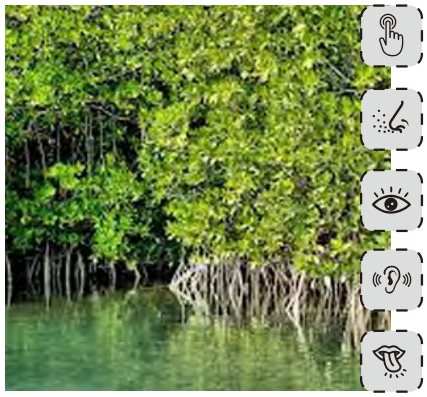
The smell of bamboo is not too strong and a bit rotten. In addition, it can dispel odors.

Bamboo has a dense density so it will produce a shadow effect. There are yellow, green, and dark brown colors.

Bamboo can produce a sound that creates harmony and when struck it makes a loud sound.

Bamboo has no taste but is often used in cooking to make it delicious.

MANGROVE TREES



Mangrove plants have 3 texture components, namely the leaves, roots, and water.

The odor produced depends on the type, but the majority have a pungent odor.

Consists of natural colors, namely green and brown. When passing through it creates a sense of mystery.

The sound comes from the friction of mangrove leaves and roots when they collide with the help of the wind blowing.

Depending on the type of mangrove, it can produce syrup, crackers and flour.

SHRIMP FIR TREE

Dry and jagged texture. When the leaf is held it will feel small and crunchy.

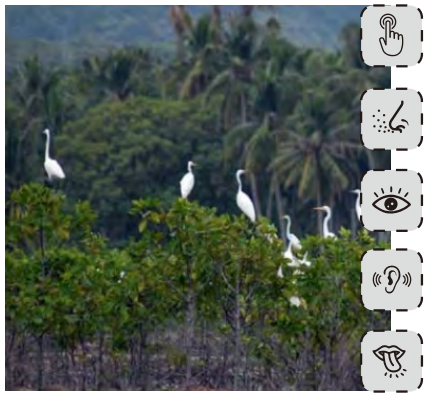
Does not produce a significant odor but feels good when smelled.

Has a natural color and a unique shape, will shrink at the end.

This plant can withstand strong winds and beautiful sounds like sunshine.

Can reduce fatigue through the colors displayed.

BIRD



Smooth bird feathers with separate and soft strands.

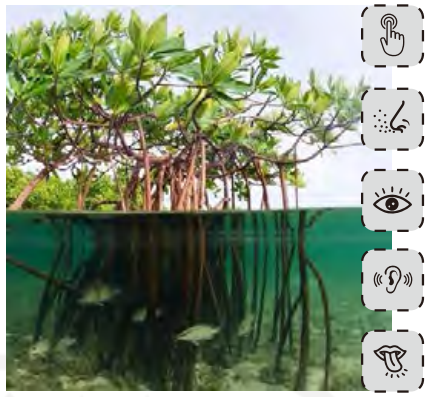
A flock of egrets that take food in the garbage will cause an unpleasant odor.

It is white and black in color with a curved shape and can move from place to place.

The sound of birds chirping and flying can be enjoyed because it is melodious when the wind blows like a song.

Can be eaten but must be cooked and seasoned first.

MARINE BIOTA



Some are hard and some are soft. Some are jagged and some are smooth.

Smells fishy and slightly salty.

Various colors and shapes. Mostly interesting.

Makes a gurgling sound when moving in water.

Will taste salty and soft, often used as food.

INSECT

Has a thin, smooth, and transparent flying tool. Easy to deform.

Insects are eaters of nectar from flowers so will have a honey and leaf smell.

Small, has a variety of colors but attractive, and can move from place to place.

The sound produced is when flying insects flap their wings and when they eat.

Some can be felt and will feel dry and tender.

RICEFIELD

Wet texture on mud and water. Has a cold temperature. And jagged leaves.

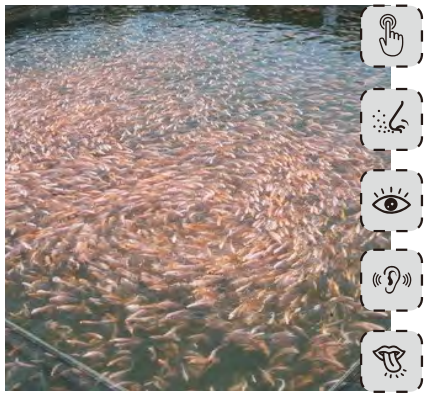
The dominant odor that can be produced is the smell of mud.

The green color with regular planting patterns gives the effect of refreshing the mind and being close to nature.

The sound of splashing water is dominating.

Can not be felt if not processed. But the color makes it close to nature.

FISH



Soft and smooth scaly on the surface of the skin. Fish can be move.

The resulting odor is categorized as an unpleasant odor because it is fishy and pungent.

Has a variety of colors and various shapes depending on the type. Can move.

The sound produced by the fish flapping when it moves will produce splashing water.

Can be eaten but must be cooked and seasoned first, has a smooth texture.

MOSS

Has a slippery texture with high humidity and tends to get wet.

Smells like water and earth mixed, will feel refreshing.

Green and crusty. Often sticks to rocks and moist soil. Very small and colonial.

Does not produce sound.

Produces an intimate feeling towards nature.

GARBAGE

Some have a slippery texture like plastic waste and a rough texture like cloth or iron.

The resulting odor is categorized as an unpleasant odor because it is disgusting.

Garbage can not be defined shape and color because there are so many.

Does not produce sound.

Cannot be felt because it is disgusting and disturbing.

CLOUD & SKY

Untouchable but like cotton.

Does not produce odor.

The bright blue color in the sunlight creates a feeling of excitement. Organic form.

Does not produce sound only when rumbling.

It has no taste but at dusk it will give a romantic impression.

Figure 195. Nature Base Element List

Source: Author
(proccessed on 02 July 2022)

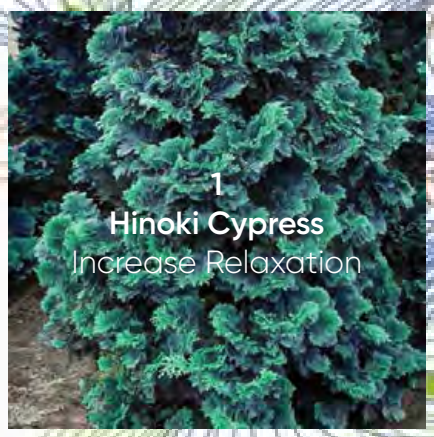
Odor of Mangrove Distilation Ingridients

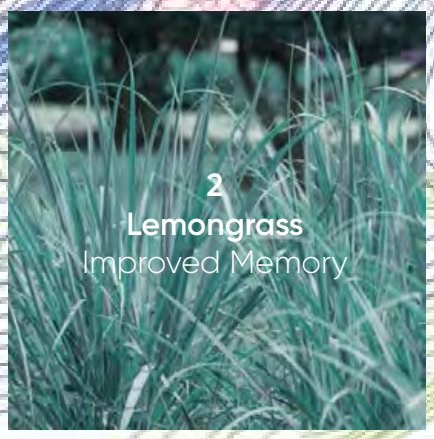
The result of the distillation process of mangrove plants is an essential oil odor that has characteristics with aromatic and earthy smell which sometimes secrete those strong odors that can increase focus and have distinctive characteristics.

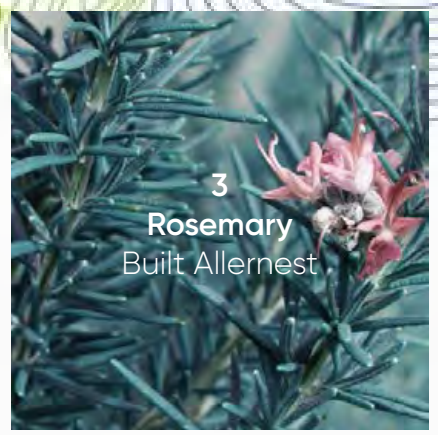
Flowers from avinnecia produce a pungent aroma that gives rise to the identity of the mangrove plant. The wood also produces a pungent odor. In addition, this mangrove produces nectar so that it smells like nectar.

The smell produced by rhizopora type mangroves can increase focus and intensity because the smell is delicious and not too strong.

Odor Distilation from Natural Sources (Flower)







Stack-Pressure Natural Ventilation Diagram

4.1 BUILDING CONSRUCTION: adaptable structure in coastal area (abrasion & tidal wave)

Thus structural concept is urgently needed in order to respond the climate condition of increasing water surface and land degradation at least 1-2 meter from tidal wave based on the analysis schenario. The building should be able to adapt with abrassion to make it still stand and have stability while the tidal wave come. It is also can support the need of brakish water instead of fresh water for growing the mangrove. The structure focusing on growth concept, easier to arrange, and stable so the result of modular design. It has several alternatives concept to make it floating. Telecospic, By balast stabilised, tensile, and monopile. Anchored structure by truss and pile system development. And floating structure by buyonancy billet barrel and racknpinion system. Based on the analysis will conclude that the floating structure can be more effective and it was have a sensory from the water, so it will affect directly to the building. The concept on multi-sensory approach is from the technology itself. It can respond to the intensity increasement (automobile).

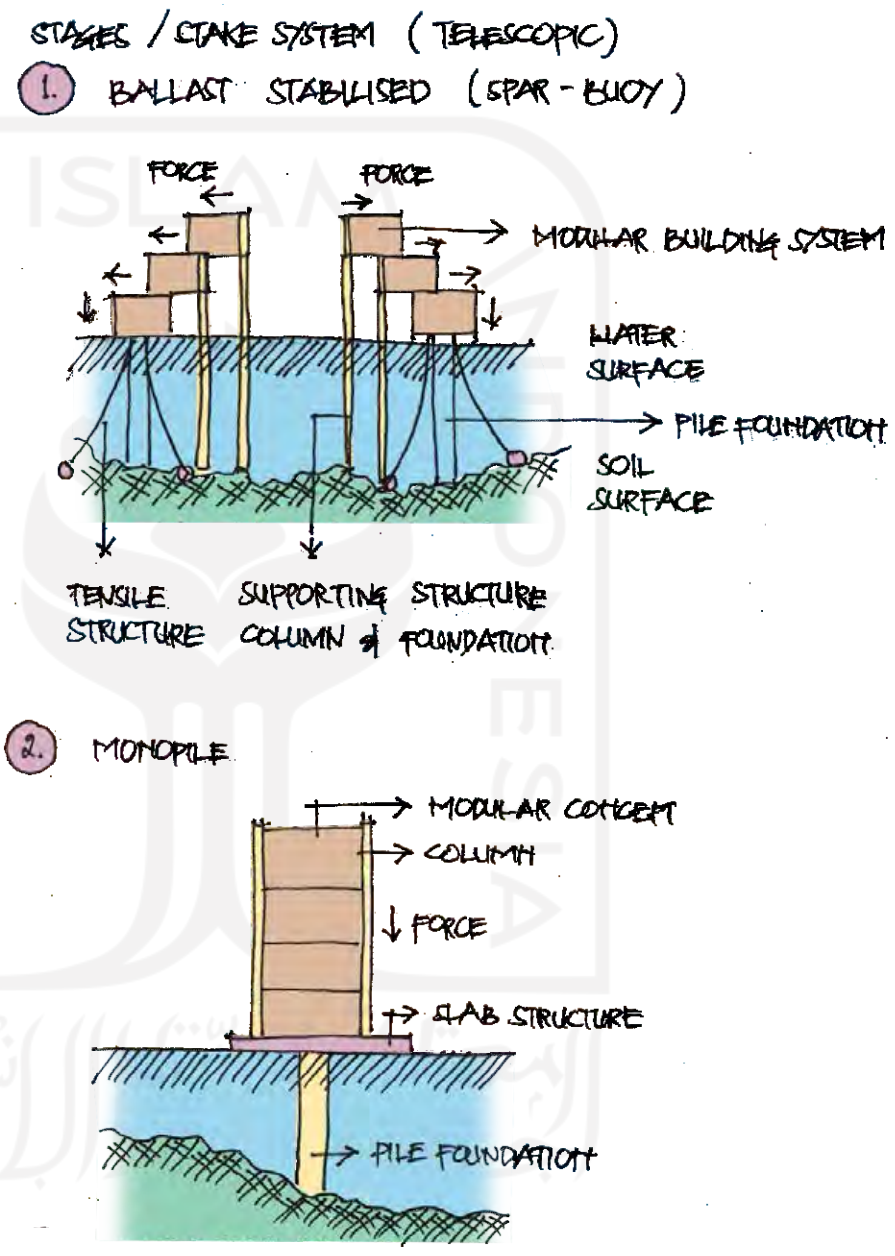


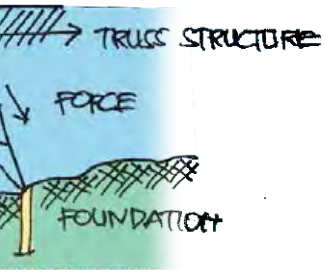
Figure 196. Adaptable Structure in Coastal Area (Abrasion & Tidal Wave) Illustration
Source: Author
(proccessed on 02 July 2022)

URE)

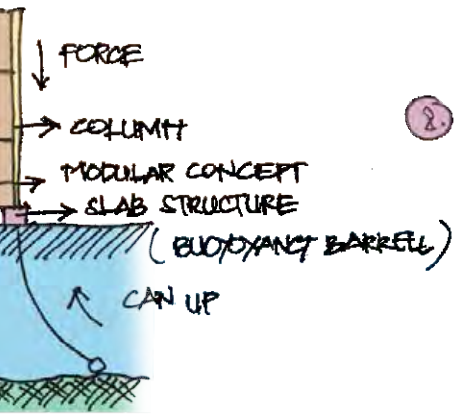
MODULAR CONCEPT

COLUMN

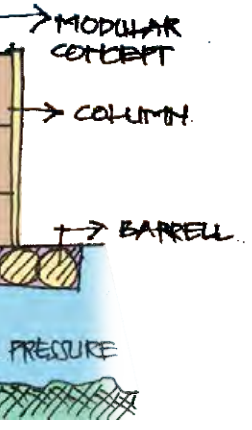
SLAB STRUCTURE



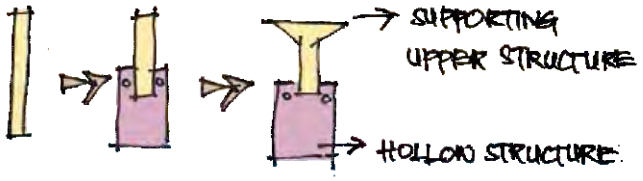
SED



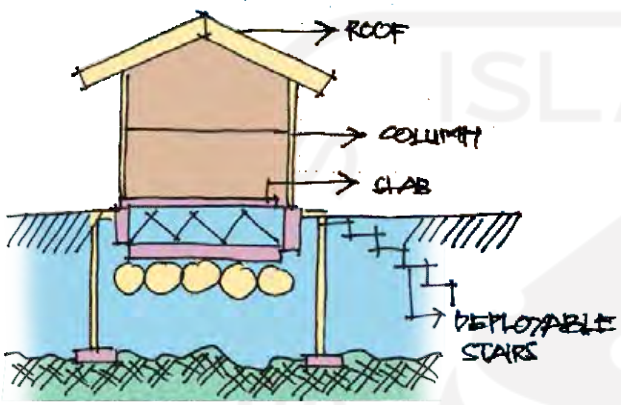
URE (AMPHIBIOUS)



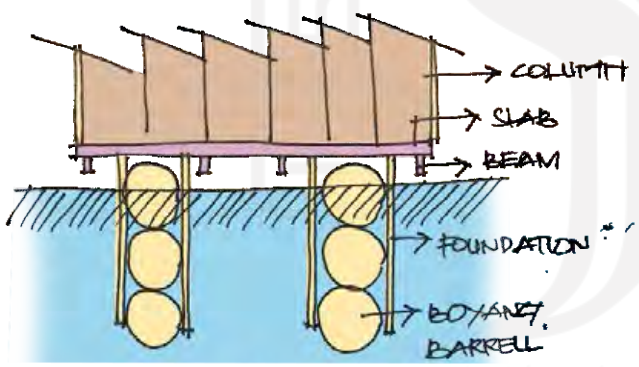
6. PILE SYSTEM DEVELOPMENT → RACK & PINION



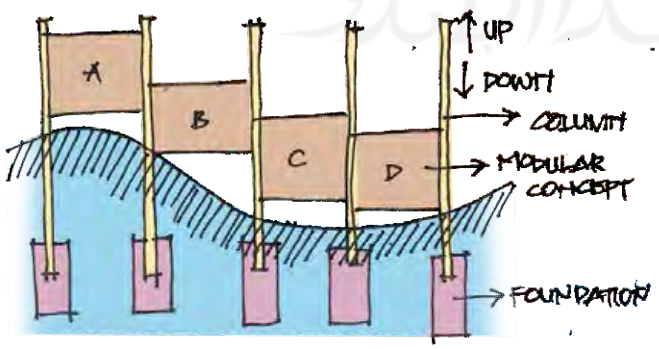
7. LOCAL TREATMENT



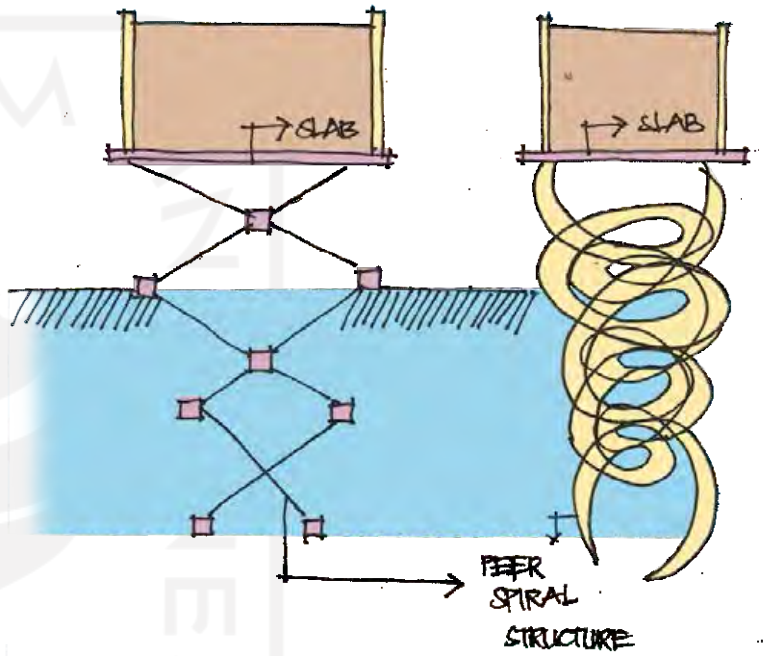
8. NEW CONCEPT OF LOCAL TREATMENT



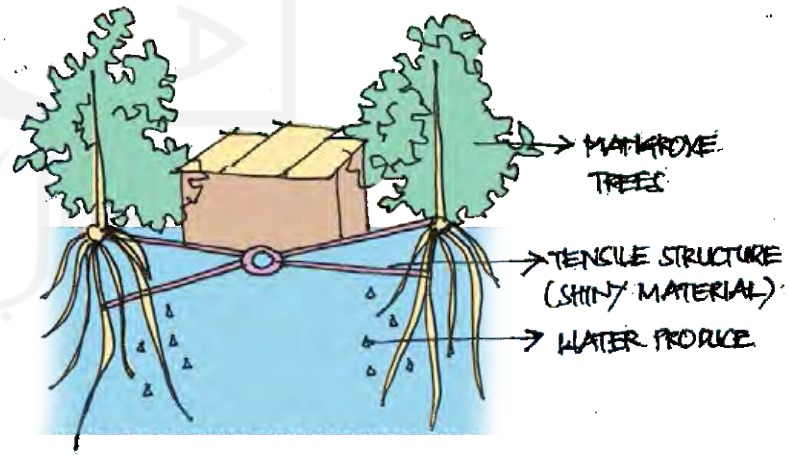
9. RACK & PITHOT SYSTEM



10. KINETIC STRUCTURE



11. TENSILE STRUCTURE



CONCEPT according to the problem

5.1 BUILDING ENVELOPE: adjust to the climate in coastal area and movement avoid predator (kinetic)

The building envelope should be developed because in mangrove baros have relatively high temperature at 28 degree and high humidity level. So the concept is to provide kinetic system envelope as a strategy in order to respond different stimuli. It was also can protect it from bird predator, that are scared to movement, color, and dazling. The form of facade was transforming from the leaf and applied the sense of bud and bloom.

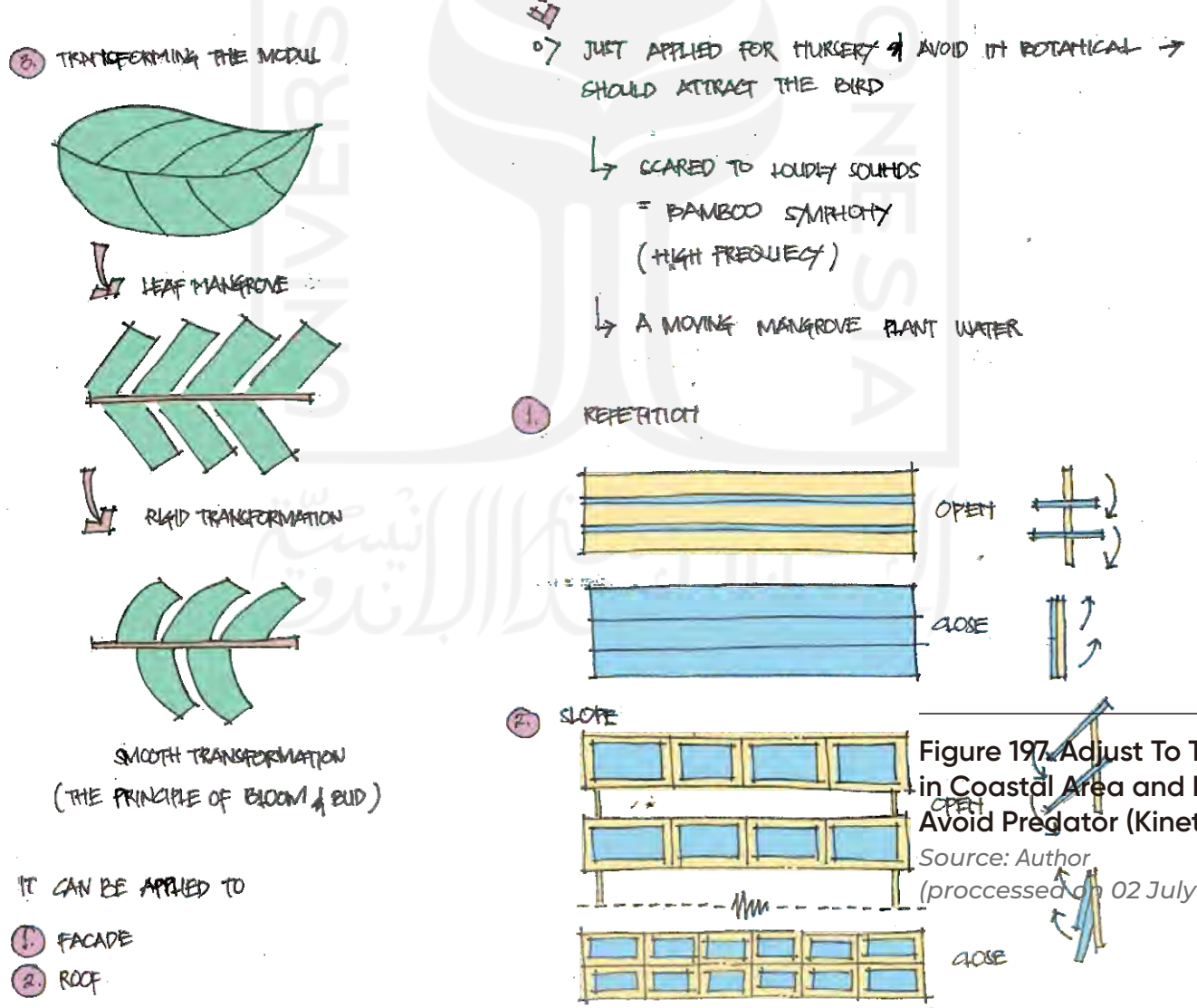
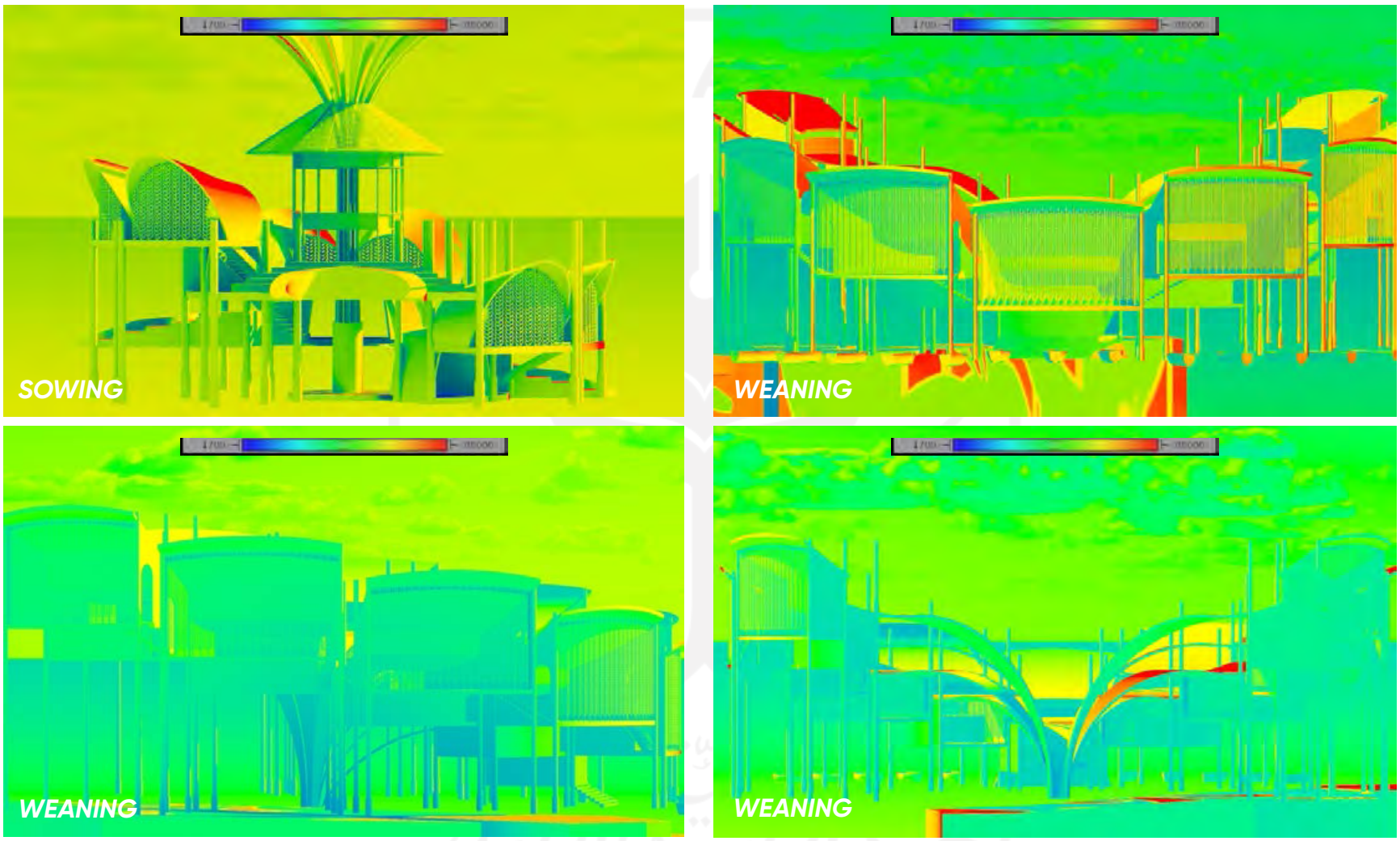


Figure 197. Adjust To The Climate in Coastal Area and Movement Avoid Predator (Kinetic)

Source: Author (proccessed on 02 July 2022)

5.1 BUILDING ENVELOPE: adjust to the climate of coastal area simulation

Figure 198. Adjust to The Climate of Coastal Area Simulation
Source: Author
(proccessed on 02 July 2022)

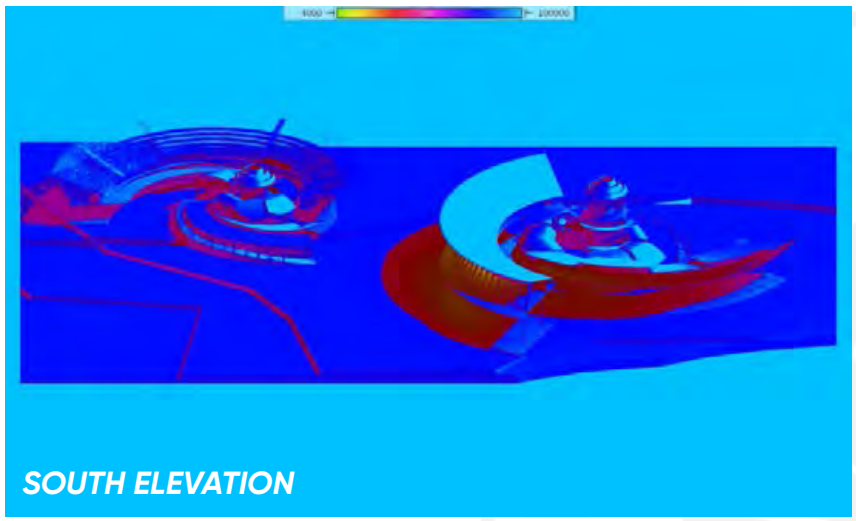


The experiment was conducted on June 22 at 09.00 to test the radiation rays at sunset because they have a negative impact on space users and plant growth. So this will be anticipated by making the building's module up and down to give a shadow in below surface of the water.

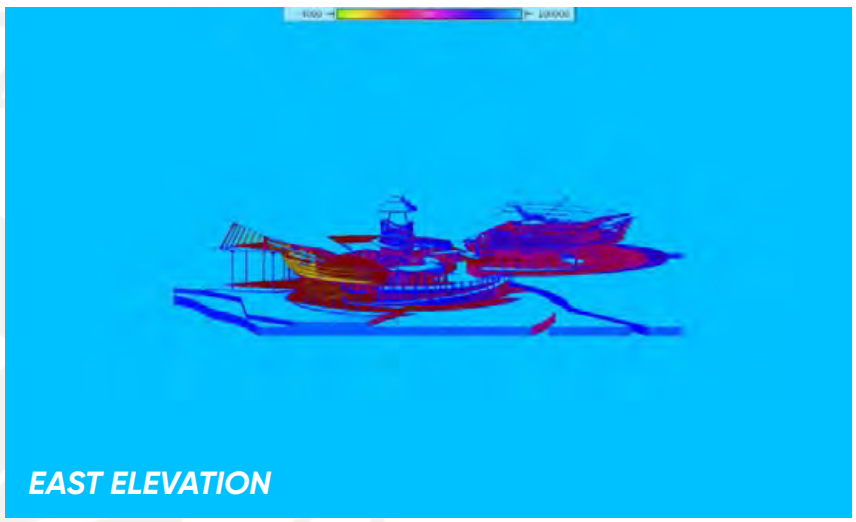
The provision of a curved roof is able to cope with light entering directly into the building, but the building will remain bright. The use of a kinetic facade on the envelope can adjust the room temperature as needed.

CONCEPT according to the problem

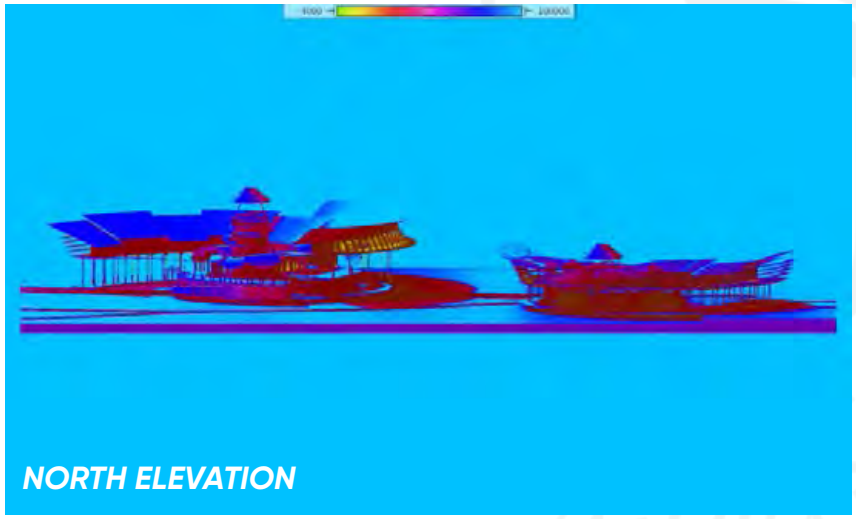
5.1 BUILDING ENVELOPE: adjust to the climate of coastal area simulation



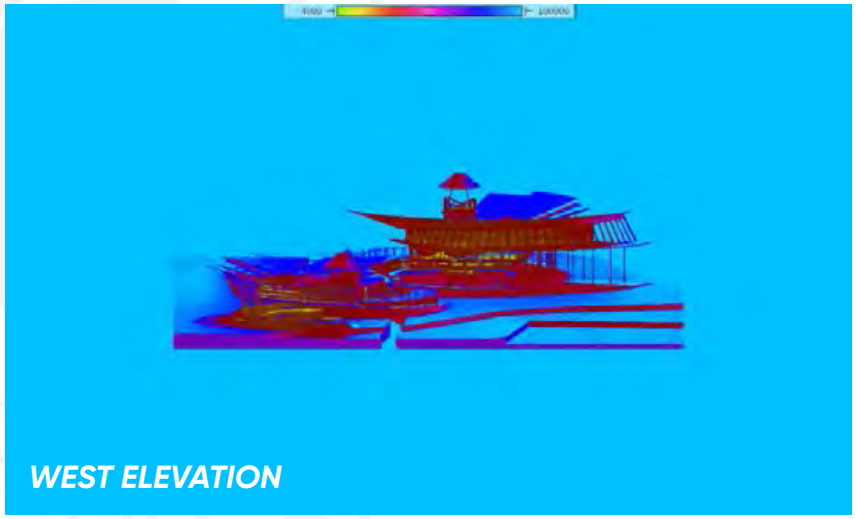
SOUTH ELEVATION



EAST ELEVATION



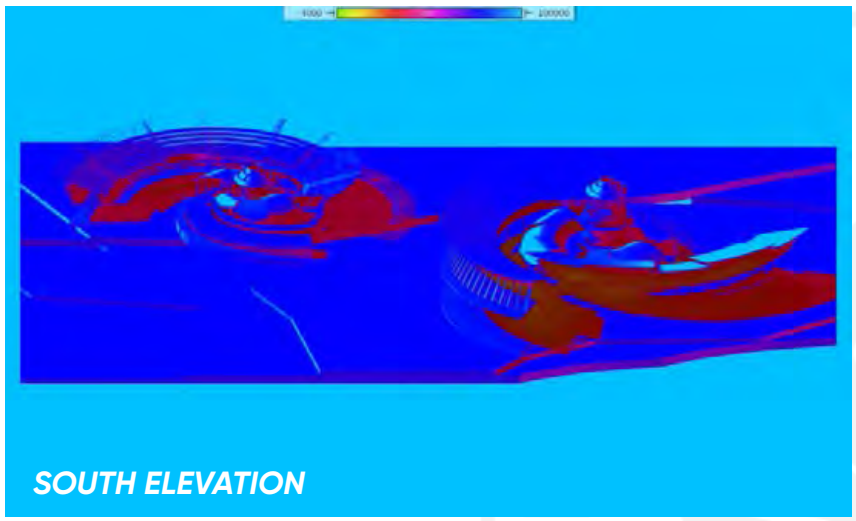
NORTH ELEVATION

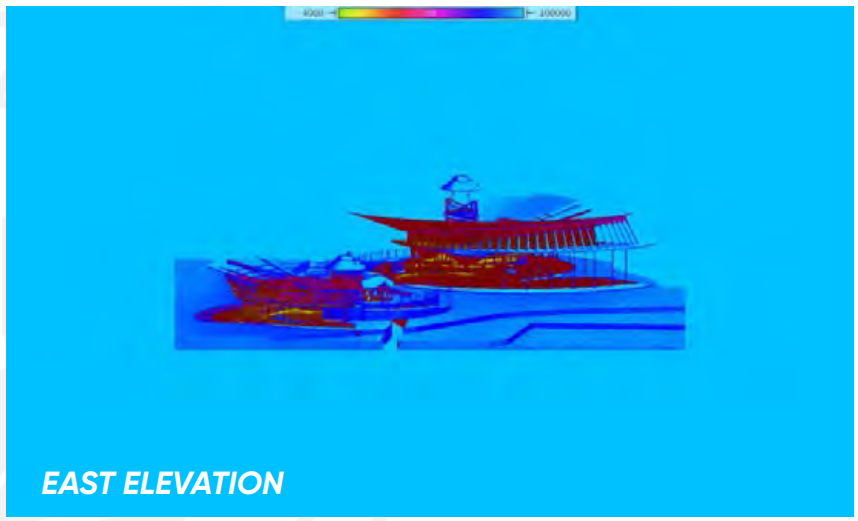


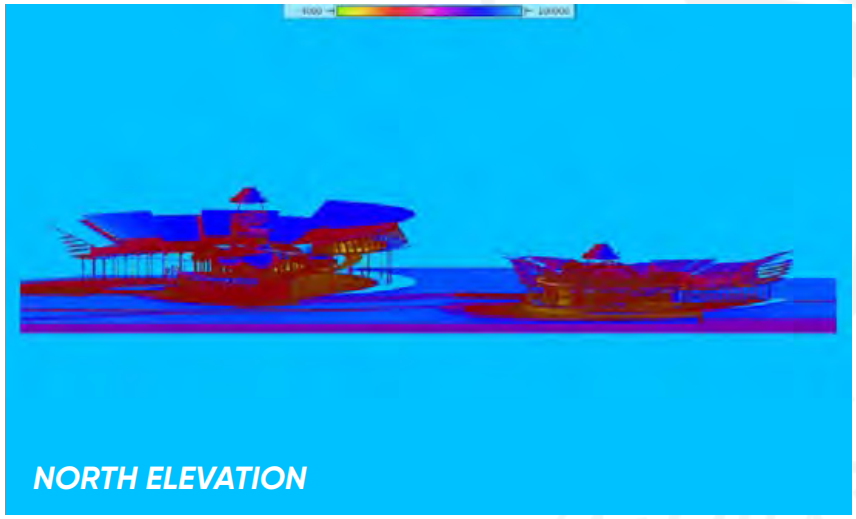
WEST ELEVATION

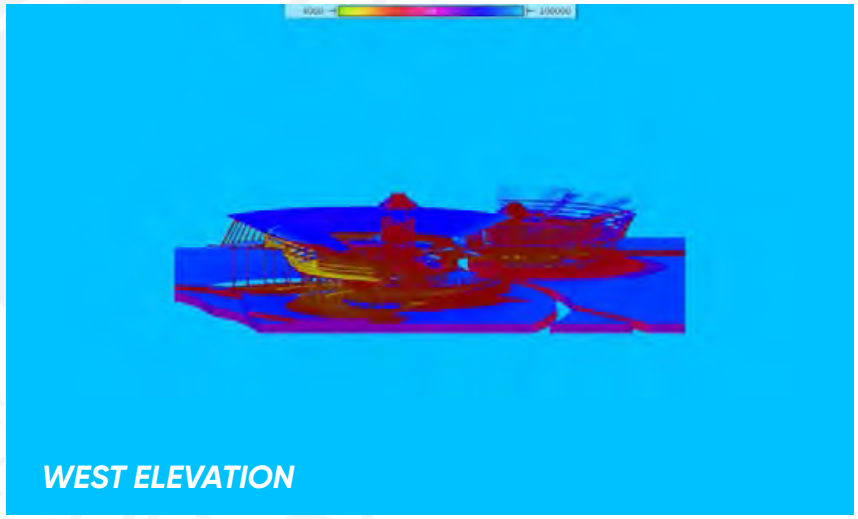
1st Building Mass

Simulations were carried out on buildings with laboratory, containment, storage, and soaking rooms because they require a temperature response to facilitate and optimize the growth of mangroves with a room temperature of 25 degrees Celsius and lighting of 5000 lux. At the time of testing, samples were taken on June 22 at 09.00 because it was the month and hour of the critical solar radiation angle. The results show that the south, west, east, and north sides of the laboratory room get a lot of sunlight, but are not exposed to direct sunlight because there is a facade slope of 30 degrees. While the botanical and interpretation section will get a cooler temperature and still get natural lighting. The material used is a material that can absorb heat and is transparent so that it can catch sunlight easily to enter the building.





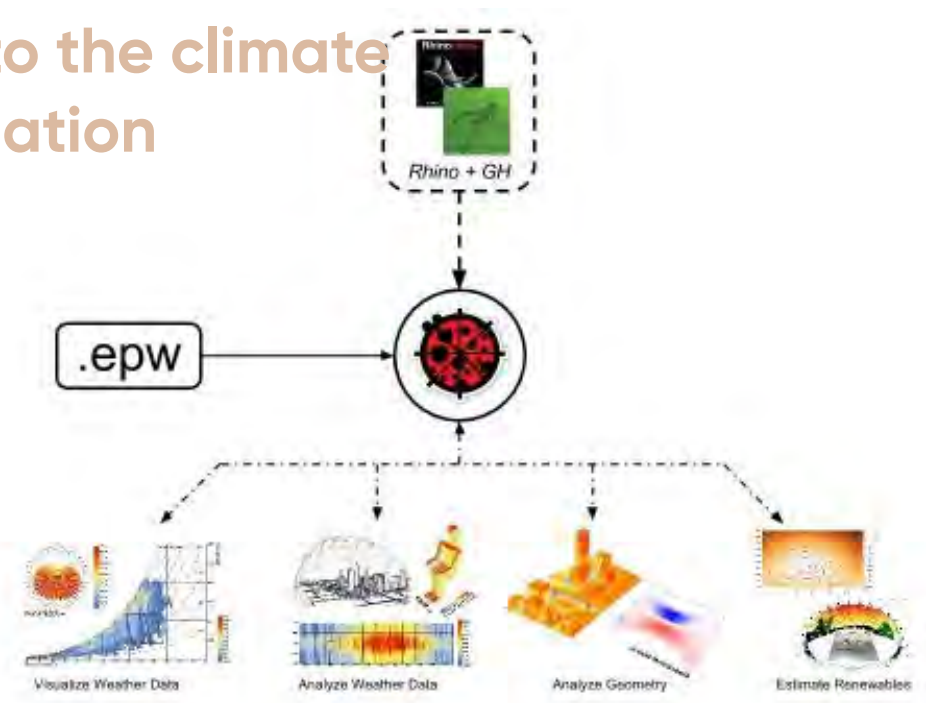


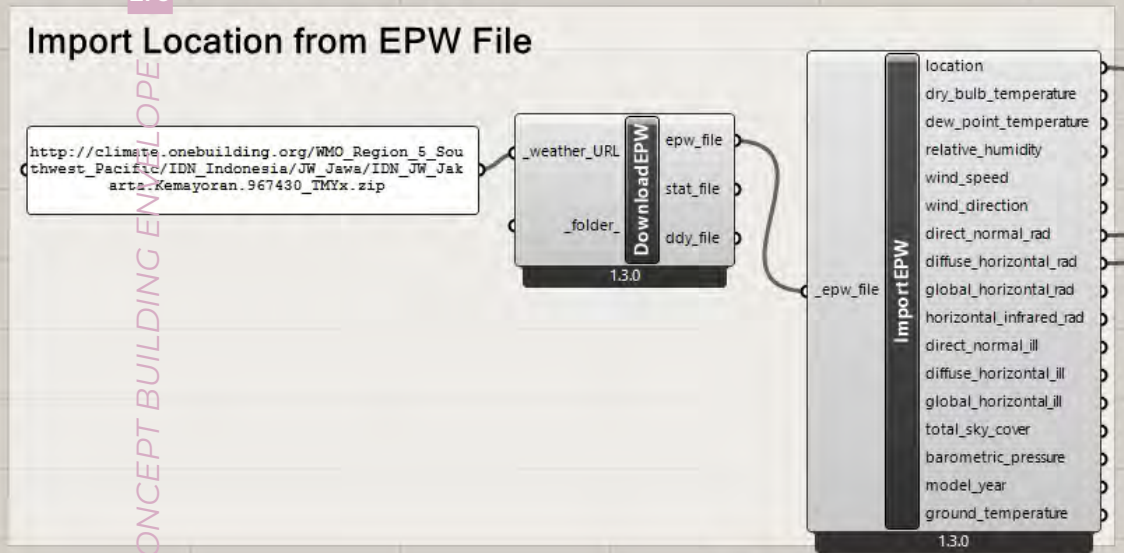


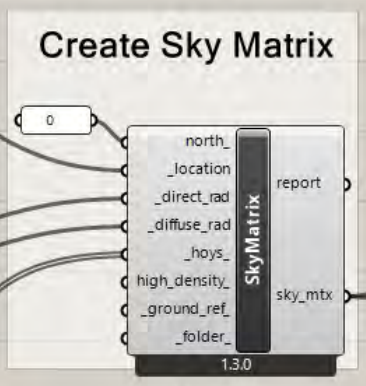
The second experiment was conducted on June 22 at 15.00 to test the radiation rays at sunset because they have a negative impact on space users and plant growth. So this will be anticipated by providing a building envelope that tends to be massive on the west side and the roof as shading. The laying of the building mass with a space that requires minimal lighting and a certain temperature will be placed on the bottom mass in order to get shading.

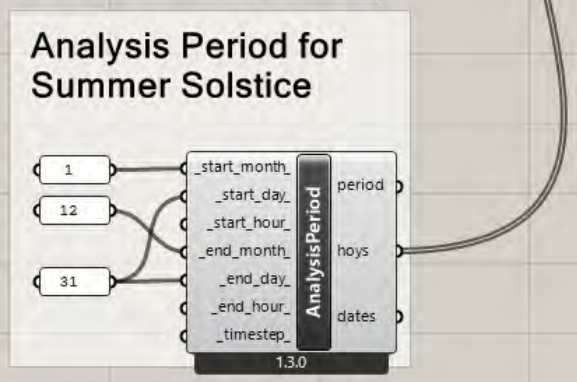
Figure 199. Adjust to The Climate of Coastal Area Simulation
Source: Author
(proccessed on 02 July 2022)

5.1 BUILDING ENVELOPE: adjust to the climate of coastal area & predator simulation









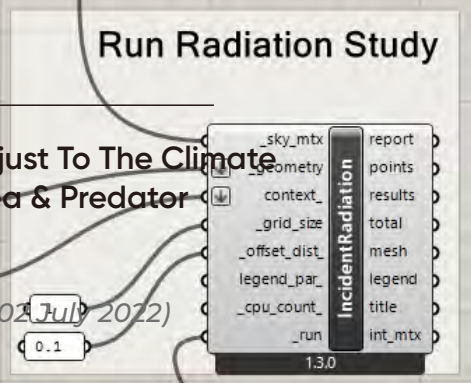
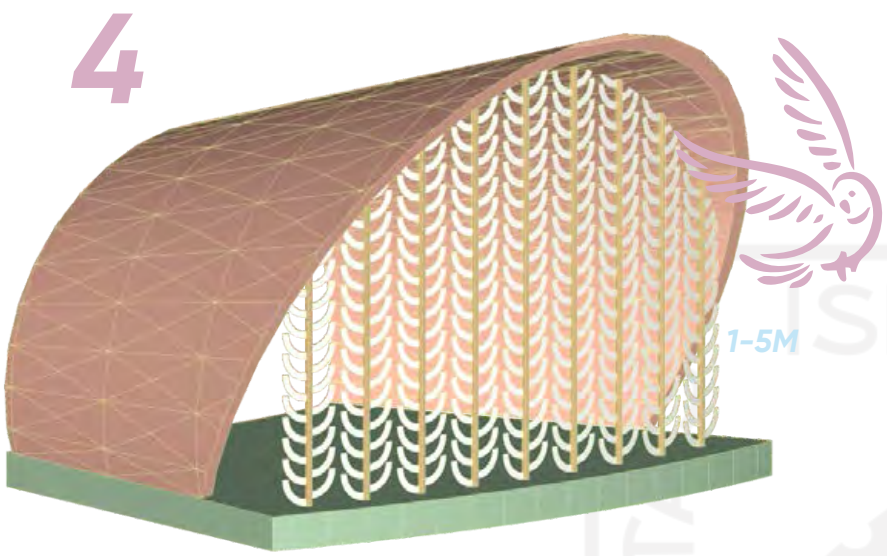


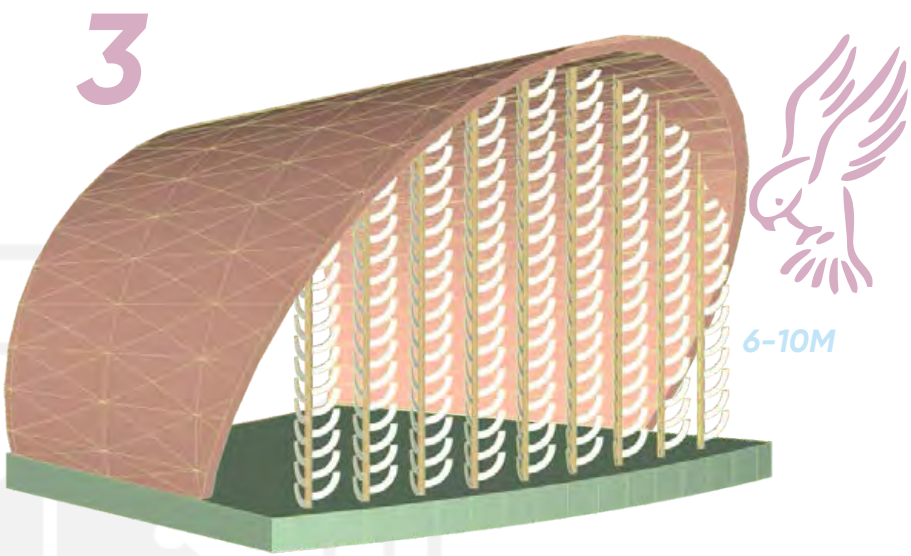
Figure 200. Adjust To The Climate Of Coastal Area & Predator Simulation

Source: Author (proccessed on 02 July 2022)



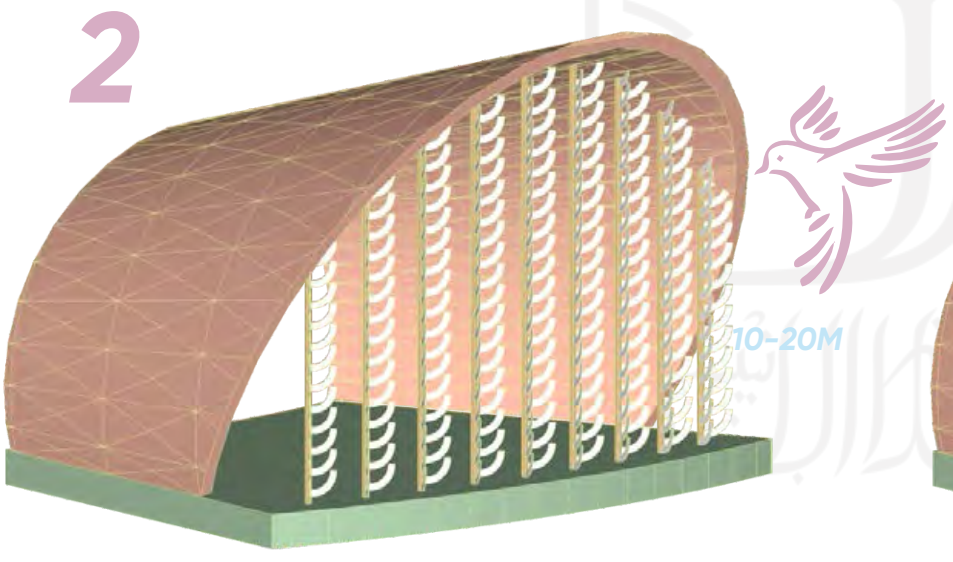
SCENARIO 1

The bird distance around 1-5m. With inside the building temperature is 28 degree celcius. The kinetic Facade can move horizontally until 0 degree angle.



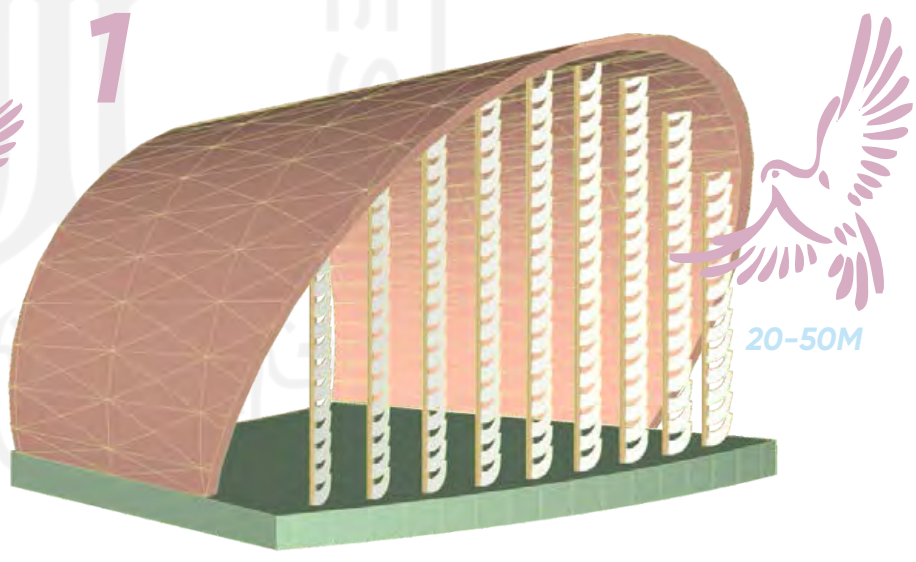
SCENARIO 2

The bird distance around 6-10m. With inside the building temperature is 27 degree celcius. The kinetic Facade can move horizontally until 30 degree angle.



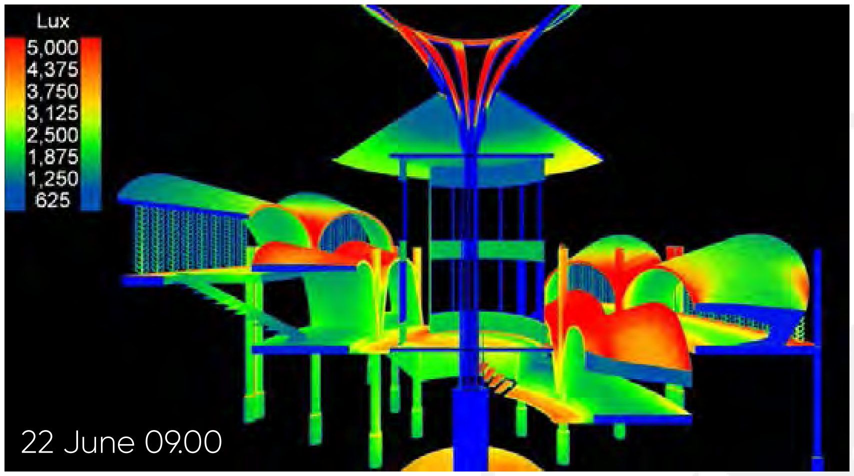
SCENARIO 3

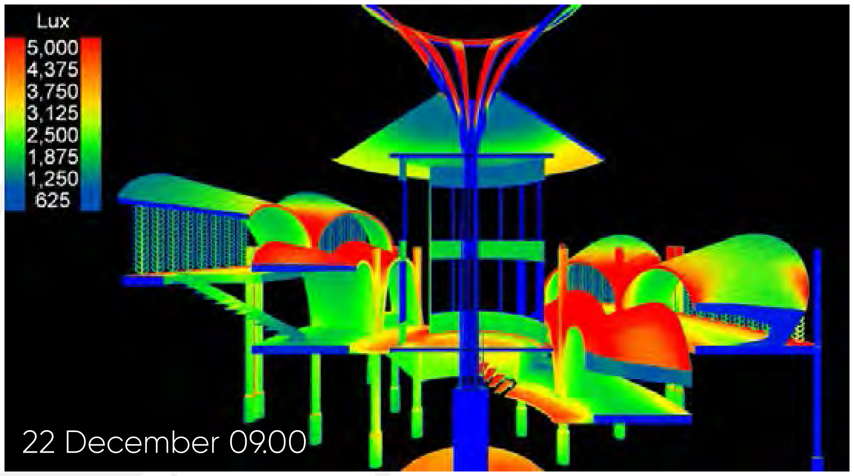
The bird distance around 10-20m. With inside the building temperature is 26 degree celcius. The kinetic Facade can move horizontally until 0 degree angle.



SCENARIO 4

The bird distance around 20-50m. With inside the building temperature is 27 degree celcius. The kinetic Facade can move horizontally until 30 degree angle.


Lux
5,000
4,375
3,750
3,125
2,500
1,875
1,250
625
22 June 09.00


Lux
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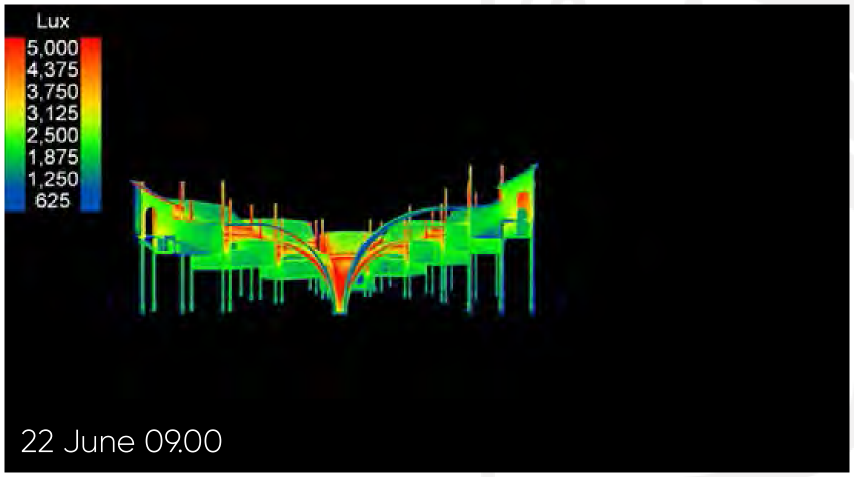
22 December 09.00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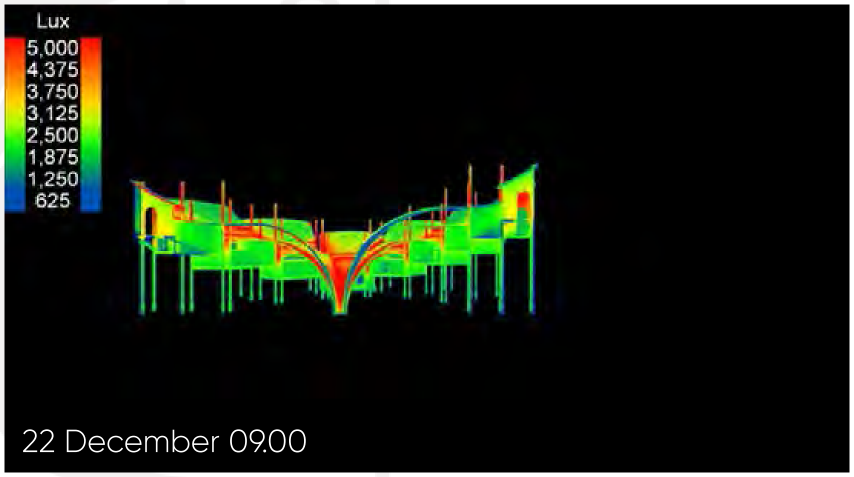
22 June 09.00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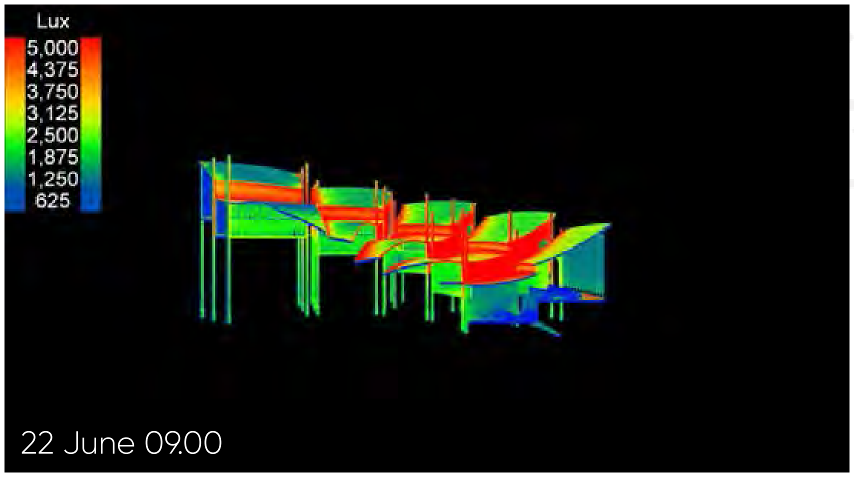
22 December 09.00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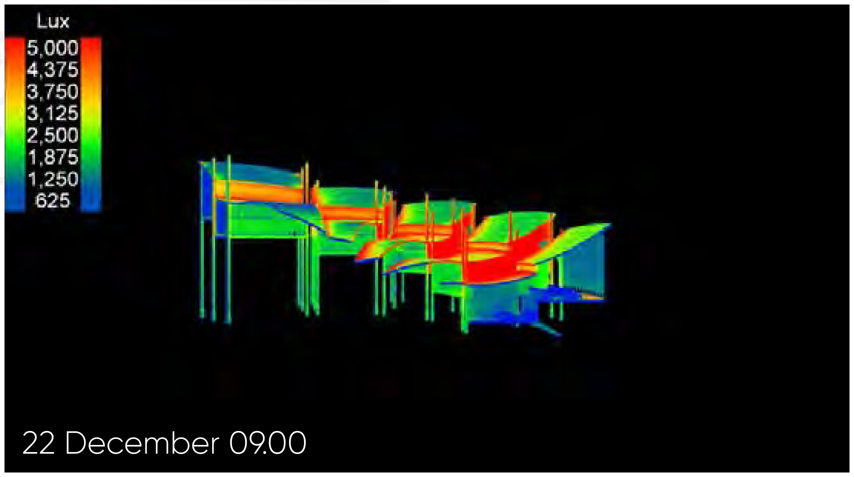
22 June 09.00


Lux
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625
22 December 09.00

6.1 WATER SENSITIVE ARCH: sponge system irrigation to manage brakish & fresh water

Residents around the village of Baros and their communities use water from the sea in the form of brackish water and also fresh water from the river for daily irrigation. Because the condition of the site is difficult for PDAM to access, then water distillation is carried out. In this project, several alternatives will be developed to help irrigation so that it does not dry up and floods occur. First, the pavement is made in the form of permeable for infiltration into the soil which will be temporarily accommodated in the wetlands before being processed. Second, wetlands can be used as transportation and water facilities. Third, take advantage of rainfall with rain water catchment in buildings that require a lot of water.

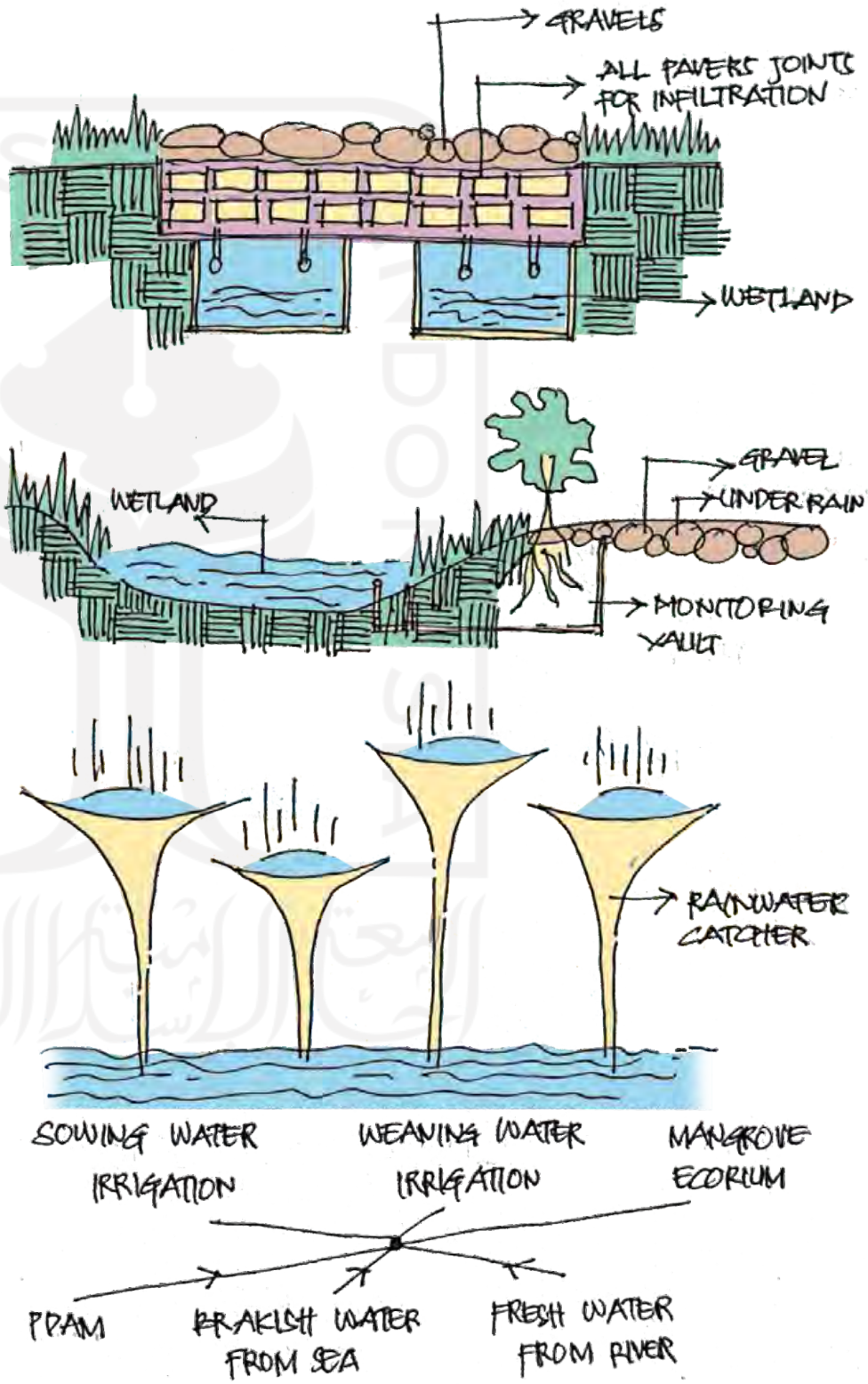
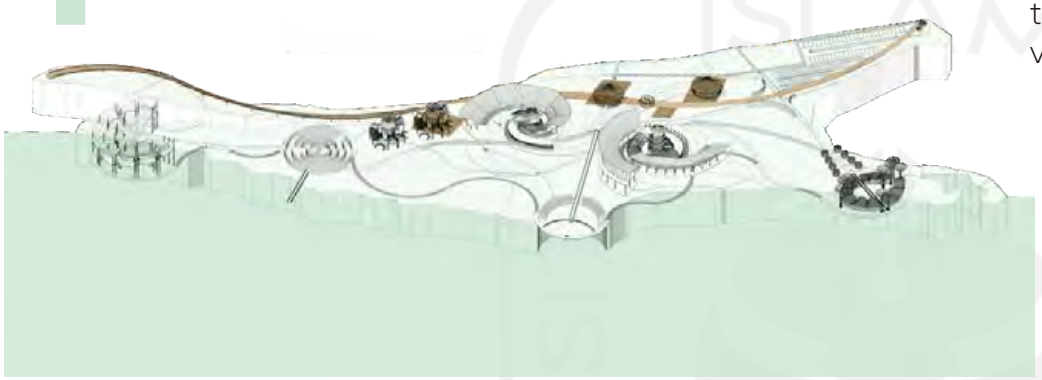


Figure 201. Sponge System Irrigation to Manage Brakish & Fresh Water
Source: Author
(proccessed on 02 July 2022)

CONCEPT according to the problem

MASS TRANSFORMATION: form reason

1

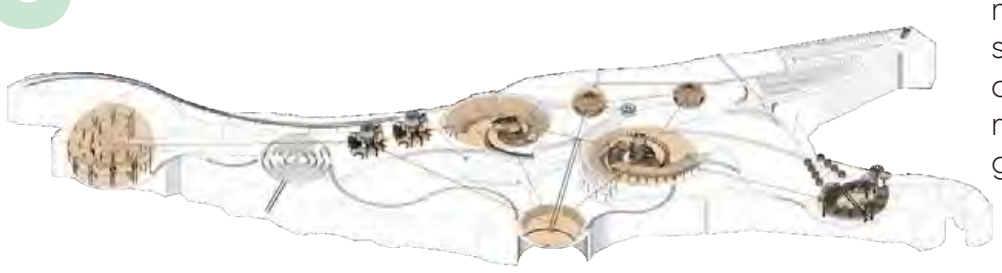


Existing conditions on the site have nursery buildings, places to buy and sell products, and gathering space. Supported by circulation of linear composition on land and water transportation. There is potential for rivers, seas, villages, and land.

2

The mass divided based on the zoning criteria of conservation as a guardian of nature, interpretation as a means of providing education to visitors, and tourism to attract visitors based on function, needs analysis based on the mangrove life-cycle, and space activities that will be provided.

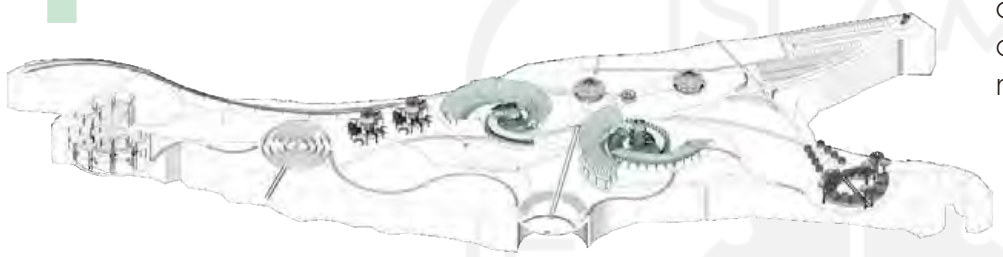
3



The basic shape of the mass responds to the existing vegetation and adds volume to the existing building. In the nursery, it is placed close to water sources and waves for the survival of mangroves that require brakish water. The basic shape of the circle is taken as a response and characteristic of the mangrove tree and the movement of water as well as the center for gathering activities.

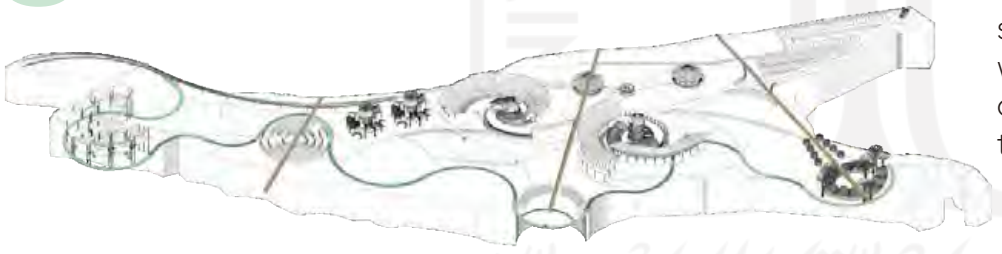
Figure 202. Form Reason
Source: Author
(proccessed on 02 July 2022)

4



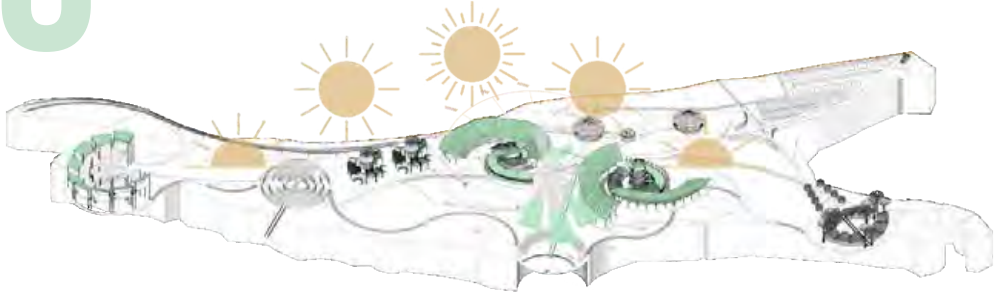
Then the shape is transformed based on the philosophy of mangrove characteristics, namely balancing the ecosystem by having the same 2 sides and mirroring, movement, growth, irregular, and radial. While the other building masses are designed radially and centered like mangrove roots as the main foundation.

5



The placement of the circulation transformation takes into account the principles of corridors and natural patches to provide maximum biodiversity, connects the site with roads in villages and rice fields to increase the possibility, sweet flow movement to respond and break waves, linear which is transformed into curved as a representation of river and sea, and connect to the point of centered activity.

6



The orientation of the building mass is then directed to respond to the site's climate, namely wind conditions, lighting, and views towards the sea and rivers in order to maximize the potential of the site and environmentally friendly buildings. The mass is broken down to make it easier for the building modules to interact with the tides which are dynamic and unpredictable.

04

“MANGROVE LAB Rehabilitated and

restored mangrove ecosystems have important ecological, economic, and social values for coastal communities. provide.”

- A. M. Ellison, 2020 -

SITUATION PLAN
SITE PLANNING
BUILDING FLOOR PLAN
INTERIOR AND EXTERIOR
BUILDING SECTION
BUILDING ELEVATION
EXPLODED AXONOMETRY
DETAIL

DESIGN SCHEMATIC BASED ON CONCEPT

Enriching the concept of architectural ideas through schematic drawing which describes the entire contents of the building facilities.

SPATIAL ARRANGEMENT: shape & building orientation of growth and freedom

Mass 8 is a circular nursery sowing centered and spread over the planting area to maximize climate and activity control monitoring

People from around the village can reach the sanctuary from the rice field road to the coast

Mass 2 which is a gathering place for the KP2B community in the form of a circle as the center of the gathering is oriented in all directions to get the maximum view

Mass 9 is a nursery weaning with a radial shape from the center with a modular arrangement to respond to tides and wind oriented directly towards the estuary for water use

Labyrinth mangroves are mangroves that have been arranged by type and function for interpreting the user

Port as a plaza for fishing and a stop for water transportation crossings before heading to the weaning nursery location

Figure 203. SPATIAL ARRANGEMENT: shape & building orientation of growth and freedom

Source: Author

(proccessed on 27 June 2022)

Mass 3 as public support facilities in the form of toilets and lavatory is placed between the community center and souvenirs to save more space

Rice fields and existing roads are able to give users experience about living in the village

The form of linear circulation responds to existing conditions at the site that connects the entire site area

Mass 1 is circular in shape which is a souvenir shop space placed in the direction of the exit as a cover for activities with orientation in all directions maximizing the circular view

Parking locations for vehicles for pickup by public transportation or private vehicles and transporting mangrove seeds from service vehicles

Mass of 6 gampling as supporting facilities for tourism who will stay overnight because nursery activities do not only last one day

Mass 4 functions as a laboratory so that the orientation responds to climatic conditions and in order to minimize site vegetation, the radial shape is chosen to be more flexible and dynamic towards nature

Mass 5 functions as an interpretation space and botanical in the form of radial, balancing, and dynamic as a transformation of mangrove characteristics oriented directly to the coastal and mangrove views

Mass 7 Mangrove Ecorium is close to the shoreline and is oval in shape from a linear arrangement so that the water in the building blends with the estuary water to create an infinity of knowledge

SPATIAL ARRANGEMENT: color and functional affect in user experience and predator

Bird avoid from several research retrieved that birds have a fear of bright colors like yellow and red. In addition, they also can not capture the shimmering and dazzling colors.

Crabs can't pick up too many greens and blues. They are used to capturing colors in dark light. Therefore, the use of green or blue lights is necessary so that the crabs do not approach the nursery area.

Nature color effect coastal area The color of the waves blends with the color of the sea sand and you can see the wide sky above by pre-fabricated and wiremash material.

Figure 204. SPATIAL ARRANGEMENT: color and functional affect in user experience and predator

Source: Author

(proccessed on 27 June 2022)

Nature color effect mangrove and the water color turn into green-grey because of the reflection of mangrove.

Nature color effect describe strength, security, peacefull, nature, and isolation. Feeling lonely, sad, and isolated yet warm by wood material.

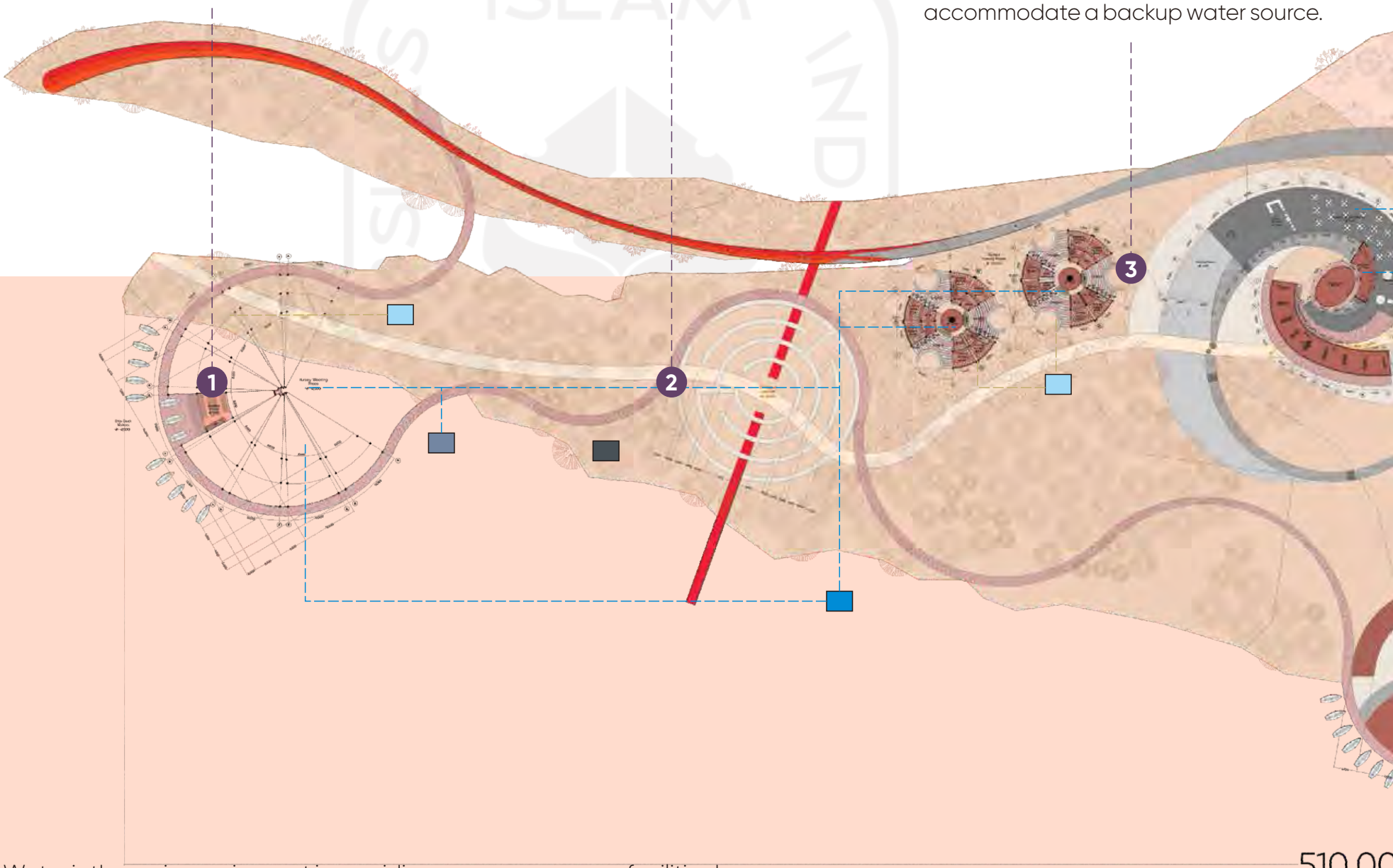
Explain active character, Increases in energy powerful & splendid. Gives an impression of warmth and gladness. Extremes, a feeling of satisfaction. The effect of this colour is as peculiar as its nature. It conveys an impression of gravity and dignity, and at the same time of grace and attractiveness.

WATER IRRIGATION: sponge system and water sensitive architecture

In Massa weaning nursery must get 2 kinds of water, namely brakish water directly and fresh water. Water obtained from the river and the sea will be distilled and circulated in the building module.

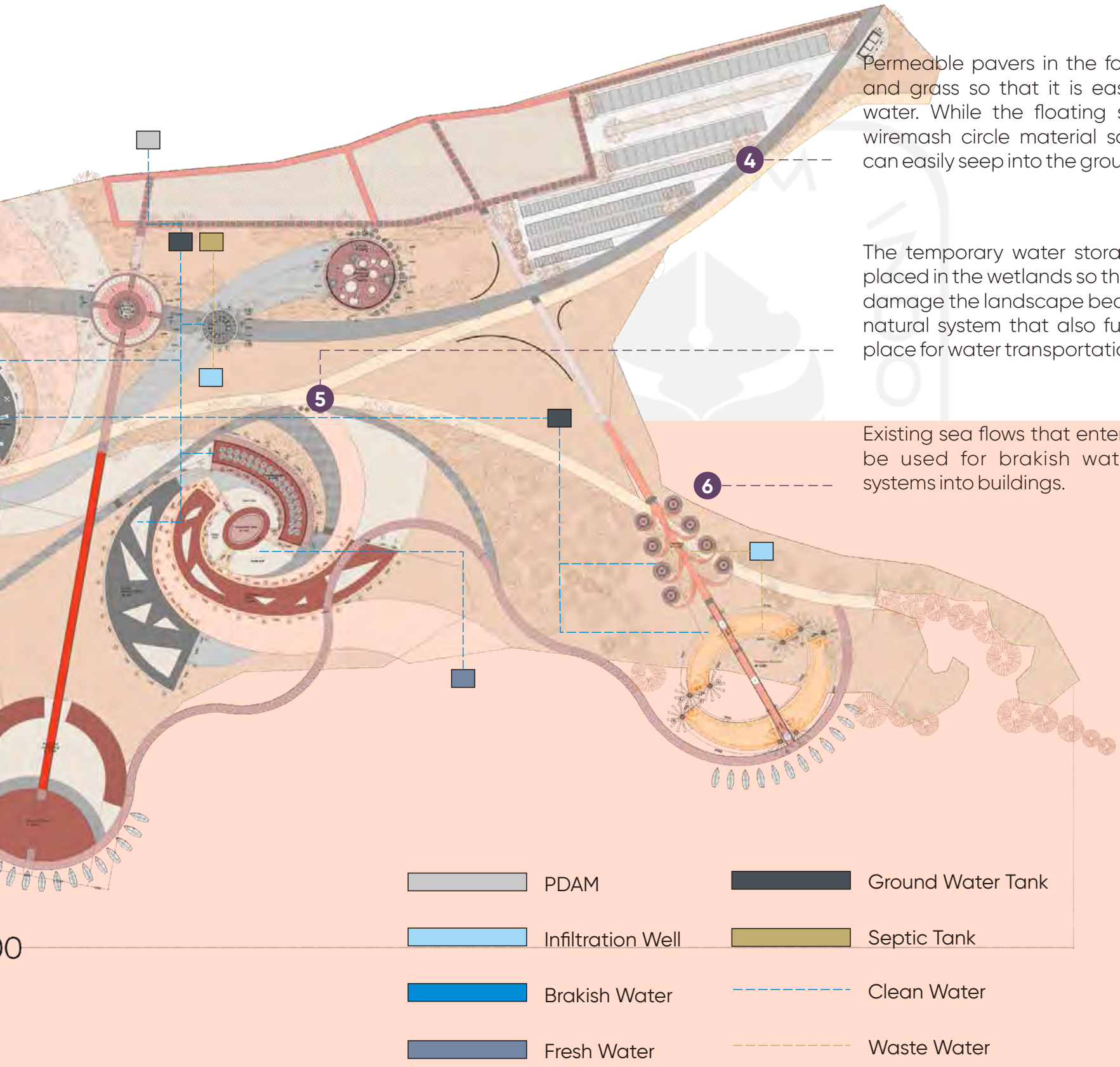
Existing river flows that enter the site can be used for freshwater irrigation systems into buildings.

In the nursery sowing mass, it is placed near the river flow to facilitate the irrigation process because it requires a lot of freshwater. This mass is also equipped with a rainwater catchment to accommodate a backup water source.



Water is the main requirement in providing mangrove nursery facilities because plants are completely dependent on water. There are two types of water needed, namely brakish water from the sea and fresh water from rivers and PDAMs. Water is also needed in some activities to eat and drink visitors. In addition, water can also provide user experience.

Figure 205. WATER IRRIGATION: sponge system and water sensitive architecture
Source: Author
(proccessed on 27 June 2022)



Permeable pavers in the form of stones and grass so that it is easy to absorb water. While the floating skywalk uses wiremash circle material so that water can easily seep into the ground.

The temporary water storage system is placed in the wetlands so that it does not damage the landscape because it has a natural system that also functions as a place for water transportation.

Existing sea flows that enter the site can be used for brakish water irrigation systems into buildings.

LIGHTING: warm, comforting, & productive lighting arrangement at night for mangrove

In mass of weaning nursery must get warm lighting at night to meet the maximum standard temperature of 25-26 degrees Celsius to optimize the growth of mangrove plants. The lights are arranged linearly so that they are evenly distributed and not scattered in one point of the building.

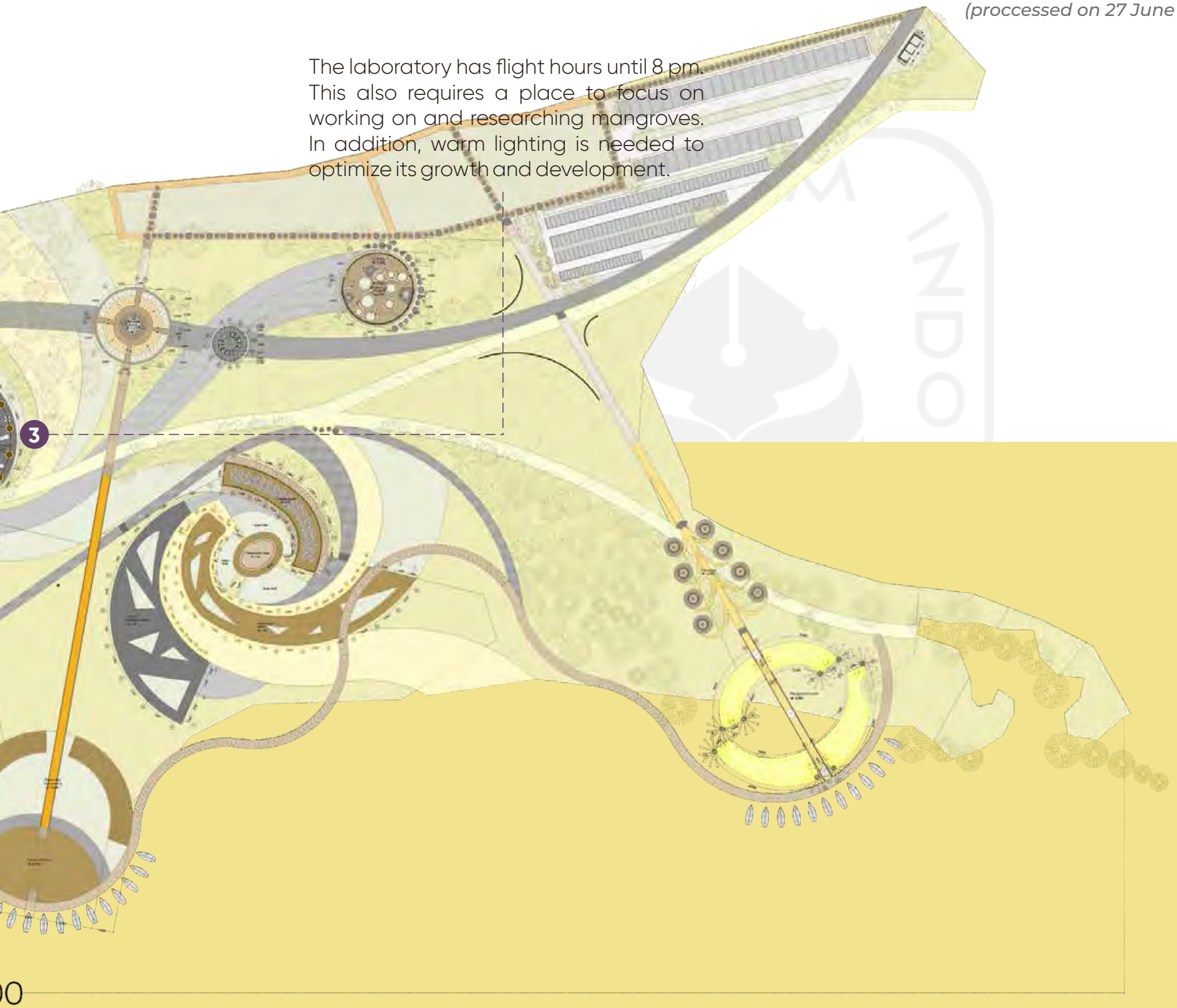
Mangrove nursery sowing has a module size that is not too large so that the use of single-point lights that can spread to other directions will be more efficient for optimizing mangrove planting.

Warm lighting is needed to optimize the temperature of mangrove plants in the room at night with a standard of 25-26 degrees Celsius. So that the arrangement of lights also has a significant impact on spreading the lights into the room.

Figure 206. LIGHTING: warm, comforting, & productive lighting arrangement at night for mangrove

Source: Author
(proccessed on 27 June 2022)

The laboratory has flight hours until 8 pm. This also requires a place to focus on working on and researching mangroves. In addition, warm lighting is needed to optimize its growth and development.

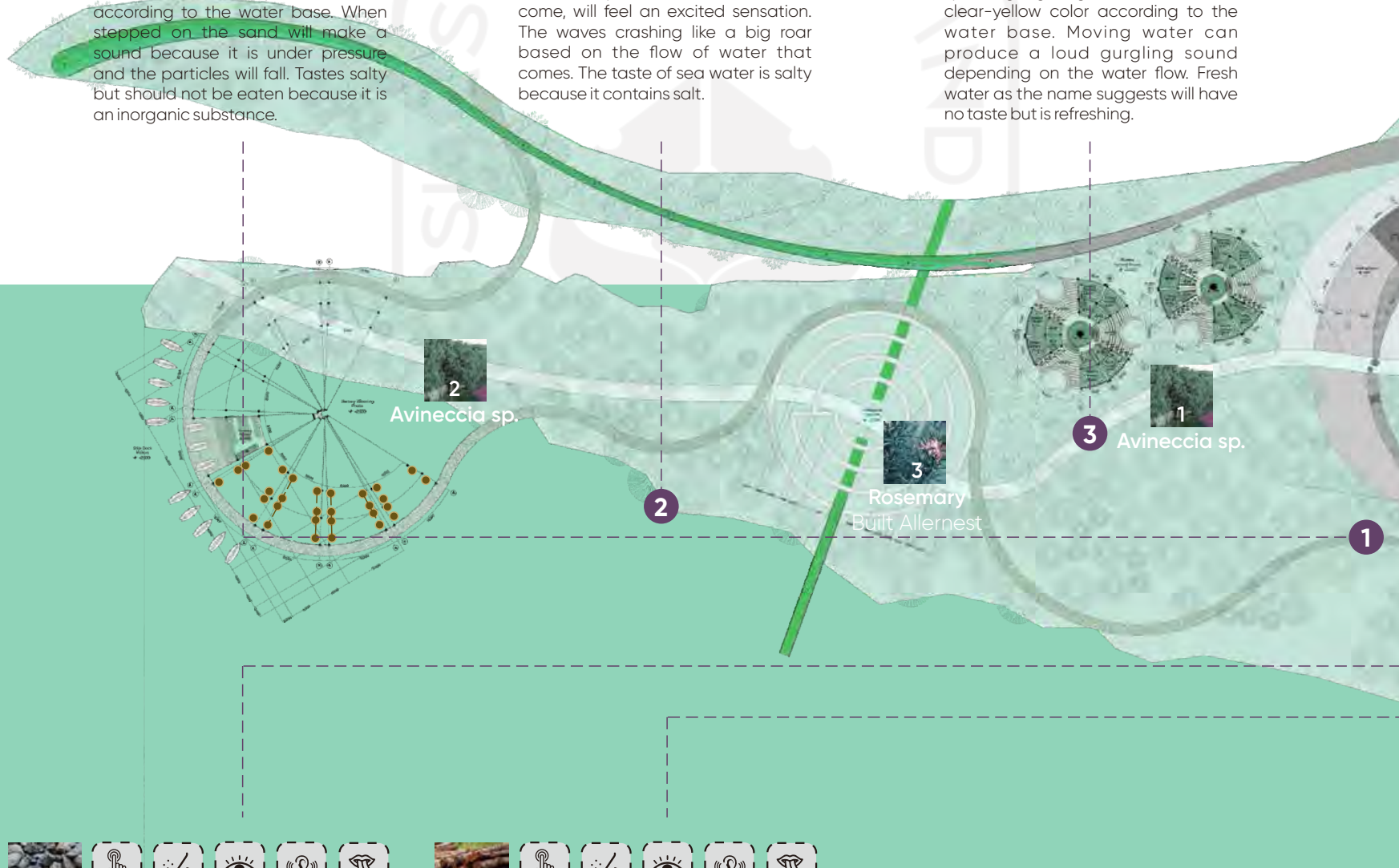


INTERACTION: multi-sensory application effect for the user

The texture feels rough and scattered. Small array of particles. The smell of beach sand is like the smell of salt because it is mixed with salt and algae. Can sparkling, lighting distort, and have clear-yellow color according to the water base. When stepped on the sand will make a sound because it is under pressure and the particles will fall. Tastes salty but should not be eaten because it is an inorganic substance.

Different temperatures (can be cold and hot) and wavy have movement (Flexibility). The smell produced by the waves will feel refreshing to the mind. Can distort light, repetitive motions in a diffused pattern. When the waves come, will feel an excited sensation. The waves crashing like a big roar based on the flow of water that comes. The taste of sea water is salty because it contains salt.

Different temperatures (can be cold and hot) and have flexible character in term of places. The smell of this water is refreshing and sometimes mixed with the smell of earth. Can sparkling, lighting distort, and have clear-yellow color according to the water base. Moving water can produce a loud gurgling sound depending on the water flow. Fresh water as the name suggests will have no taste but is refreshing.



The texture humid rough that can make people feel peacefull with cool surface. Does not have a striking odor but can make the air fresh and cool. Dark color w/ gives a rough texture to the irregular shape of the stone, while the regular one has a smooth texture. Able to muffle sound and will make a sound when there is a collision. Can not be felt with the tongue but the psychological effect is dark.

Mangrove wood has a slippery texture on the inside and rough on the skin. The smell of mangrove wood can be extracted into essential oils that can improve focus. The color of the mangrove wood is brown which makes people feel warm. The sound produced when 2 sticks collide with each other is "Tek". Can not be felt by the tongue, can only be felt by color.

Figure 207. INTERACTION: multi-sensory application effect for the user
Source: Author
(proccessed on 27 June 2022)

The texture is sticky and soft which if over time produces cold to hot temperatures. Has an odor with its own identity due to a mixture of water and soil as well as other components. The color is gray, glossy, and cloudy. Cannot reflect light. A soft sound like something is sucking from inside the surface due to stickiness characteristic. Can not be felt with the tongue but the psychological effect is ansiousness.

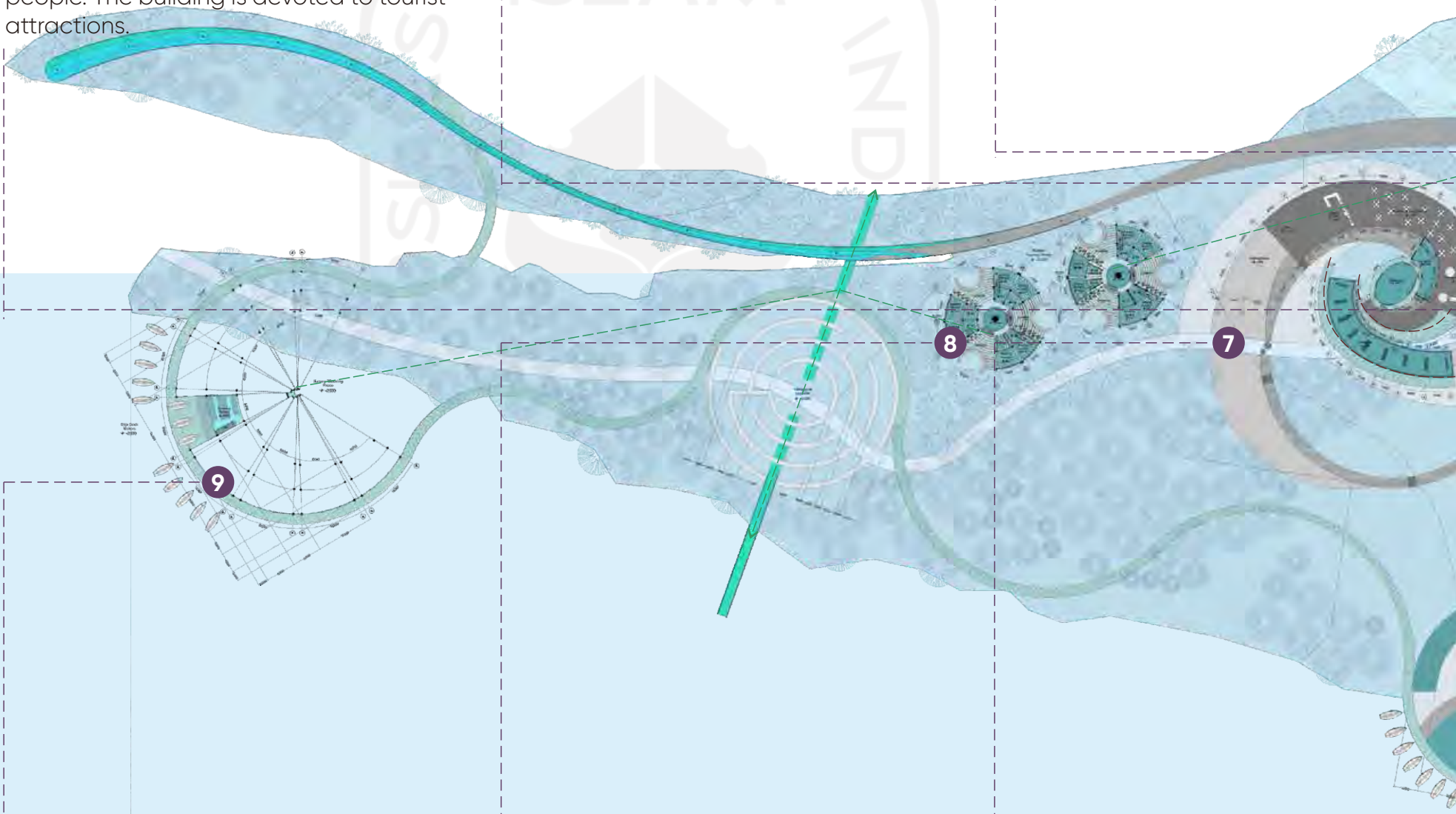
Mangrove plants have 3 texture components, namely the leaves, roots, and water. The odor produced depends on the type, but the majority have a pungent odor. Consists of natural colors, namely green and brown. When passing through it creates a sense of mystery. The sound comes from the friction of mangrove leaves and roots when they collide with the help of the wind blowing. Depending on the type of mangrove, it can produce syrup, crackers and flour.

ACCESSABILITY & SPATIAL ARRANGEMENT: user flow and circulation & freedom and growth storyline activity

Interpretation space and botanical garden in the form of plants that live and are cultivated during the treatment process so as to facilitate maintenance because they get help from many people. The building is devoted to tourist attractions.

Gathering place for the KP2B community in the form of a circle as the center of the gathering with aphitheater chairs and centered as a discussion room.

Public support facilities in the form of toilets and lavatory is placed between the community center and souvenirs to save more space.



Weaning nursery as a stage after sowing is a training activity for mangrove planting before it is released in order to adapt first to coastal conditions.

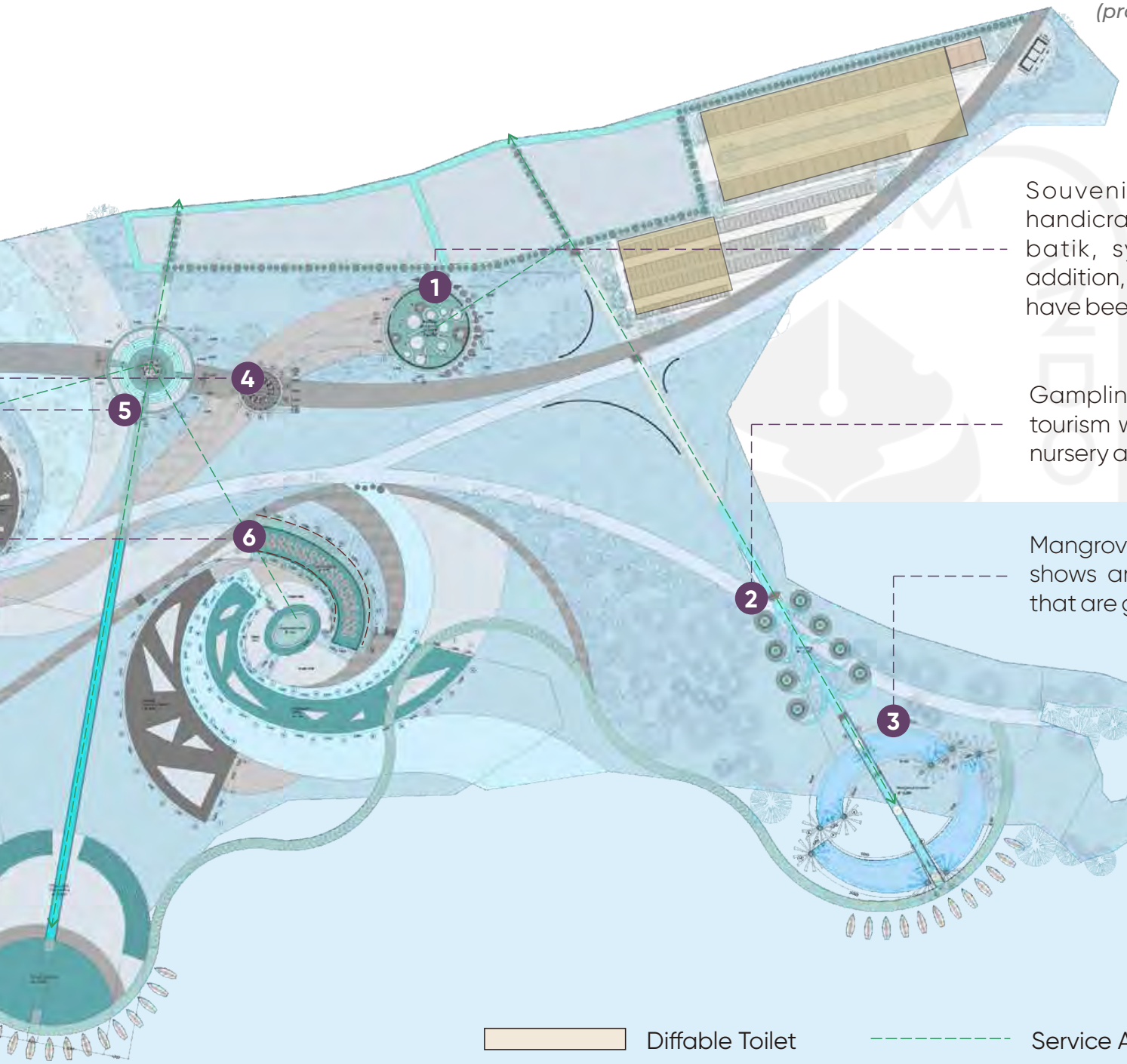
Sowing nursery as the first stage of mangrove planting after being stored in the form of seeds and washed. Buildings must anticipate disturbances so that planting is optimal.

Mangrove laboratory as a place for observation and research on mangrove plants is intended for the public and the community with several warehouse activities, hoods, soaking, workshops, and supporting activities for cafes and restaurants.

Figure 208. ACCESSABILITY & SPATIAL ARRANGEMENT: user flow and circulation & freedom and growth storyline activity

Source: Author

(proccessed on 27 June 2022)



SPATIAL ARRANGEMENT: respond to the coastal context

Each mass composition is connected to mangrove trees, villages, and coastal areas.

The facade is tilted 70 degrees to anticipate direct solar radiation so that the building does not heat up with openings and hanging wall plants.

Opening elements in the form of transparent glass and wooden lattice to maximize the view of direct outdoor access.

Elements of building materials utilize local functions and materials such as mangrove wood.

Green open areas and vegetation arranged according to conservation standards.

The colorful wate
expected to prov
experience and as

Figure 209. SPATIAL ARRANGEMENT: respond to the coastal context
Source: Author
(proccessed on 27 June 2022)

The composition of the mass can go up and down to provide shadow and also maintain vegetation so that development does not damage

The lower part of the room can be optimized as a social and supporting function.

The room is given a multi-function function so that it can be flexible to the user.

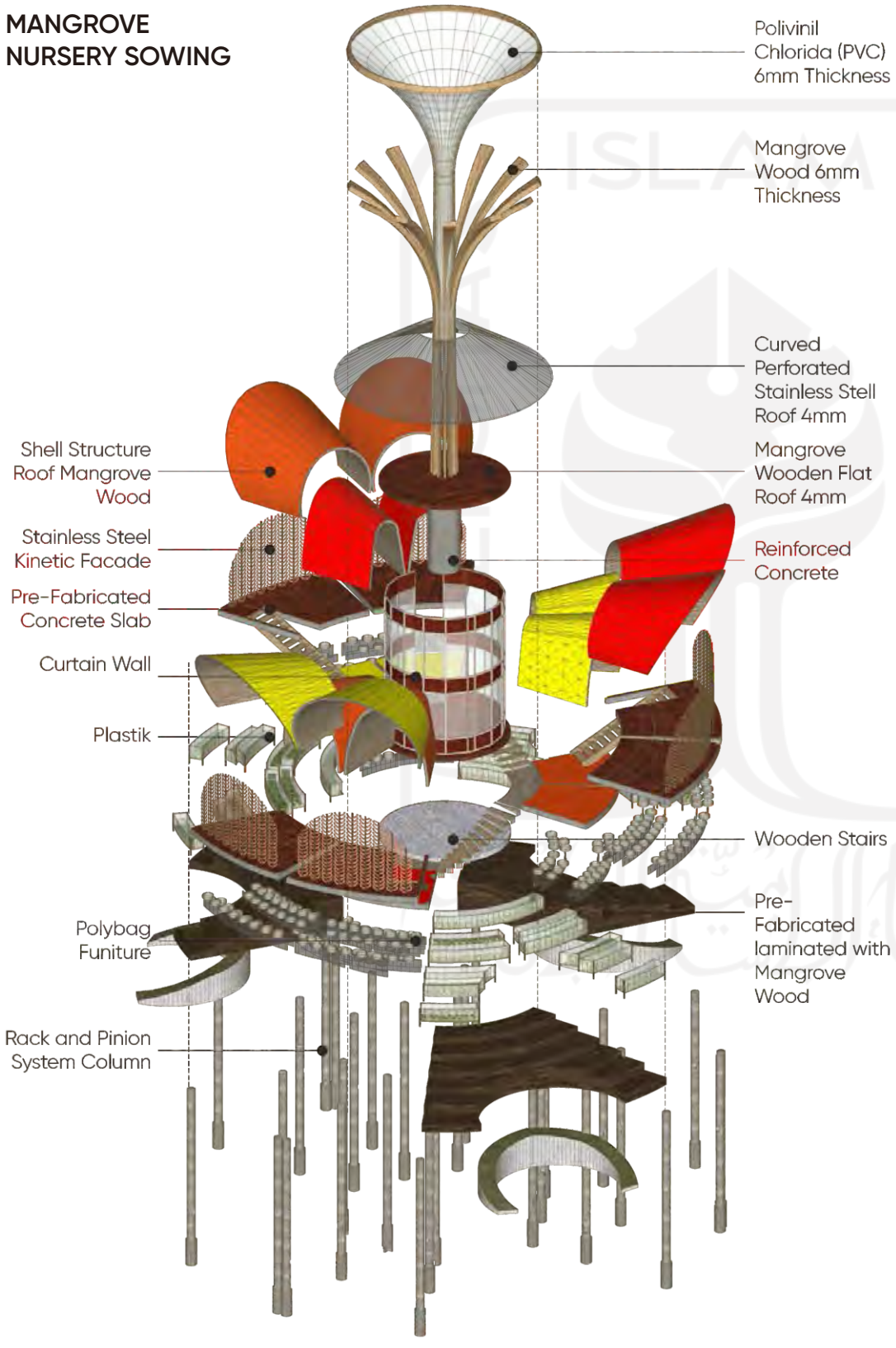
er sensitive road is ide an educational a water catchment.

Permeable skywalk way provides composition in depth with ramp elevation playing.

The indoor and outdoor areas create a blurry in between to maximize the natural surroundings.

BUILDING CONSTRUCTION & ENVELOPE: kinetic, modular, rack and pinion, & hard corossion material

MANGROVE NURSERY SOWING



in order to respond the climate condition of increasing water surface and land degradation at least 1-2 meter from tidal wave based on the analysis schenario. The building should be able to adapt with abrassion to make it still stand and have stability while the tidal wave come. It is also can support the need of brakish water instead of fresh water for growing the mangrove. The structure focusing on growth concept, easier to arrange, and stable so the result of modular design. It has several alternatives concept to make it floating. The concept on multi-sensory approach is from the technology itself. It can respond to the intensity increasement (automobile).

Figure 210. BUILDING CONSTRUCTION & ENVELOPE: kinetic, modular, rack and pinion, & hard corossion material
Source: Author
(proccessed on 27 June 2022)

BUILDING CONSTRUCTION & ENVELOPE: kinetic, modular, rack and pinion, & hard corossion material

The building envelope should be developed because in mangrove baros have relatively high temperature at 28 degree and high humidity level. So the concept is to provide kinetic system envelope as a strategy in order to respond different stimuli. The facade can be move by folding in the vertical way. It was also can protect it from bird predator, that are scared to movement, color, and dazling. The form of facade was transforming from the leaf and applied the sense of bud and bloom.

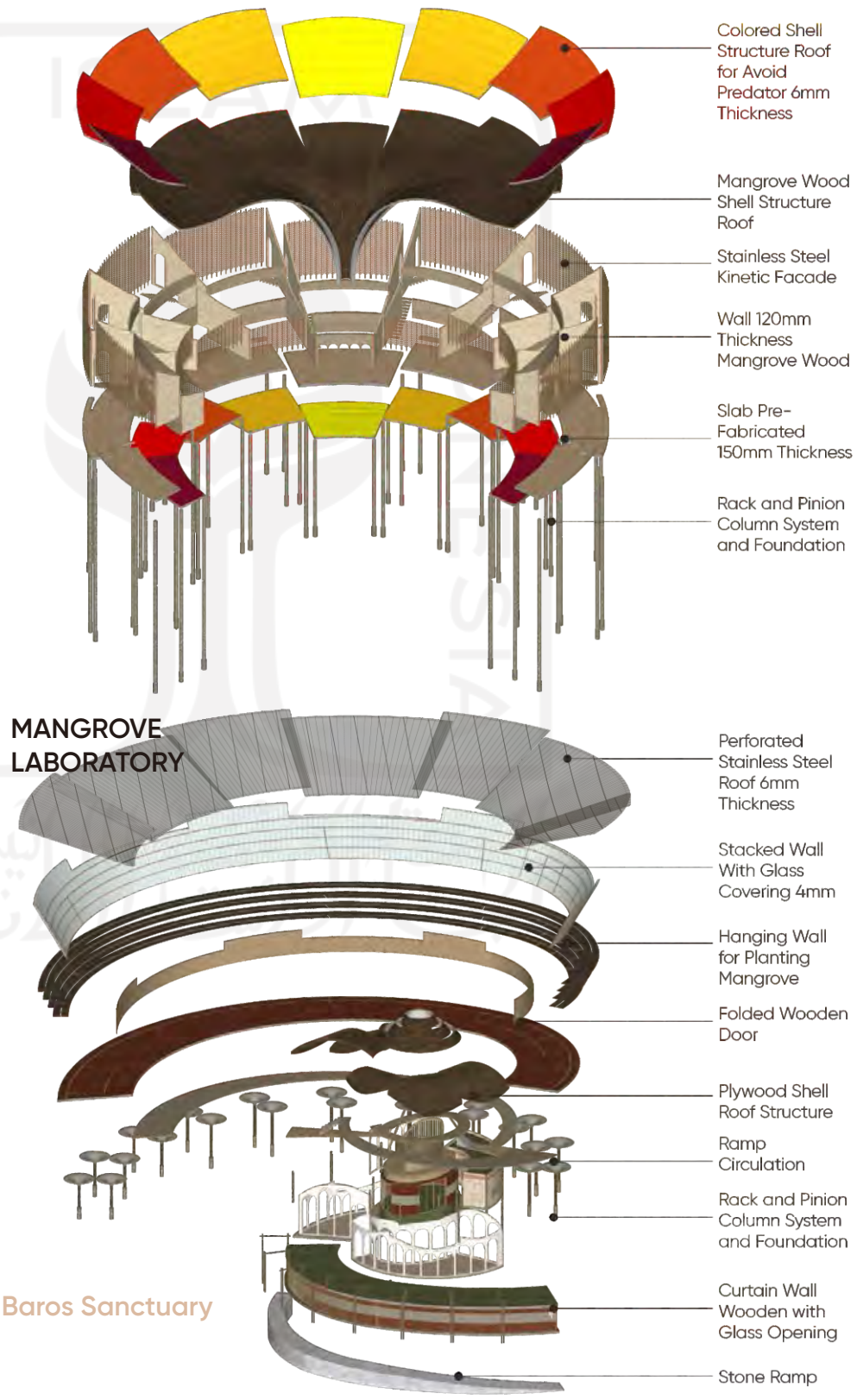


Figure 211. BUILDING CONSTRUCTION & ENVELOPE: kinetic, modular, rack and pinion, & hard corossion material
Source: Author
(proccessed on 27 June 2022)

BUILDING ENVELOPE : kinetic facade, color, functional affect in experience, and predator

MANGROVE
NURSERY SOWING

The use of facades as protection from high temperatures and predators by using colors in building materials and kinetic systems. On some sides it is used as a sowing nursery module and on some sides for hoods that are connected to stairs and ramps. In the middle mass is used as a control so that a wide glass opening is given.

Figure 212. BUILDING ENVELOPE : kinetic facade, color, functional affect in experience, and predator
Source: Author
(processed on 27 June 2022)

BUILDING CONSTRUCTION: vegetation, modular floating structure, and hard corrosion material

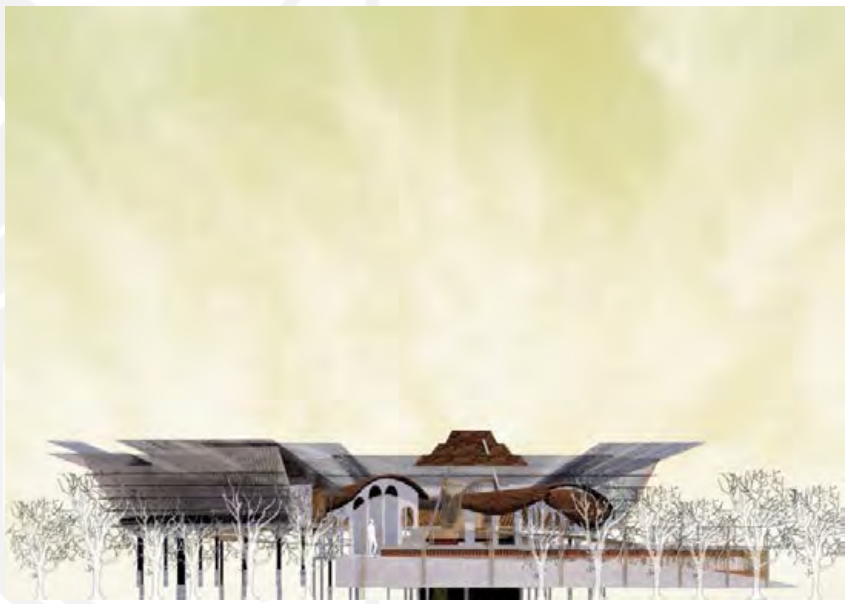
The building is placed at the junction of land and water to facilitate the circulation of space users and also water transportation which is supported by water irrigation. Arched roof structure as a support structure. Surrounded by mangrove trees that have been grouped by type to provide a shadow for plants that are being weaned under the building. Up-and-down structures can anticipate to adapt to subsidence of ground surface abrasion and tidal waves.

Figure 213. BUILDING CONSTRUCTION: vegetation, modular floating structure, and hard corrosion material
Source: Author
(proccessed on 27 June 2022)

MANGROVE NURSERY WEANING

ENVELOPE & CONSTRUCTION: kinetic facade, color, functional affect in experience, and predator, modular floating structure, and hard corrosion material

MANGROVE LABORATORY



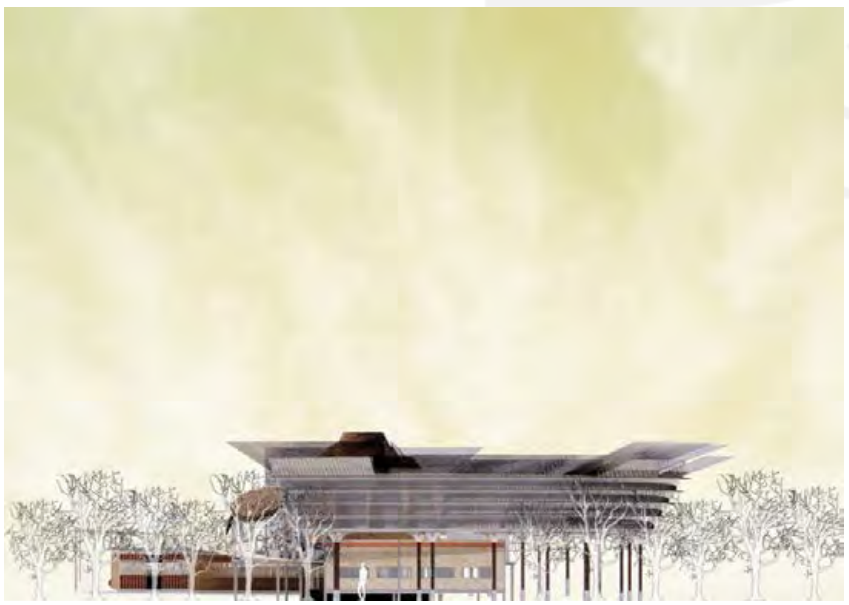
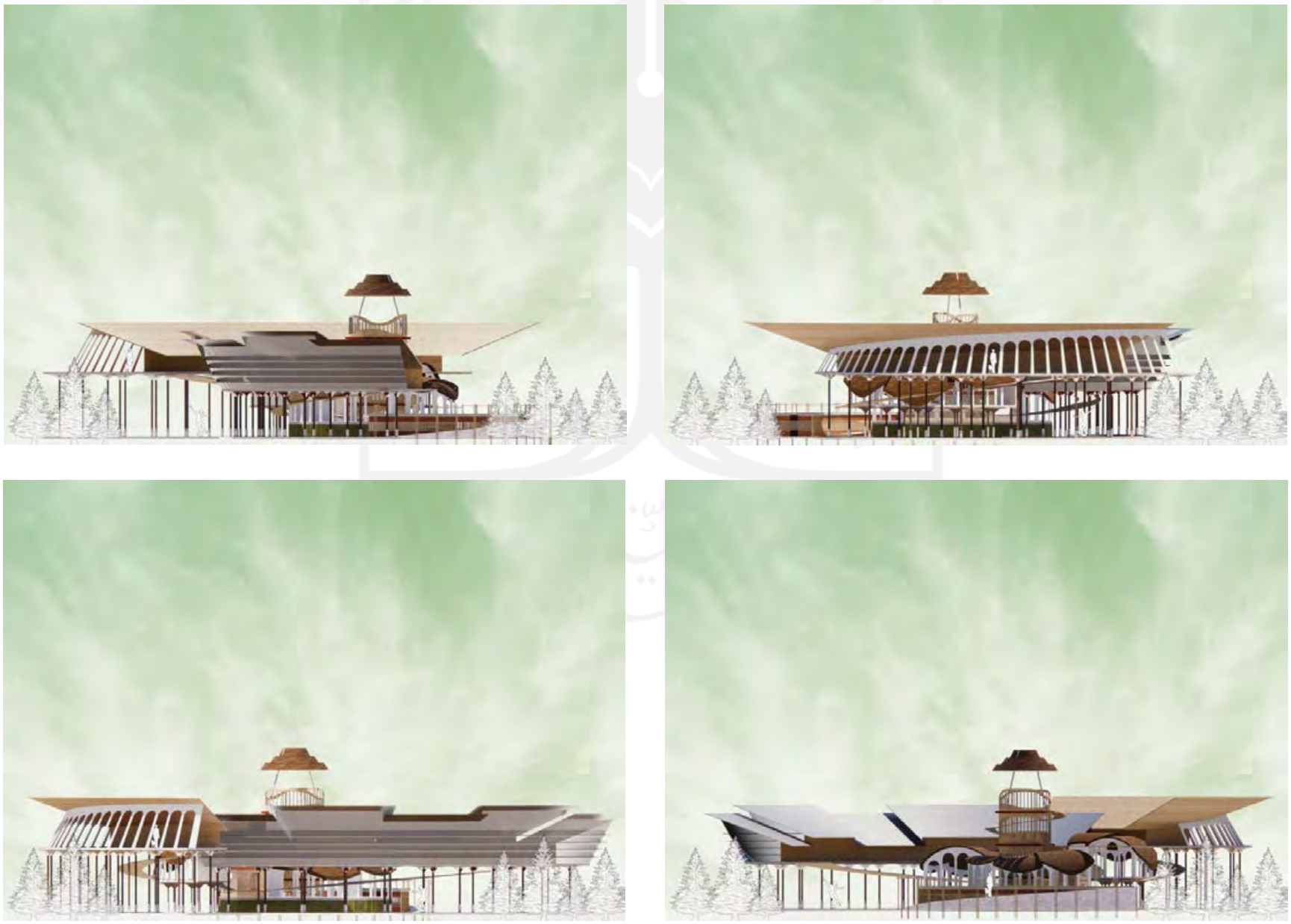


Figure 214. ENVELOPE & CONSTRUCTION: kinetic facade, color, functional affect in experience, and predator, modular floating structure, and hard corrosion material
Source: Author
(proccessed on 27 Jun

INTERPRETATION SPACE & BOTANICAL



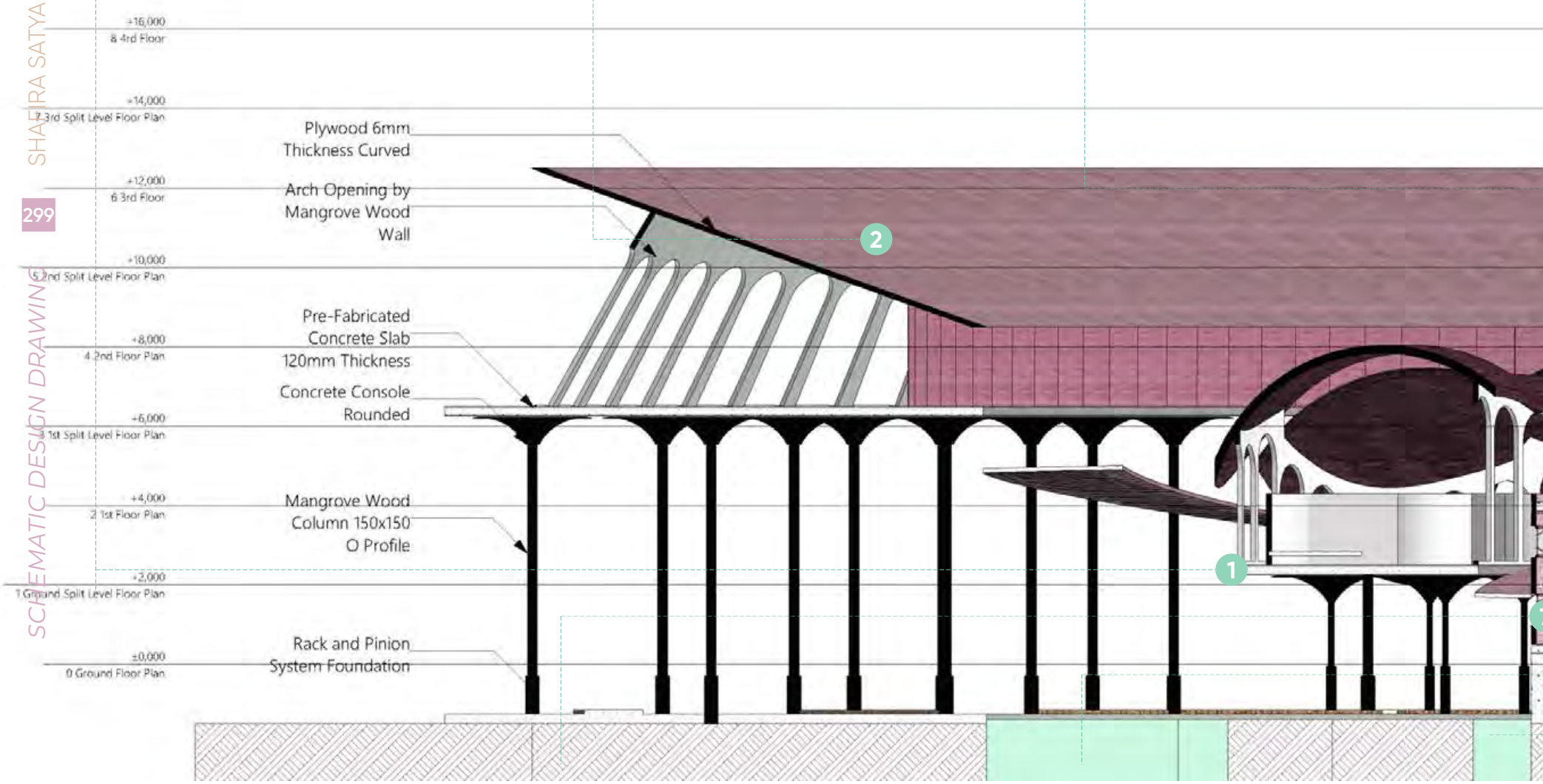
SCHEMATIC DESIGN DRAWING SECTION MANGROVE LAB & BOTANICAL

BUILDING ENVELOPE: kinetic facade movement respond to the climate and predator

The composition of the mass rises and falls in response to the direction of the wind and sun so that natural ventilation and lighting are more optimal in order to create a comfortable space for mangroves and users

The use of a shell structure on the roof to trap airflow in the space and make the space more dynamic

The facade system 1 uses wood arranged in a lattice to form a space that can increase couriousity due to the incoming light



Facade system 5 with natural stone to provide a cooler room temperature, according to the local coastal context around, and resistant to water

The facade system 6 with openings in the form of an arch responds to the form of anthropological use that can function as an apartment wall as well as a supporting wall for the shell roof structure

Wetland develo
transportation and
temporary water
cooling system for b

Figure 215. BUILDING ENVELOPE: kinetic facade movement respond to the climate and predator

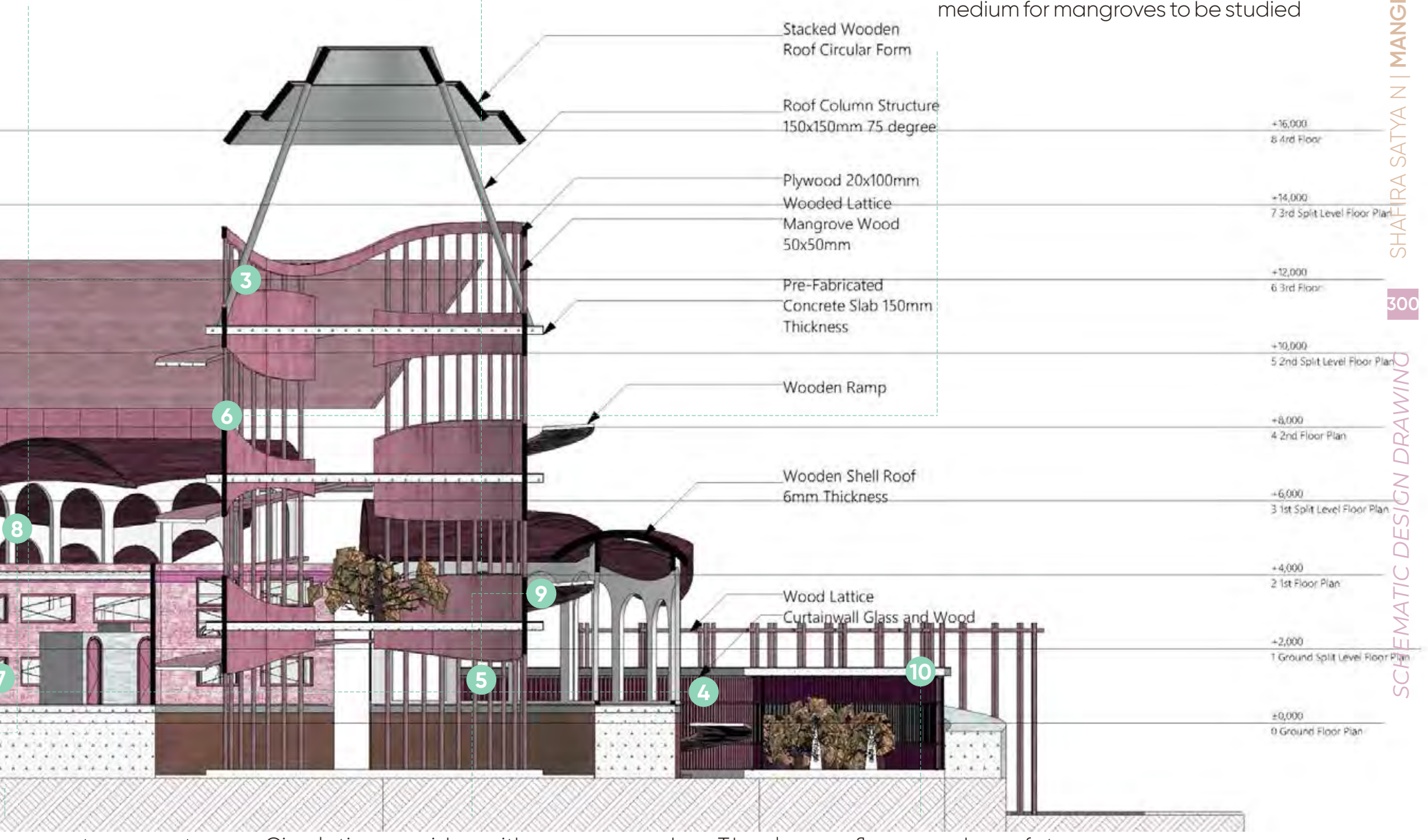
Source: Author

(proccessed on 27 June 2022)

The facade system 2 is a curtain wall that is used to block incoming light with a small glass opening in the middle so that it does not require artificial lighting during the day

The facade 3 system in the storage section is closed to ensure the success of the seeds so that they can grow optimally

The envelope system 4 in the laboratory section is made transparent with glass so that room users can interact directly with mangrove cultivation. In addition, the facade can also be used as a planting medium for mangroves to be studied



opment as water recreation as well as storage also as a building

Circulation corridor with a ramp and stage system to provide experience and respond to muddy soil conditions that tend to be watery

The lower floor and roof top as supporting facilities such as a library and cafeteria

SCHEMATIC DESIGN DRAWING SECTION MANGROVE LAB & BOTANICAL

BUILDING CONSTRUCTION: modular floating structure and hard corrosion material system

The use of a shell structure on the roof to trap airflow in the space and make the space more dynamic with mangrove wood frame which has flexible and durable character

A system of stilt structures that allows the building to move with the pressure of sea water

Development with a modular and growth system responds to space requirements and periodic developments. In addition, it saves time and materials

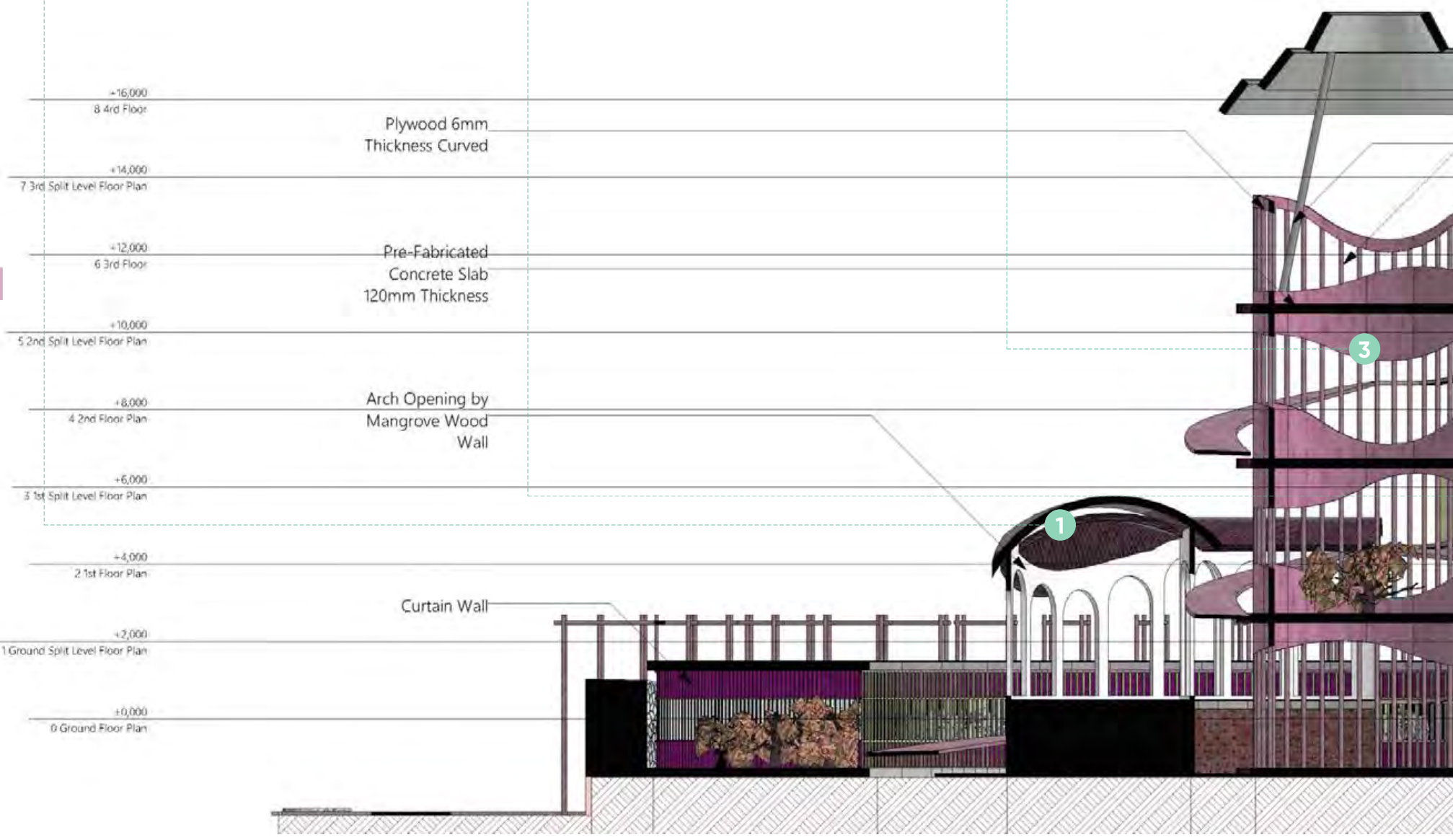


Figure 216. BUILDING CONSTRUCTION: modular floating structure and hard corrosion material system

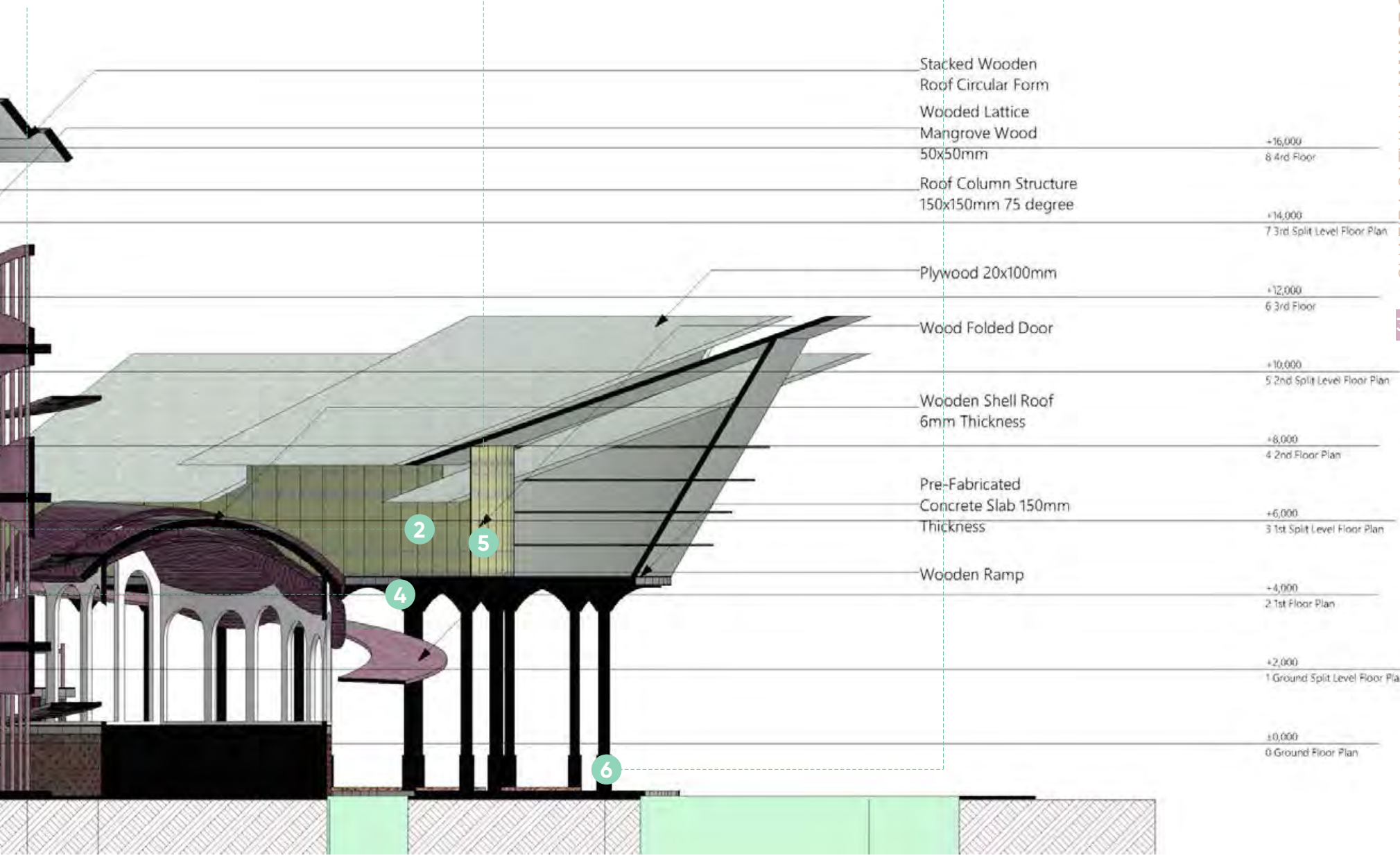
Source: Author

(proccessed on 27 June 2022)

The building structure is made with a rack and pinion system for handling abrasion and rising sea water disasters in the future

Using mangrove wood material that has been tested for seawater resistance and anti-corrosion

Pile foundation capable of scratching the soil surface with a high depth



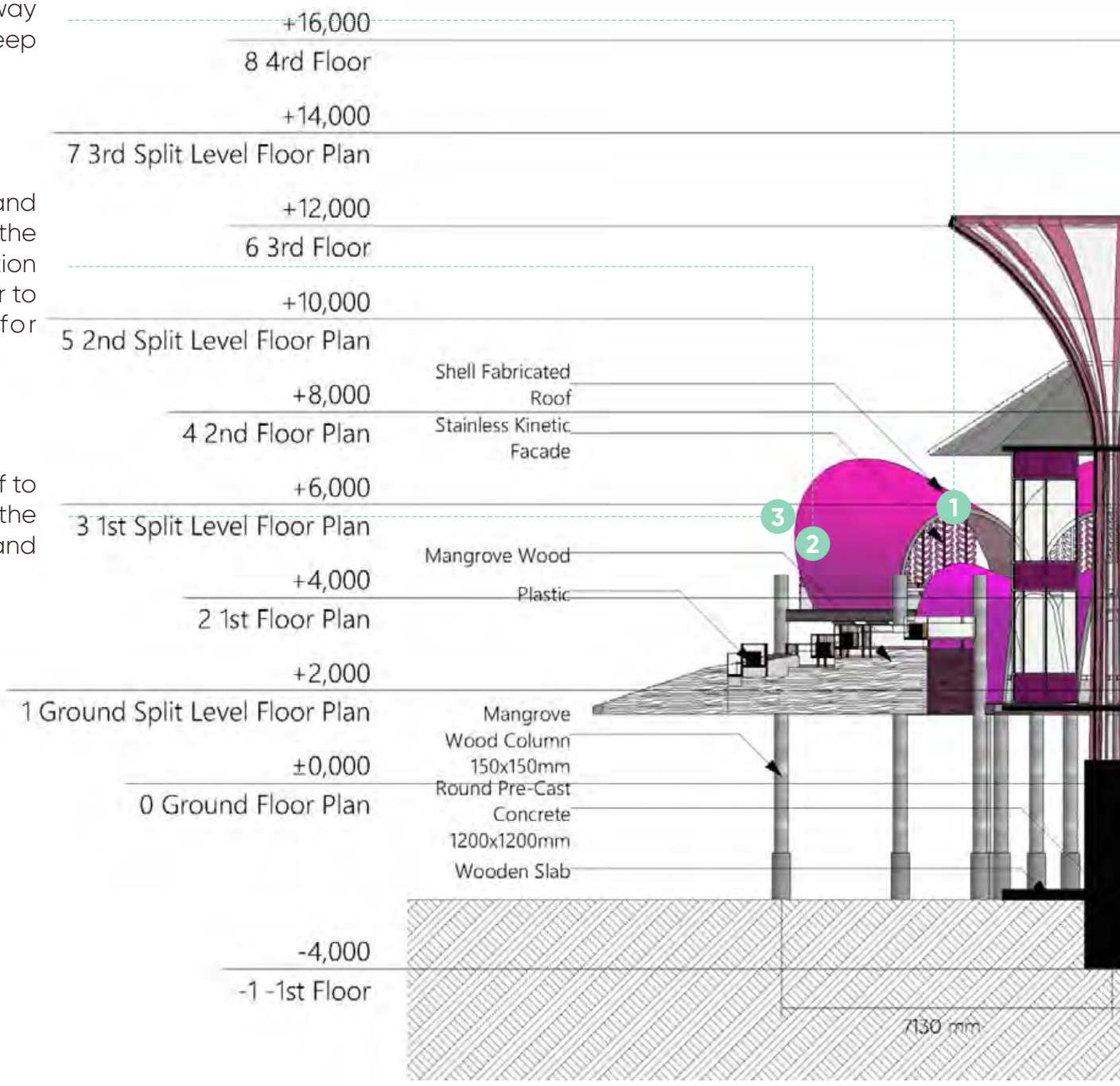
SCHEMATIC DESIGN DRAWING SECTION NURSERY SOWING

BUILDING ENVELOPE: kinetic facade movement respond to the climate and predator

A kinetic facade that adjusts to temperature and moves to scare away predators and with a colored roof to keep predators away

The composition of the mass rises and falls in response to the direction of the wind and sun so that natural ventilation and lighting are more optimal in order to create a comfortable space for mangroves

The use of a shell structure on the roof to trap airflow in the space and make the space more dynamic against wind and light



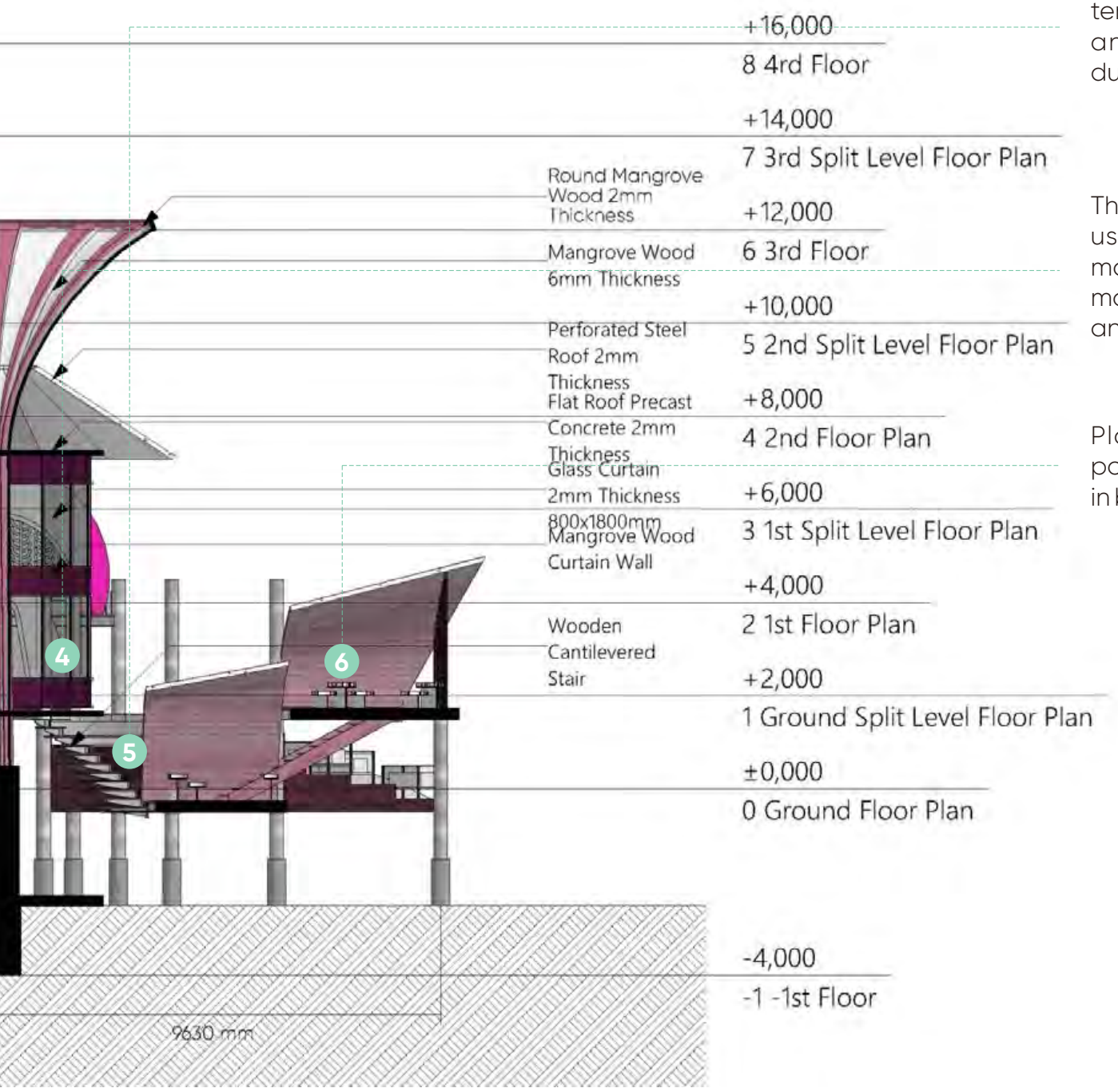


Figure 217. BUILDING ENVELOPE: kinetic facade movement respond to the climate and predator

Source: Author
(proccessed on 27 June 2022)

Interior truss construction system for terraced planting for easy monitoring and appropriate movement space during the nursery process

The facade system in the control room uses a transparent curtain wall and mangrove wood to make it easier to monitor if there is a situation of urgency and still blend in with nature.

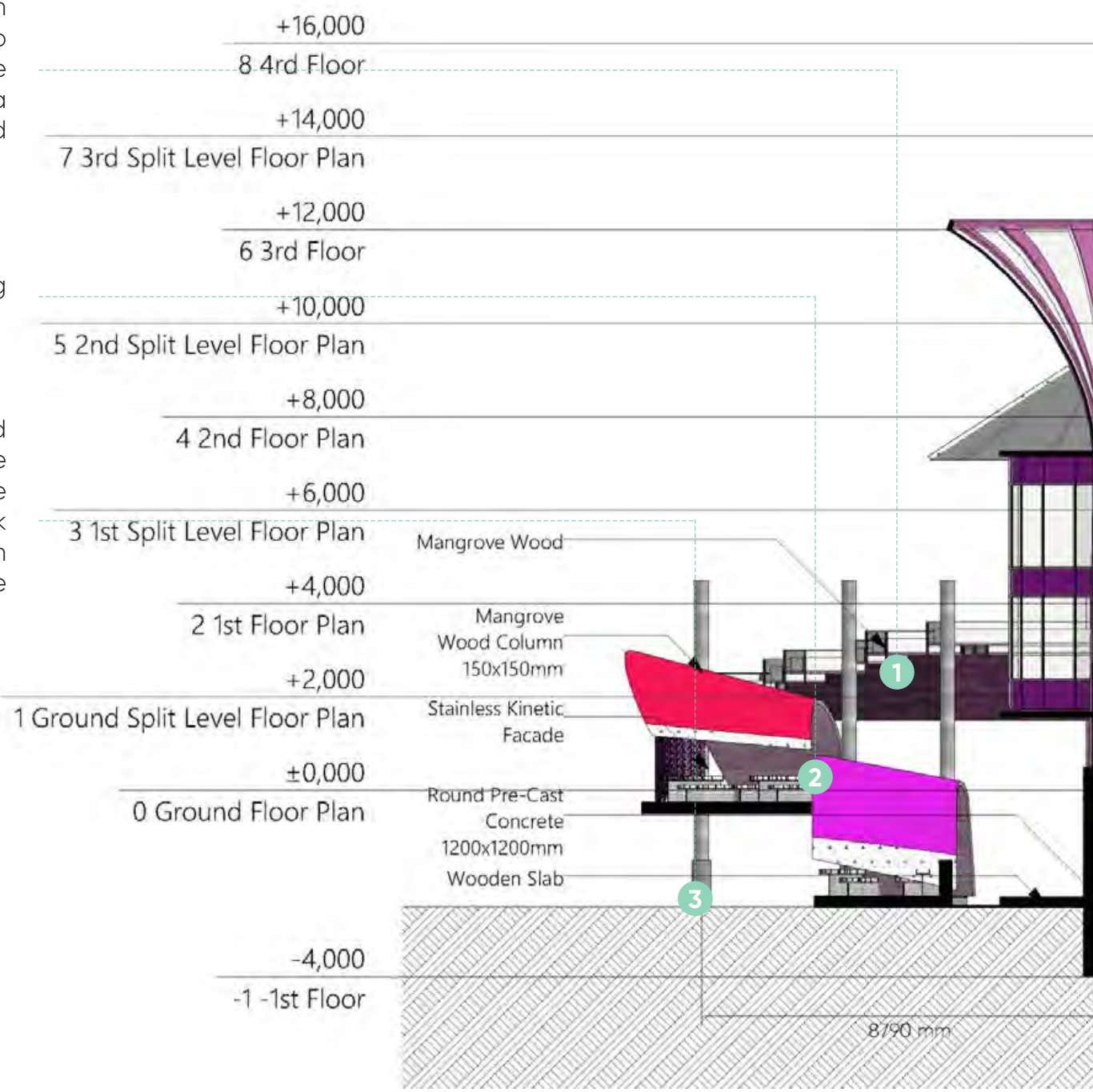
Planting mangrove seedlings using polybag media that has been arranged in beds

BUILDING CONSTRUCTION: modular floating structure and hard corrosion material system

Mass arrangement with a modular system that can go up and down in response to wind and sun directions so that ventilation and natural lighting are more optimal in order to create a comfortable space for mangroves and anticipate tidal waves

Nursery sowing as a place for the sowing phase has scope and planting

Stage structure system with rack and pinion that allows the building to move with the pressure of sea water The building structure is made with a rack and pinion system for handling abrasion and rising sea water disasters in the future



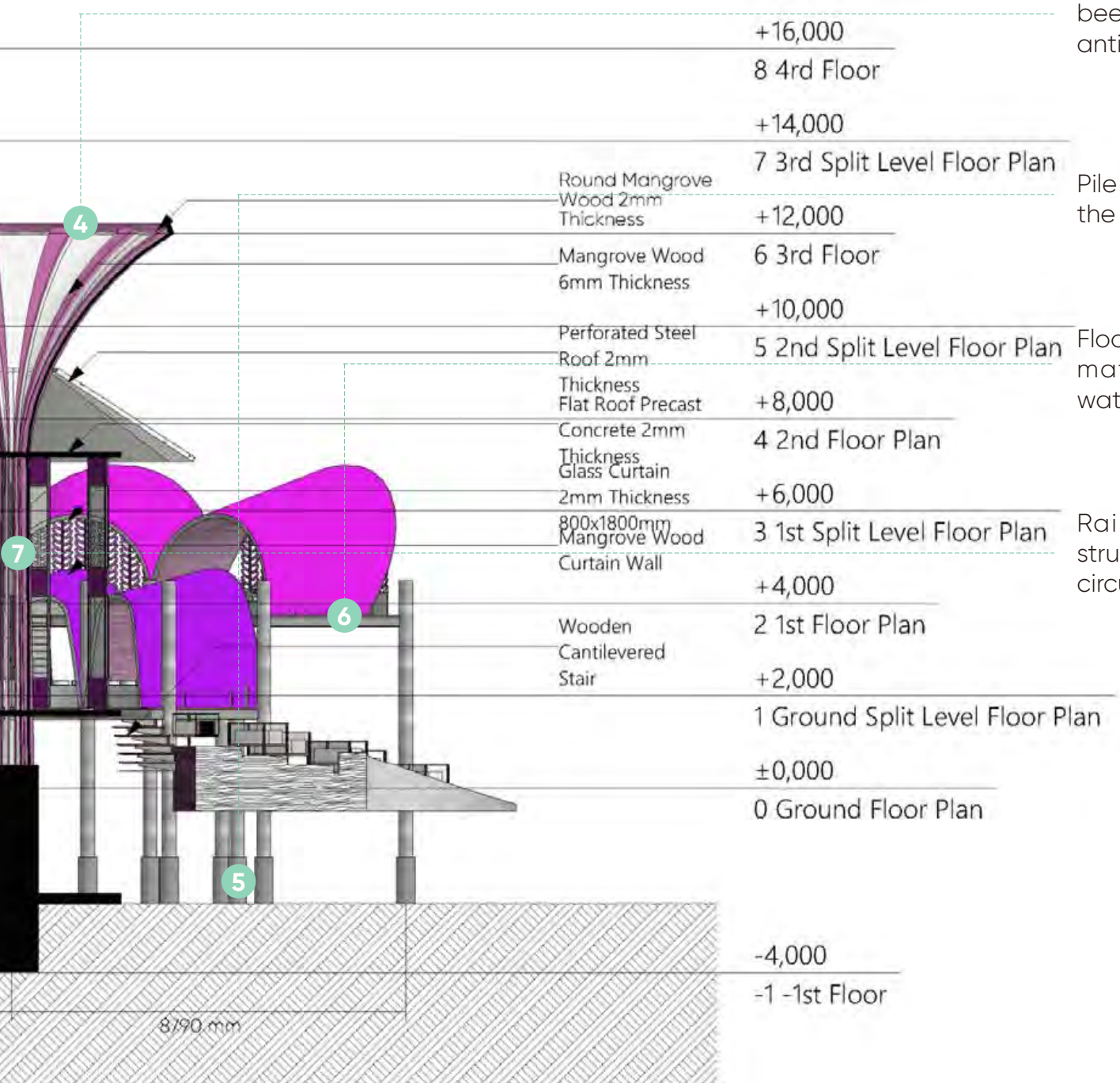


Figure 218. BUILDING CONSTRUCTION: modular floating structure and hard corrosion material system
Source: Author
(proccessed on 27 June 2022)

Using mangrove wood material that has been tested for seawater resistance and anti-corrosion

Pile foundation capable of scratching the soil surface with a high depth

Floor slab with pre-fabricated concrete material because it is lightweight, waterproof, and easy to install

Rainwater catchment as the main structure and can also hold water and circulate it to the wetlands

BUILDING ENVELOPE: kinetic facade movement respond to the climate and predator

A kinetic facade that adjusts to temperature and moves to scare away predators and with a colored roof to keep predators away

The composition of the mass rises and falls in response to the direction of the wind and sun so that natural ventilation and lighting are more optimal in order to create a comfortable space for mangroves

The use of a shell structure on the roof to trap airflow in the space and make the space more dynamic against wind and light

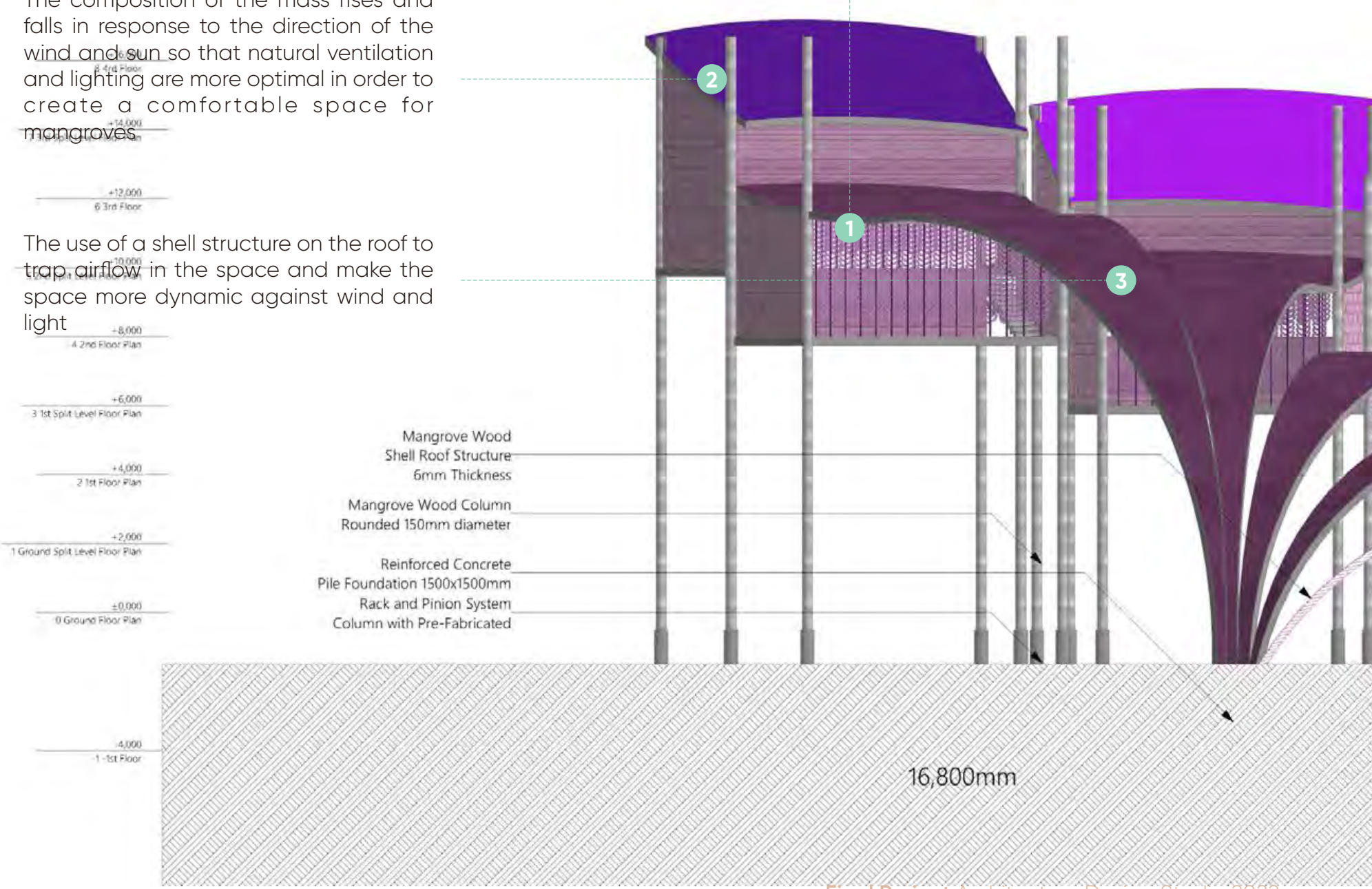
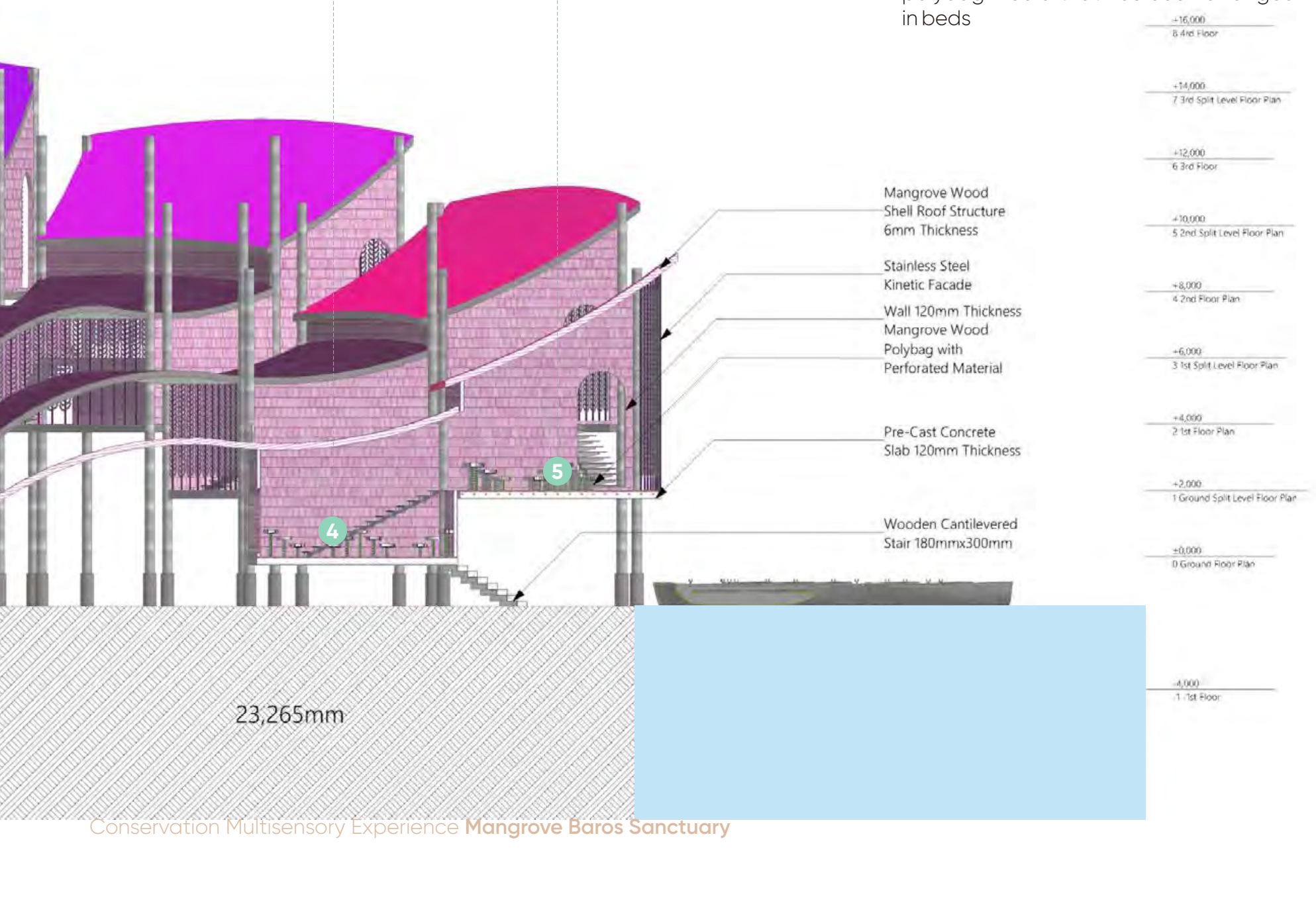


Figure 219. BUILDING ENVELOPE: kinetic facade movement respond to the climate and predator

Source: Author
(proccessed on 27 June 2022)

Interior truss construction system for terraced planting for easy monitoring and appropriate movement space during the nursery process

Planting mangrove seedlings using polybag media that has been arranged in beds



SCHEMATIC DESIGN DRAWING SECTION NURSERY SOWING

BUILDING CONSTRUCTION: modular floating structure and hard corrosion material system

Mass arrangement with a modular system that can go up and down in response to wind and sun directions so that ventilation and natural lighting are more optimal in order to create a comfortable space for mangroves and anticipate tidal waves

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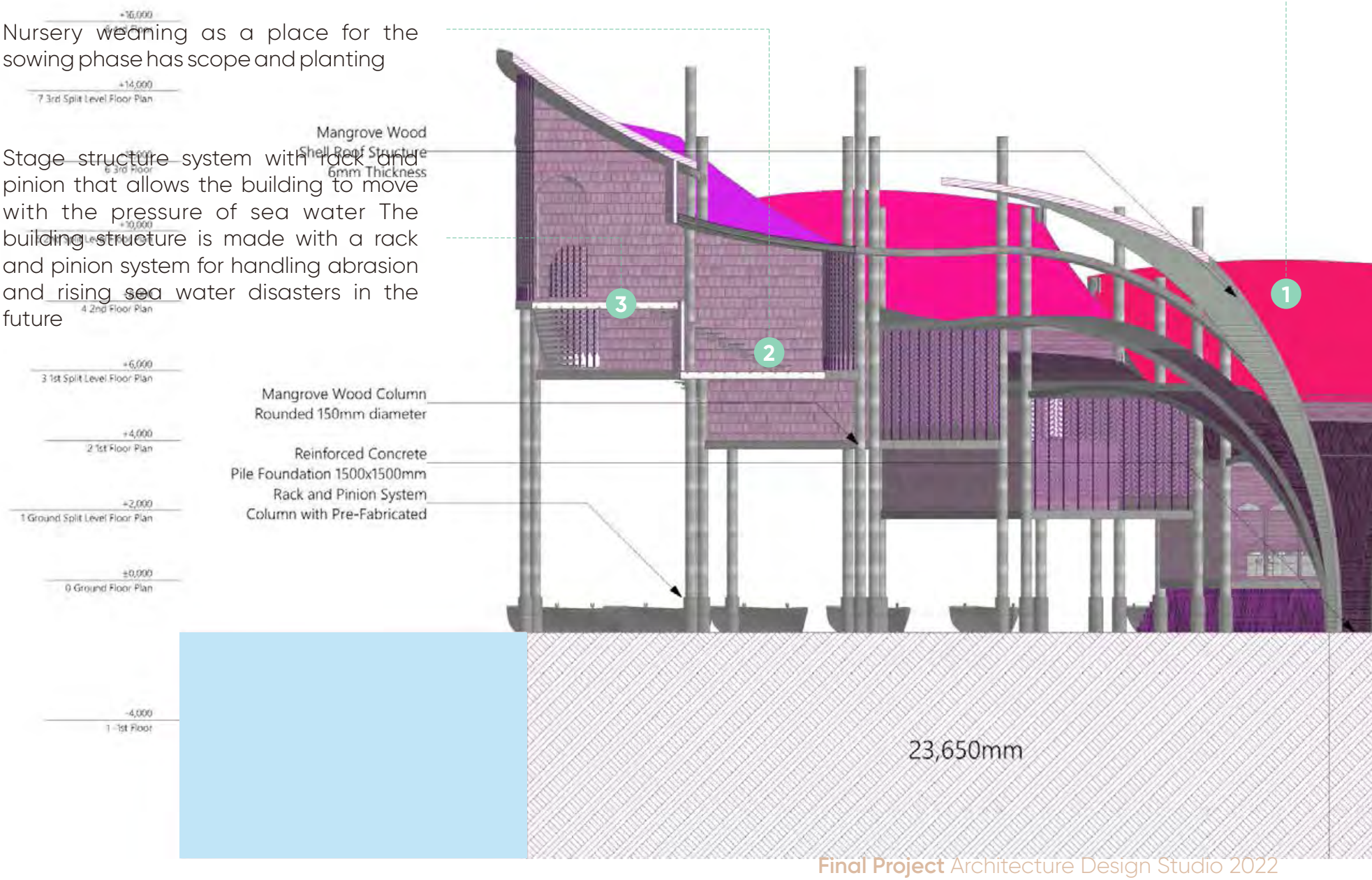
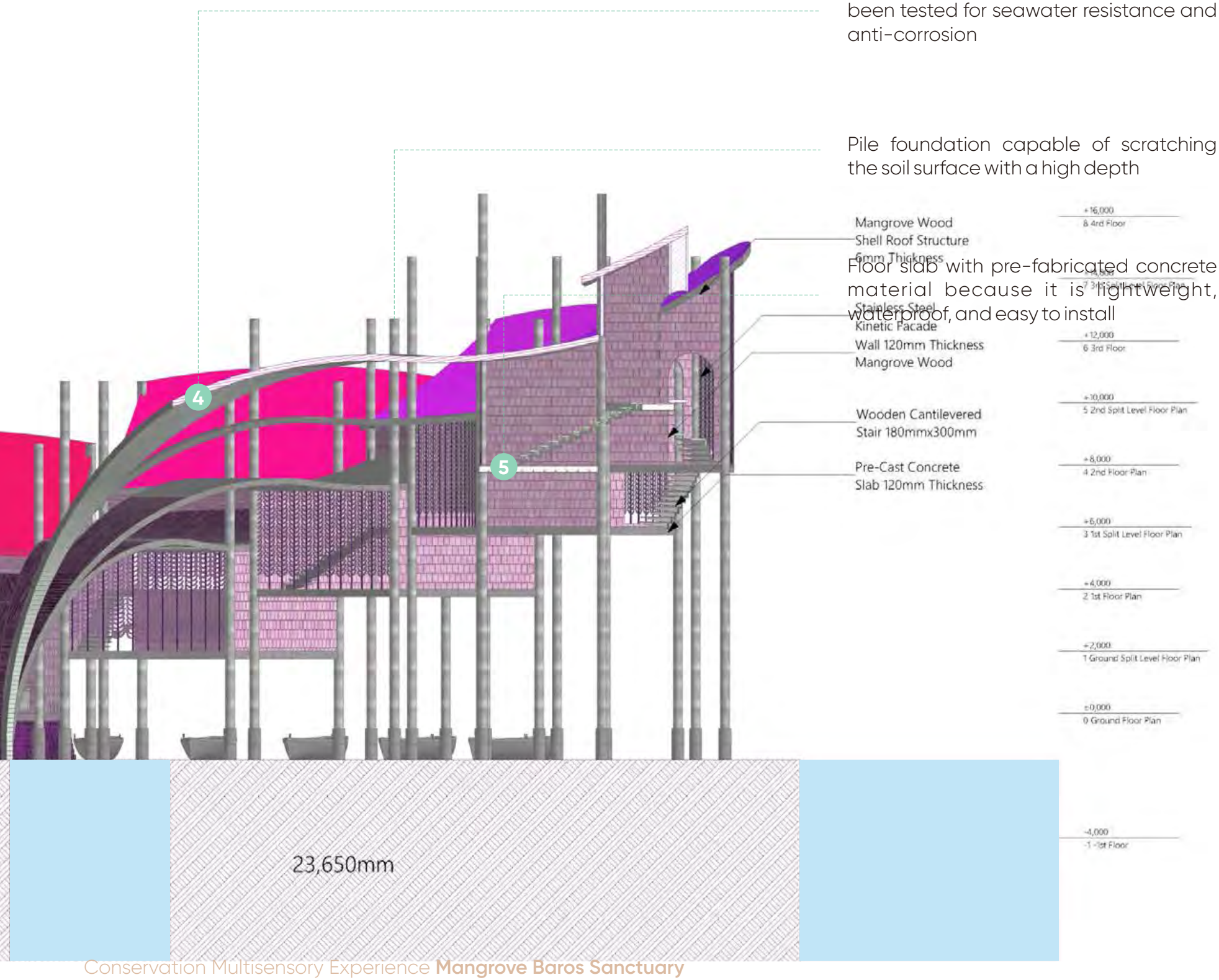


Figure 220. BUILDING CONSTRUCTION: modular floating structure and hard corrosion material system
Source: Author
(proccessed on 27 June 2022)

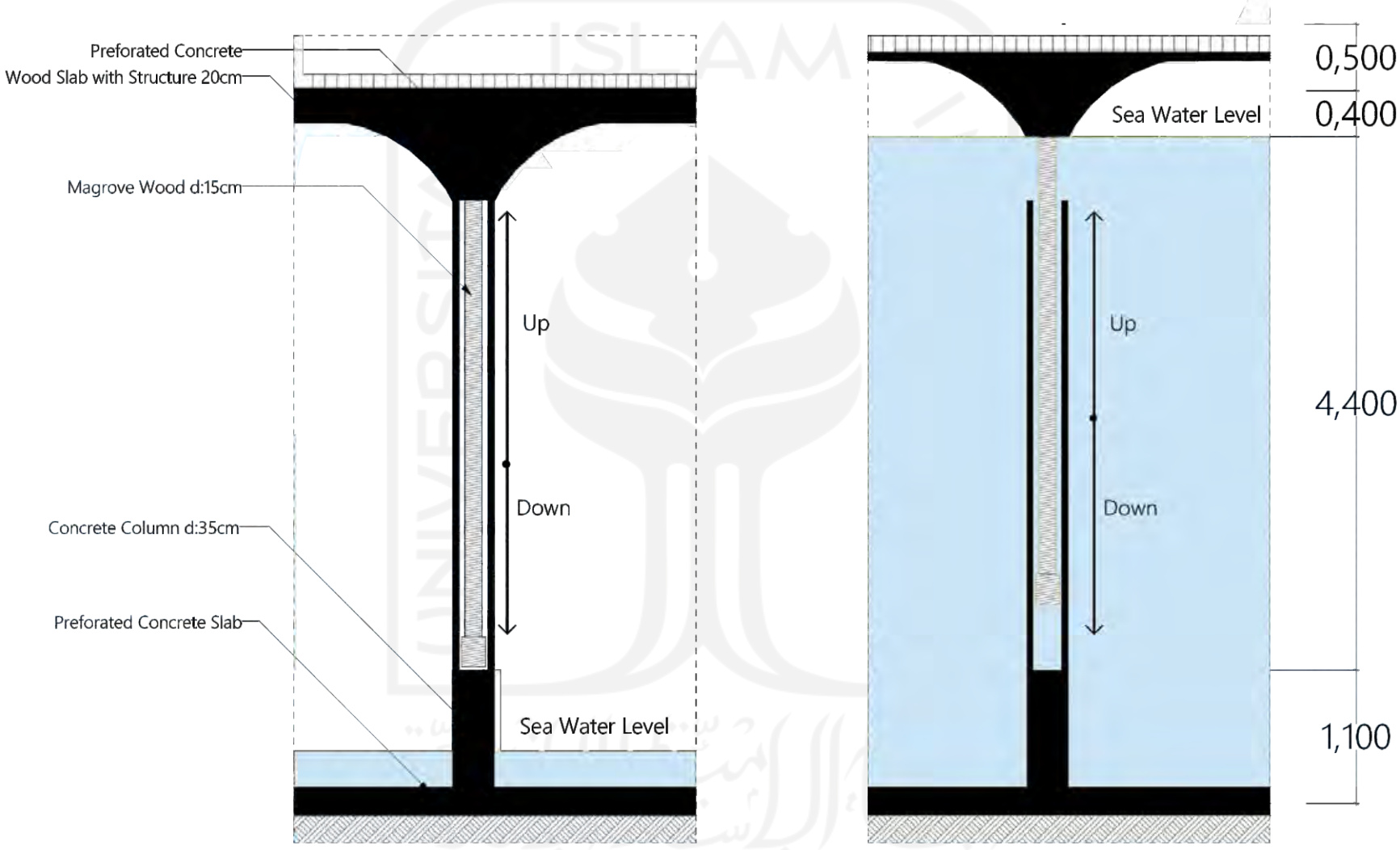
Using mangrove wood material that has been tested for seawater resistance and anti-corrosion

Pile foundation capable of scratching the soil surface with a high depth

Floor slab with pre-fabricated concrete material because it is lightweight, waterproof, and easy to install



BUILDING CONSTRUCTION: modular floating structure and hard corrosion material system



Water has a greater pressure than air. By utilizing this, the material used in the filling column is lighter than the density of water so that the column can move up and down to adapt to rising sea levels.

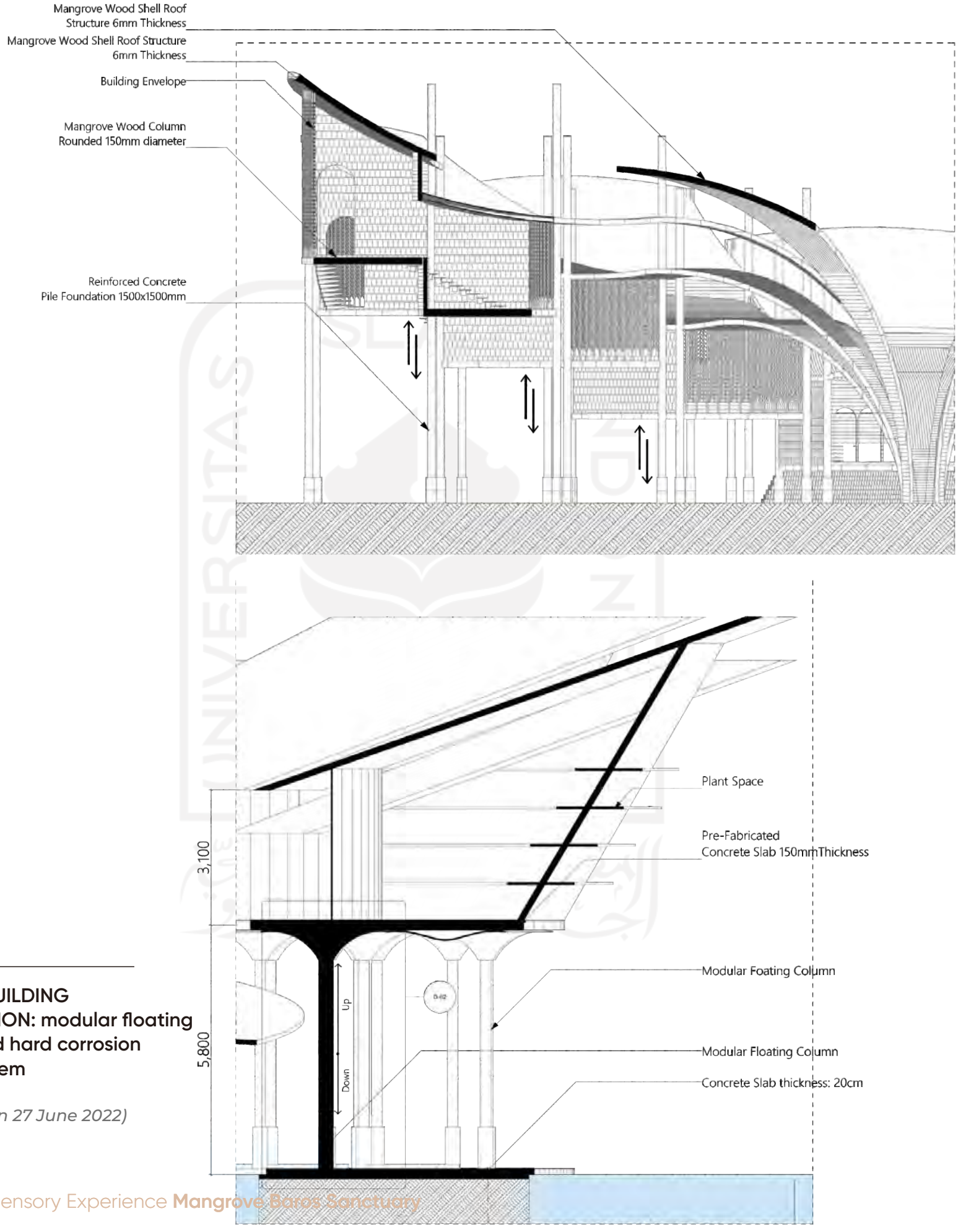


Figure 221. BUILDING CONSTRUCTION: modular floating structure and hard corrosion material system
Source: Author
(proccessed on 27 June 2022)

BUILDING ENVELOPE: movement of kinetic facade in respond to climate and predator

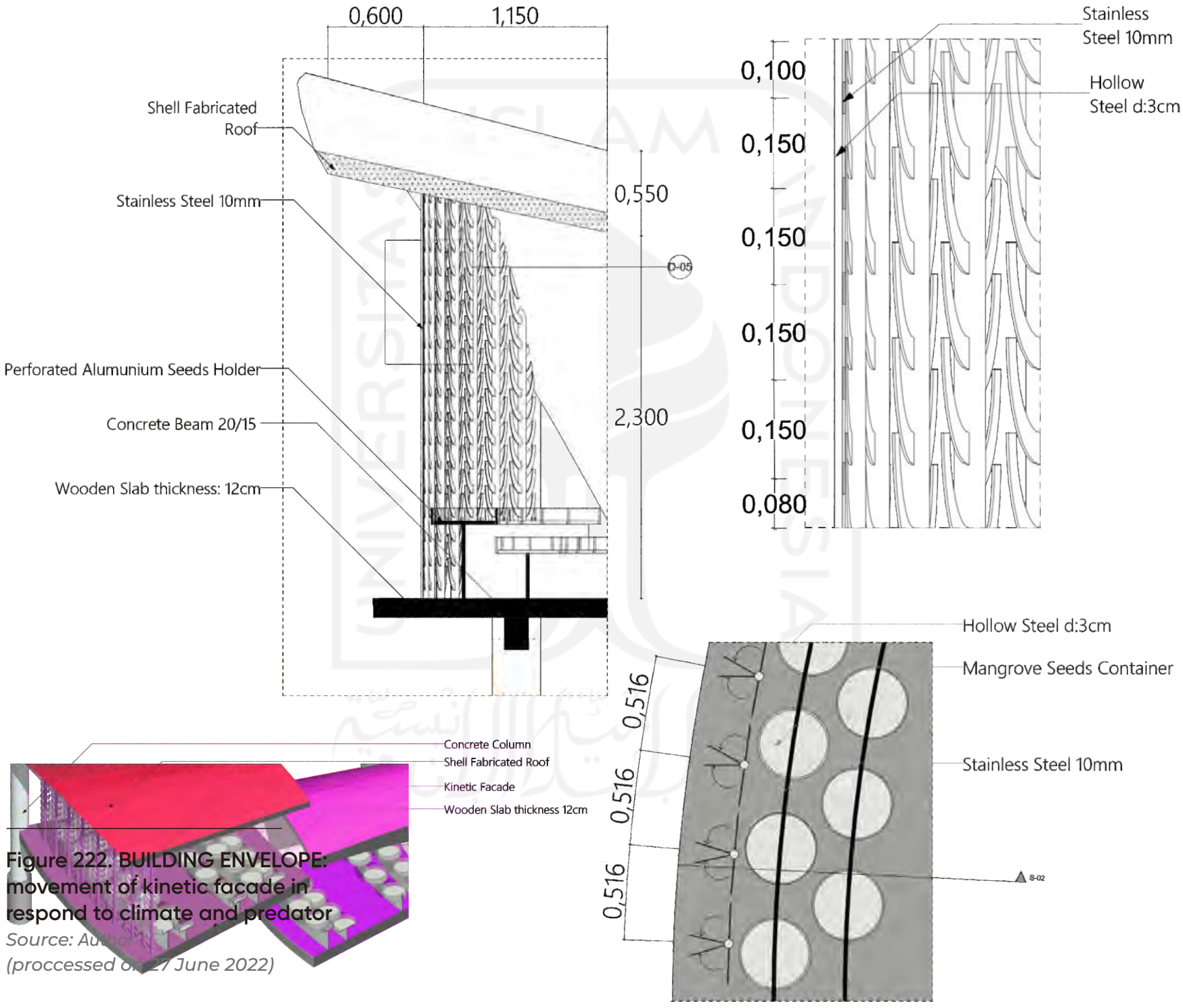


Figure 222. BUILDING ENVELOPE: movement of kinetic facade in respond to climate and predator

Source: Author (proccessed on 27 June 2022)

RENDERING IMAGE

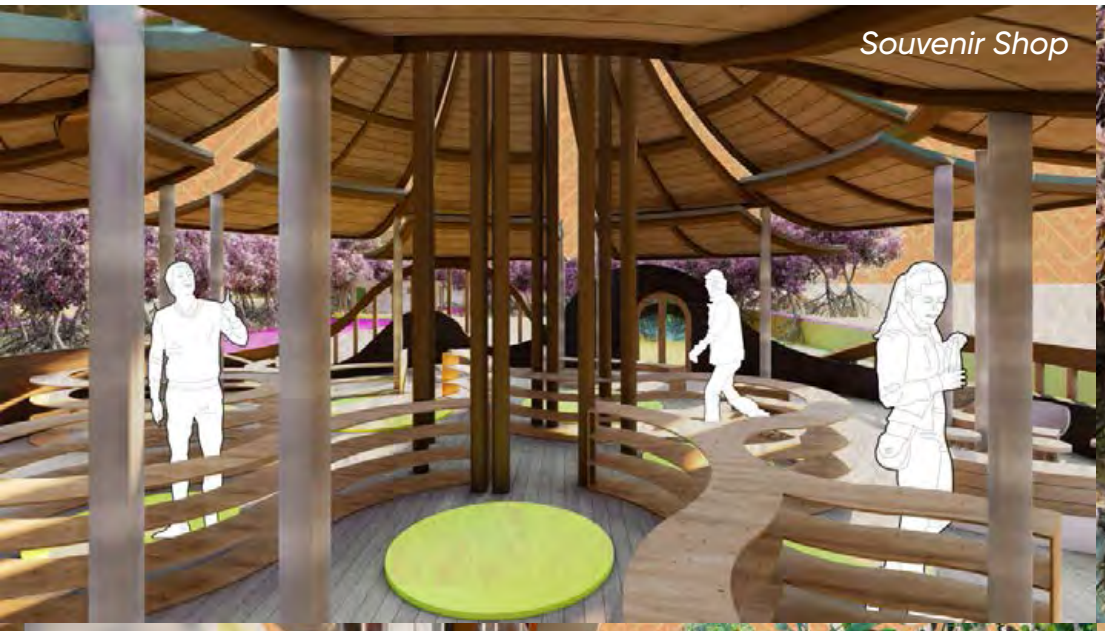
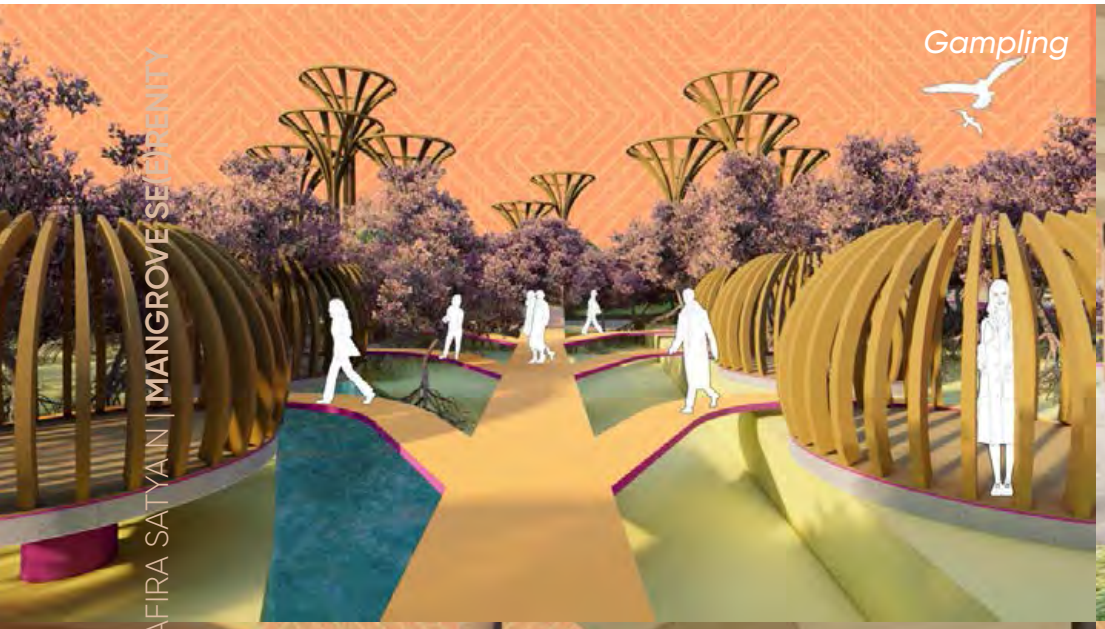


Figure 223. PERSPECTIVE EXTERIOR: RENDERING IMAGE
Source: Author (processed on 27 June 2022)

SCHEMATIC DESIGN DRAWING PERSPECTIVE EXTERIOR

RENDERING IMAGE



Mangrove Nursery Sowing

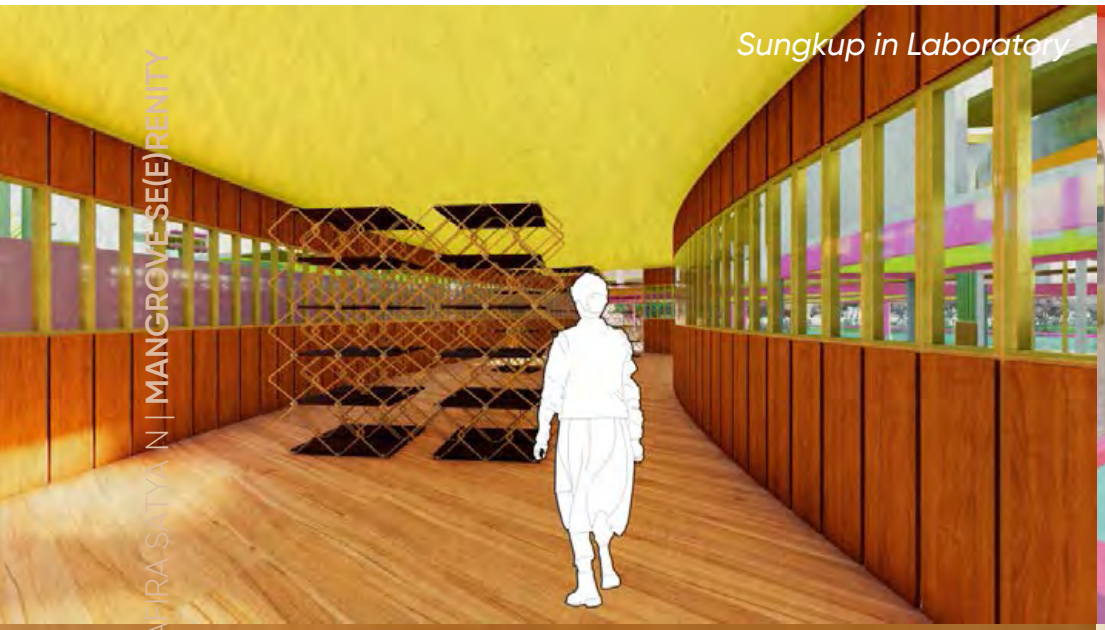
Mangrove Nursery Weaning

Conservation Multisensory Experience **Mangrove Baros Sanctuary**

Final Project Architecture Design Studio 2022

Conservation Multisensory Experience Mangrove Baros Sanctuary

RENDERING IMAGE



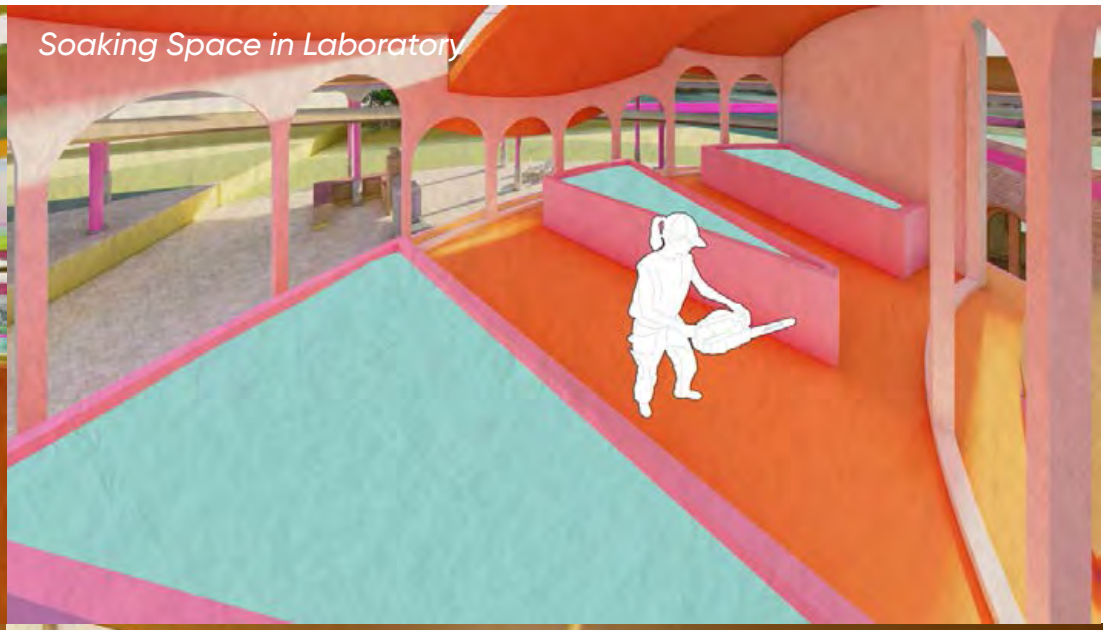
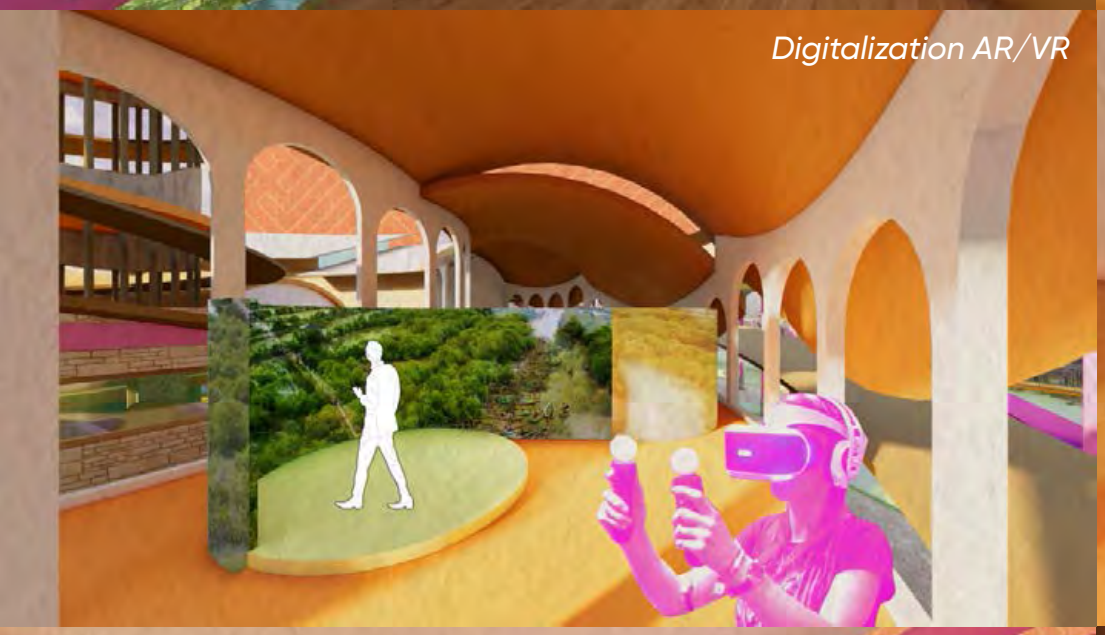


Figure 224. PERSPECTIVE INTERIOR: RENDERING IMAGE
Source: Author
(proccessed on 27 June 2022)

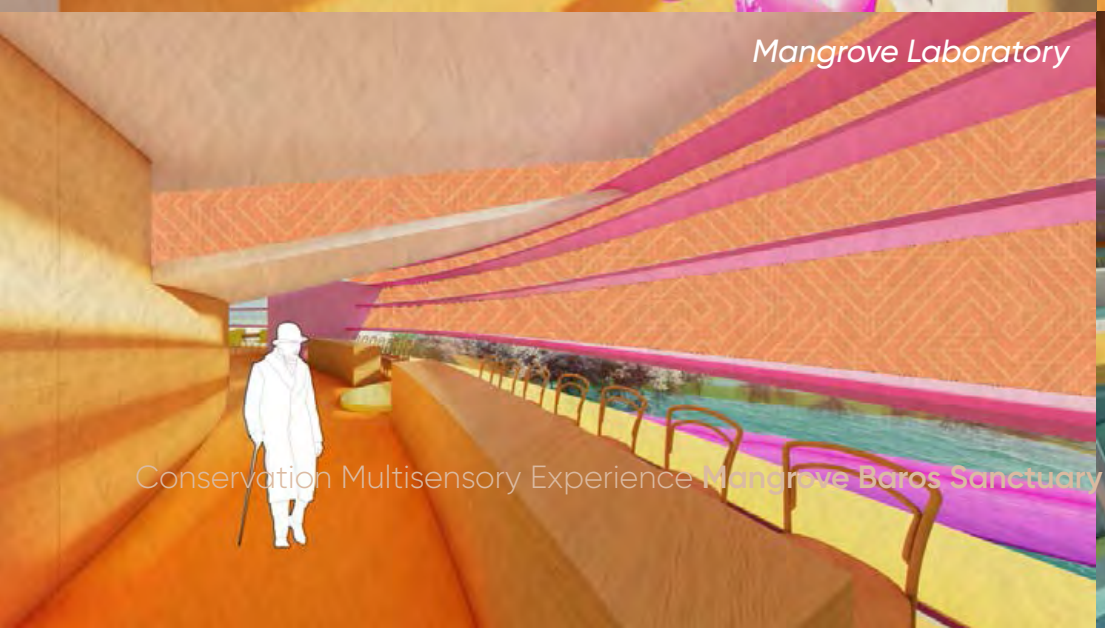
Interpretation Space

Hologram in Interpretation Space



Digitalization AR/VR

Workshop Space



Mangrove Laboratory

Control Room Nursery Sowing

05

“SANCTUARY

Your safe and peaceful haven a comforting place of refuge and rest in a noisy the chaotic world. There is nothing wrong with having a tree as a friend

- Bob Ross -

EVALUATIF CONCLUSION

DESIGN EVALUATION REVIEW

Final problem solving that has met a bright spot requires input so that it can be developed better.

NOTES: from jury as a conclusion of evaluative review

Based on the result of evaluation, there are several part that are critically responded by the examiner and supervisor. The response aims to make the design better and finding a design that is more than optimal. Here is some description that need to be added:

SUPERVISOR NOTES AND CONCLUSION

It its very clear about the concept and the design drawing will follow the concept. Since the mangrove plantation in Baros already broken so you need to design a building that can grow mangrove after that got some adding point by educational and tourism function. The design must explain clearly about the main function of the design. The mangrove sanctuary is the main so how to make some dealing to your mangrove and after that they growing well they can sent it back to the nature. Which one the room programming that want to show up.

EXAMINER LECTURER

1. How people will attracted to see the mangrove because it is a land? They coming for a mangrove or biodiversity? What are the element that want to be display?
   - Adding an interior design that will attract people to come. Some of them are preserve and some of them are present.

Response: The answer to the question refers to the design image on pages 203-246 which explains the flow of visitors who come with the concept of freedom and growth storyline and multi-sensory applications. In the building, separate masses are made to provide experience by utilizing the existing land according to its zoning. The interpretation space and botanical garden buildings are designed for the public by making openness designs to respond to the surrounding view and including living things in the building to see how mangroves and biodiversity are. As for the other mass only for mangrove planting based on mangrove life cycle analysis. Interior answers can be found on page 314.

There are 3 types of space use to attract tourists. The first is the educational method by planting mangroves in the building and visitors can experience directly with the application of nature elements that will be reflected in the building, the second is through learning by doing with mangrove planting activities based on the mangrove life-cycle, and the third is the application of technology and installations. as an interactive learning medium.

2. How to attract the animals to get in that can expect the biodiversity will live peacufully?

Response: The placement of the mass placed on top of the mangrove is able to provide a shadow to the mangrove as well as use it to be part of the inside of the building. The mangrove plant itself has functioned as an attractive animal habitat. In addition, buildings that must attract animals are designed with neutral colors and reflections of nature.

3. Mangrove life in a salt water. How to make mangrove life in a salt water in the building?

Response: The answer of the question can be seen in the page 276 which mangroves will get irrigation from wetland water that comes from the river and the coast. There are several steps in the mangrove life-cycle. The first at the seed stage with the anthropochory method does not require sea water. In nursery soaking, it will be immersed in a tub filled with seawater which is applied to the room at the mangrove laboratory. In the sowing and weaning phase, the building is designed close to seawater and fresh water sources to facilitate irrigation needs. In the released and adult phases, they are not in the building so there is sufficient sea water. The answer of water scheme refer to page 283.

4. How to make mangrove life in indoor building? How they get enough sunlight, wind, precipitation, and humidity?

Response:
a. Sunlight, wind, and humidity, at the stage of planting mangrove nursery sowing, weaning, and treatment, it is better to design a building that is not too open because it has a standard temperature of 25 degrees Celsius. So that the building with the building envelope is designed semi-open to achieve the expected temperature but still get direct natural lighting. The building envelope concept has been tested on pages 269-275, 277-278, 255, 299, and 303.

b. precipitation, mangroves that are still in the nursery stage to treatment do not need rainfall because the water needed comes from salt water and fresh water.

4. Why do you have a repetition of the shape and the opening shape?

Response: It is to create a blurry boundary within the natural view. The people can enjoy the surroundings as well as the building interior at the same time. It design to be a repetition with different height in order to create sequence the sense of movement and growing.

5. Need to explain more clearly which one the room programming that you want to show.

Response: The siteplan consist of 7 mass that is souvenir shop, community space, mangrove laboratory, interpretation space and botanical, mangrove ecorium, port, mangrove labirinth, mangrove nursery sowing, and mangrove nursery weaning. The arrangement of the room programming can be seen in page 195-197.

6. The title is Mangrove Sanctuary in Baros. What are the main function? Is it sanctuary of mangrove or of people?

Response: The main function is a mangrove conservation with adding point facility for educational and recreation for tourism.

So the problem of cultivating the mangrove should be done first then can add the other function. Refer to page 193-194.

7. Why choose radial form to growing a mangrove?

Response: In the construction of conservation buildings, it would be better if it does not damage the environment so that linear masses that can be arranged with a radial modular system are chosen to respond to the existing vegetation. This linear mass shape also facilitates flexibility for the user. The separated mass indicates different types of zoning depending on the type of mangrove planted. The outward radial arrangement also depends on the needs of space users when planting mangroves, which will always grow. In the laboratory mass, storage is placed in the middle because it requires minimal light and regulation. While the planting must be facing the view and sunlight to get maximum sunlight. The drawing of floor plan can be seen in the attached document below.

8. Why the building mass separate?

Response: In order to respond the zonation by conservation regulation and the need of nursery proccess. In Nursery Sowing phase should be done near to the fresh water irrigation and have a lot of vegetation. For Weaning Phase should be done near the wave of brakish water. meanwhile for tourism should reflected the natural element of view.

9. Why the 2 mass in the middle (tourism) more bigger than the nursery function. Why should design that because it is look like not consistent about the problem. Is the facility useless?

Response: The title and zonate is Mangrove Sanctuary in Baros Eco-Edu tourism, the building facility in respond to the goverment regulation and asldo promoting to the people outside to growing mangrove. It is more bigger because the capacity of people that will be use, the tourism more higher than the community. The mangrove can't be survive until 80% optimal if there is no people behind the stage.

10. Why the bird come? There is a simulation of climate and predator envelope to make sure the kinetic facade proof?

Response: Mangrove is a habitat for the migration bird. Mangrove have a fruit that have nectar and the leaves as bird food. The answer refer to page 273.

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PLAGIARISM CHECK
DED
3D Model
APREB

06

LIST OF ATTACHMENT

Direktorat Perpustakaan Universitas Islam Indonesia
Gedung Moh. Hatta
Jl. Kaliurang Km 14,5 Yogyakarta 55584
T. (0274) 898444 ext.2301
F. (0274) 898444 psw.2091
E. perpustakaan@uii.ac.id
W. library.uii.ac.id

SURAT KETERANGAN HASIL CEK PLAGIASI

Nomor: 1866414088/Perpus./10/Dir.Perpus/IV/2022

Bismillaahirrahmaanirrahiim

Assalamualaikum Wr. Wb.

Dengan ini, menerangkan Bahwa:

Nama	: SHAFIRA SATYA NURSHANTI
Nomor Mahasiswa	: 18512025
Pembimbing	: -
Fakultas / Prodi	: Teknik Sipil dan Perencanaan/ Arsitektur
Judul Karya Ilmiah	: Transverse Coastal Corridor: Nurturing Biodiversity Though Multi-Sensory Mangrove Forest Sanctuary In Baros Eco-Edu Tourism

Karya ilmiah yang bersangkutan di atas telah melalui proses cek plagiasi menggunakan **Turnitin** dengan hasil kemiripan (*similarity*) sebesar **9 (Sembilan) %.**

Demikian Surat Keterangan ini dibuat untuk dapat dipergunakan sebagaimana mestinya.

Wassalamualaikum Wr. Wb.

Yogyakarta, 7/4/2022
Direktur

UNIVERSITAS ISLAM INDONESIA
DIREKTORAT PERPUSTAKAAN
YOGYAKARTA

Joko S. Prianto, SIP., M.Hum

SITUATION PLAN

Mangrove Sanctuary Hub

UNIVERSITAS ISLAM INDONESIA

Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Situation Plan

Scale

1 : 2000

Note

Student Name

Shafira Satya Nurshanti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

Jury 02

Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

Date

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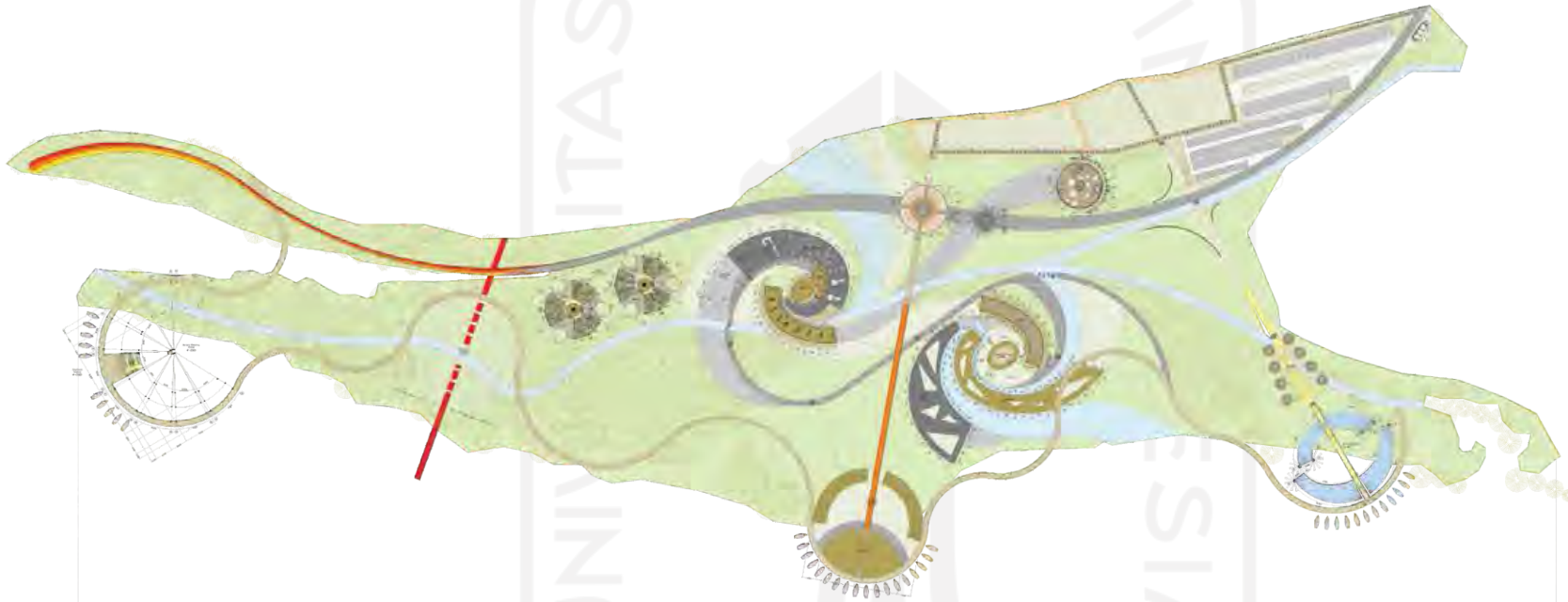
SITE PLAN & GROUND FLOOR PLAN

Mangrove Sanctuary Hub



Mangrove Sanctuary Hub

10m 30m 60m 100m

Site Plan & Ground Floor Plan

Location	Mangrove Baros Conservation, Bantul, Yogyakarta Special Region
Drawing Title	Site Plan & Ground Floor Plan
Scale	1 : 1000
Note	
Student Name	Shafira Satya Nurshanti
Student ID	18512025
Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
Jury 01	Prof. Noor Cholis Idham, ST., M. Arch., Ph. D
Jury 02	Dr-ing Putu Ayu P. Agustiananda, S. T, M. A
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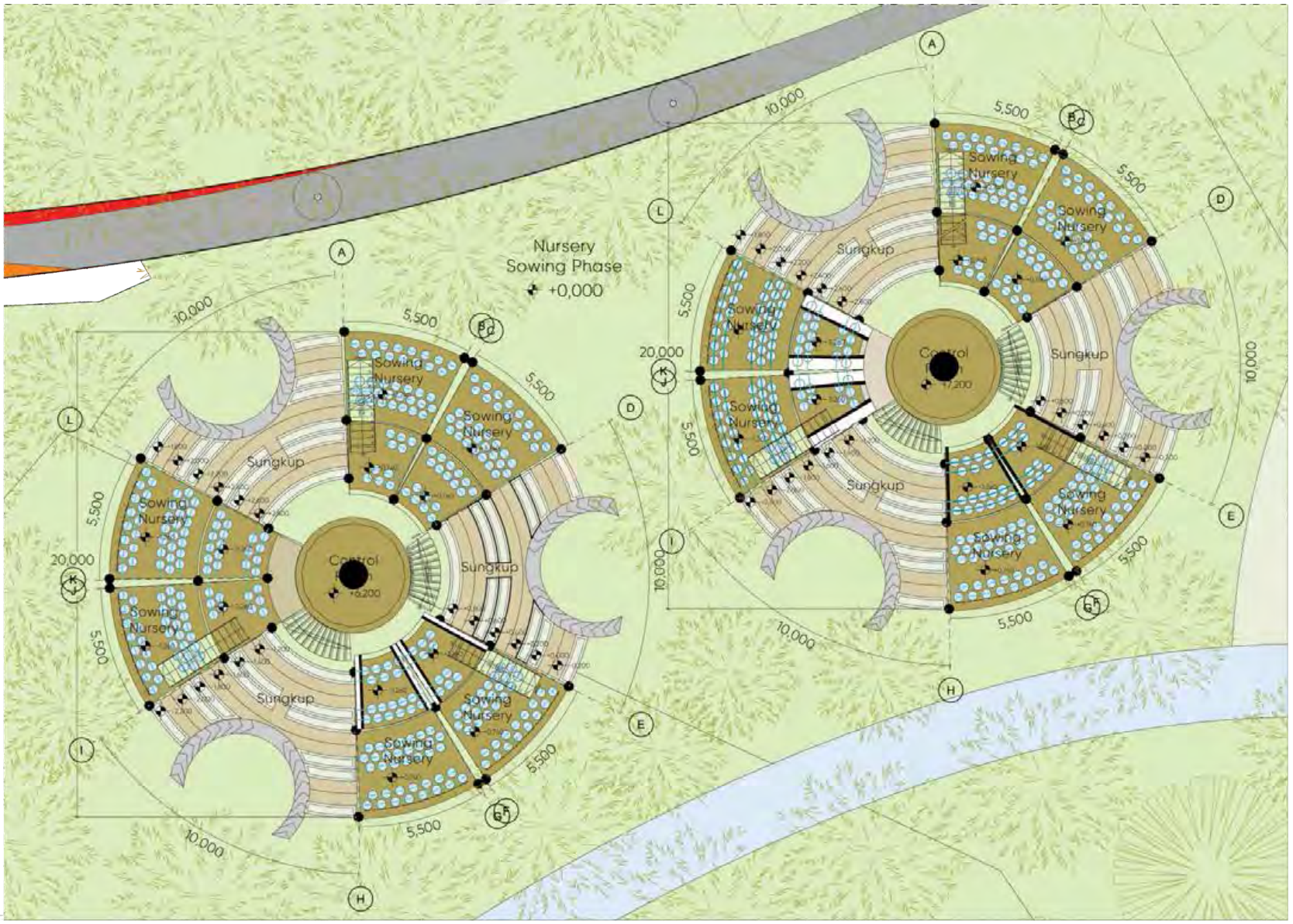
NURSERY SOWING GROUND FLOOR PLAN

Mangrove Sanctuary Hub



Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Nursery Sowing Ground Floor Plan

Scale

1 : 300

Note

Student Name

Shafira Satya Nurshanti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

Jury 02

Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

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NURSERY WEANING Ground FLOOR PLAN

Mangrove Sanctuary Hub

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Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Nursery Weaning Ground Floor Plan

Scale

1 : 500

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Student Name

Shafira Satya Nurshanti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

Jury 02

Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

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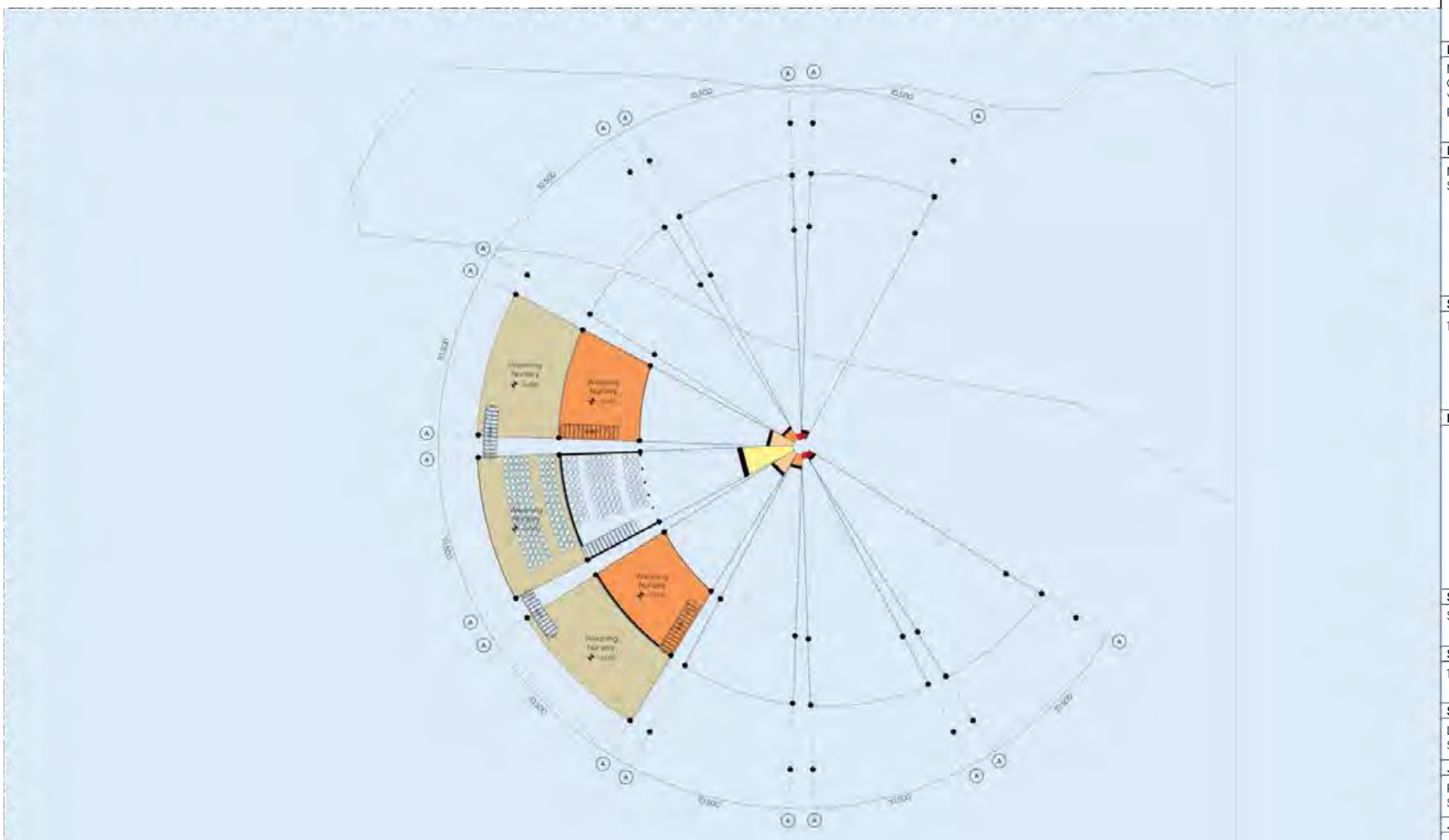
NURSERY WEANING Ground Split FLOOR PLAN

Mangrove Sanctuary Hub



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Nursery Weaning Ground Split Floor Plan

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Shafira Satya Nurshanti

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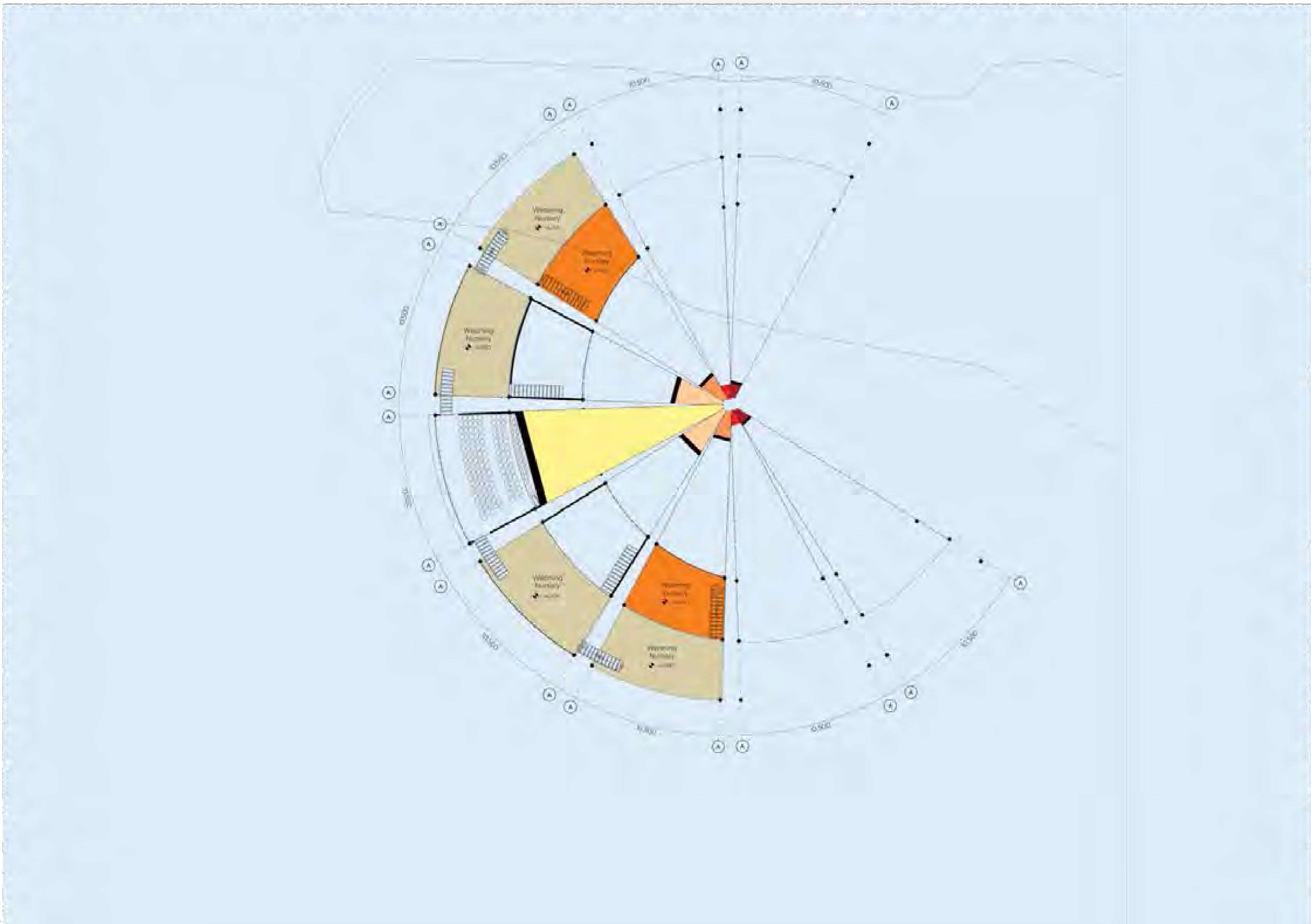
– NURSERY WEANING 1st FLOOR PLAN

Mangrove Sanctuary Hub



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MANGROVE SANCTUARY HUB

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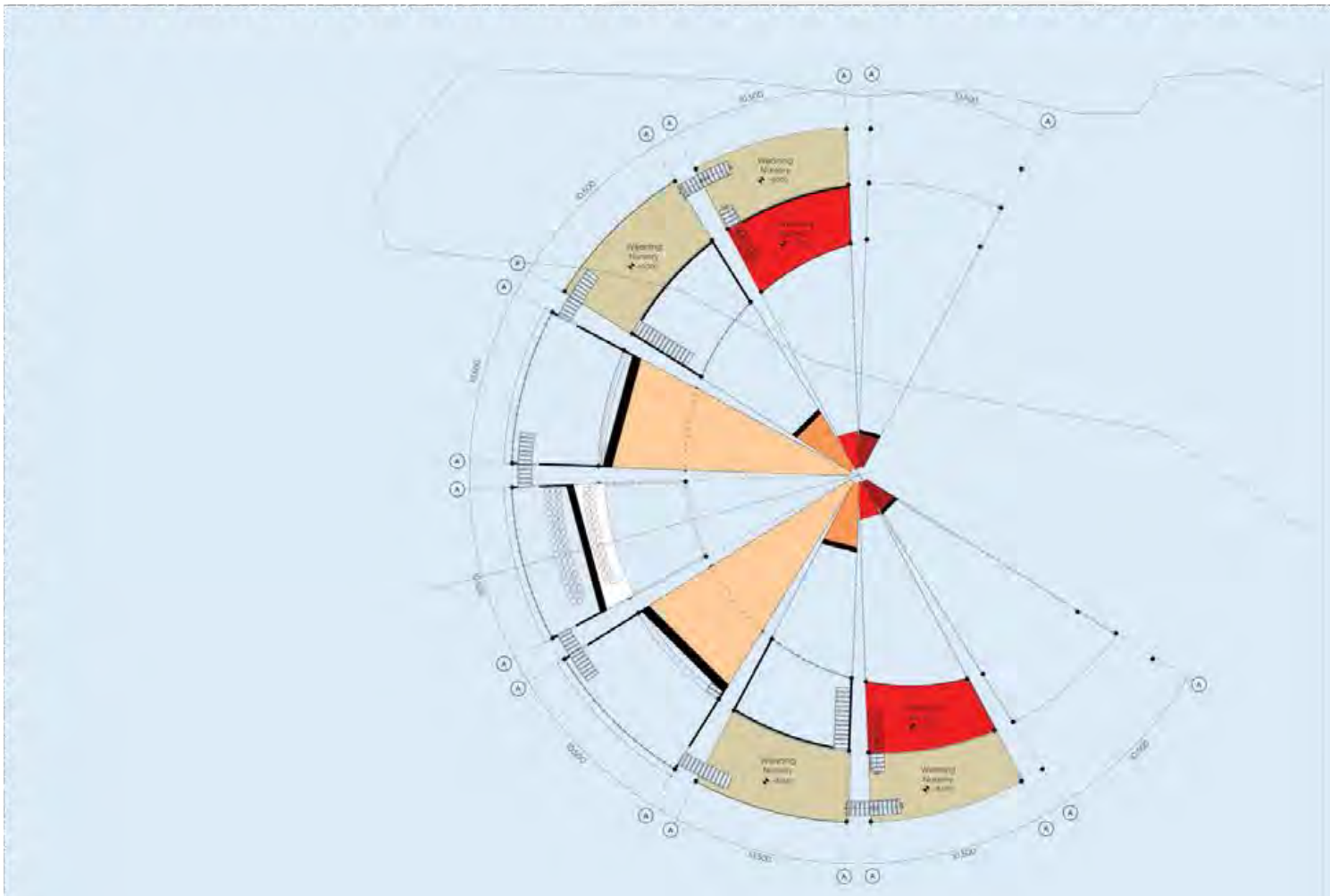
NURSERY WEANING 1st Split FLOOR PLAN

Mangrove Sanctuary Hub



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Student ID	18512025
Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
Jury 01	Prof. Noor Cholis Idham, ST., M. Arch., Ph. D
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NURSERY WEANING 2nd FLOOR PLAN

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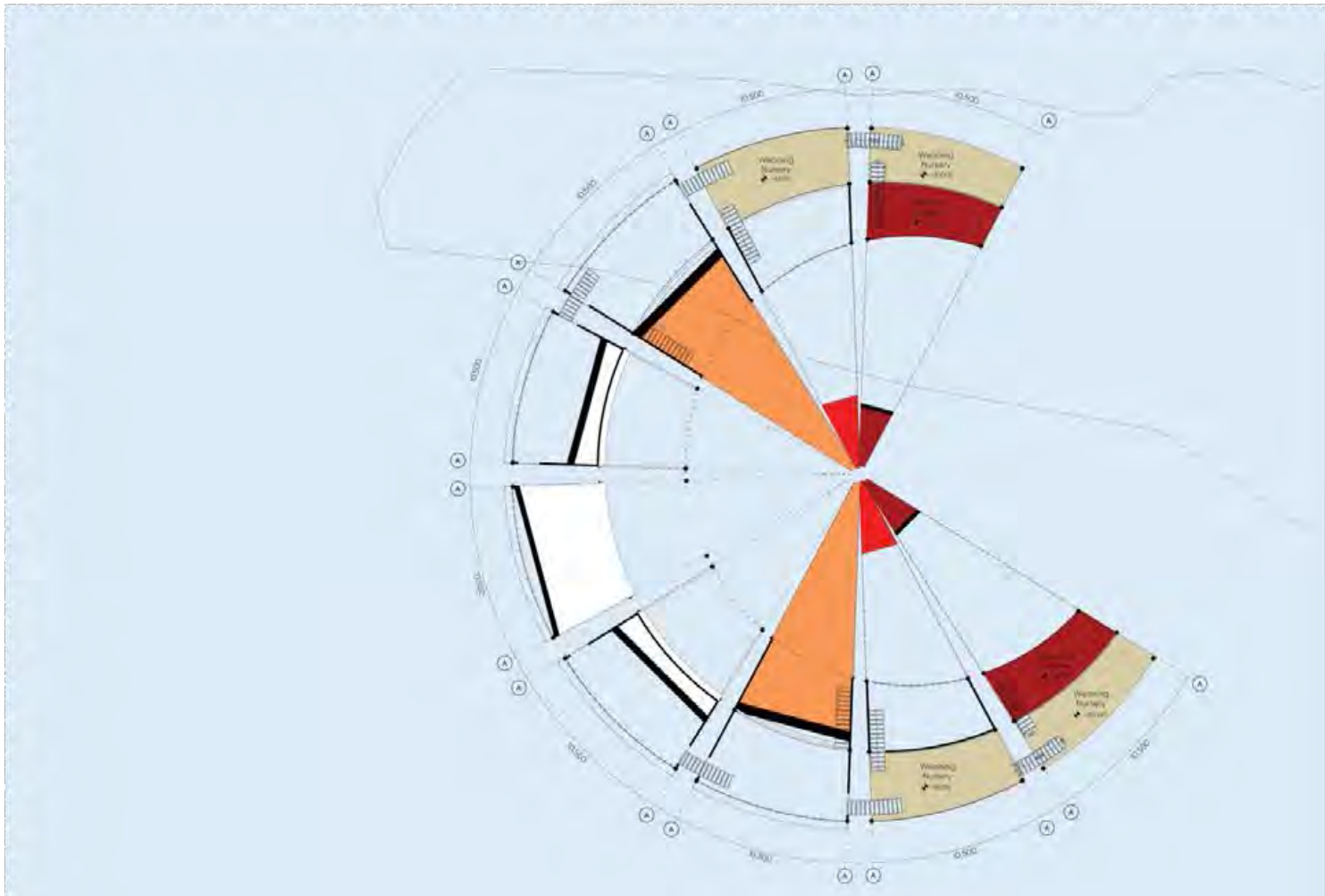

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Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
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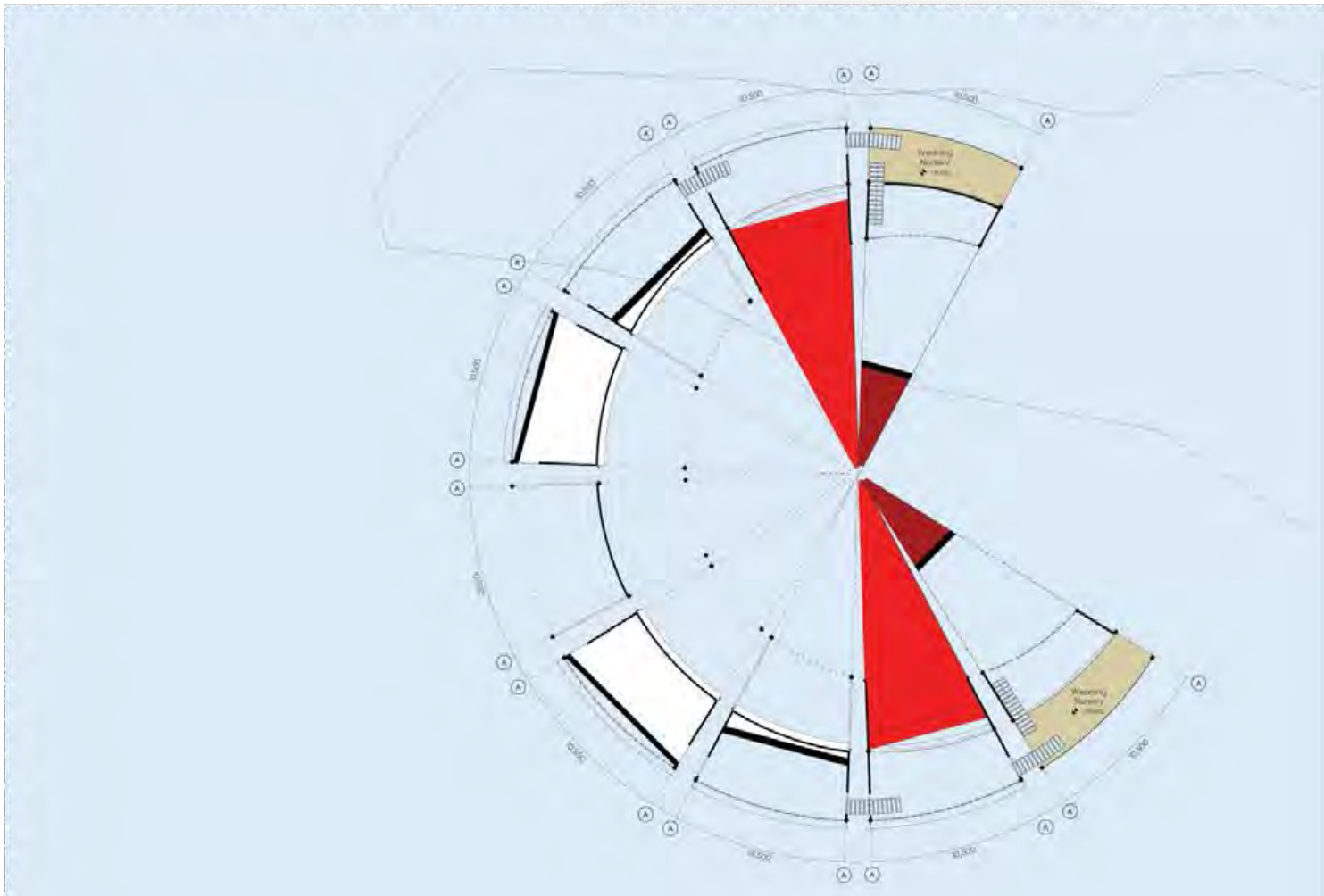
NURSERY WEANING 2nd Split FLOOR PLAN

Mangrove Sanctuary Hub



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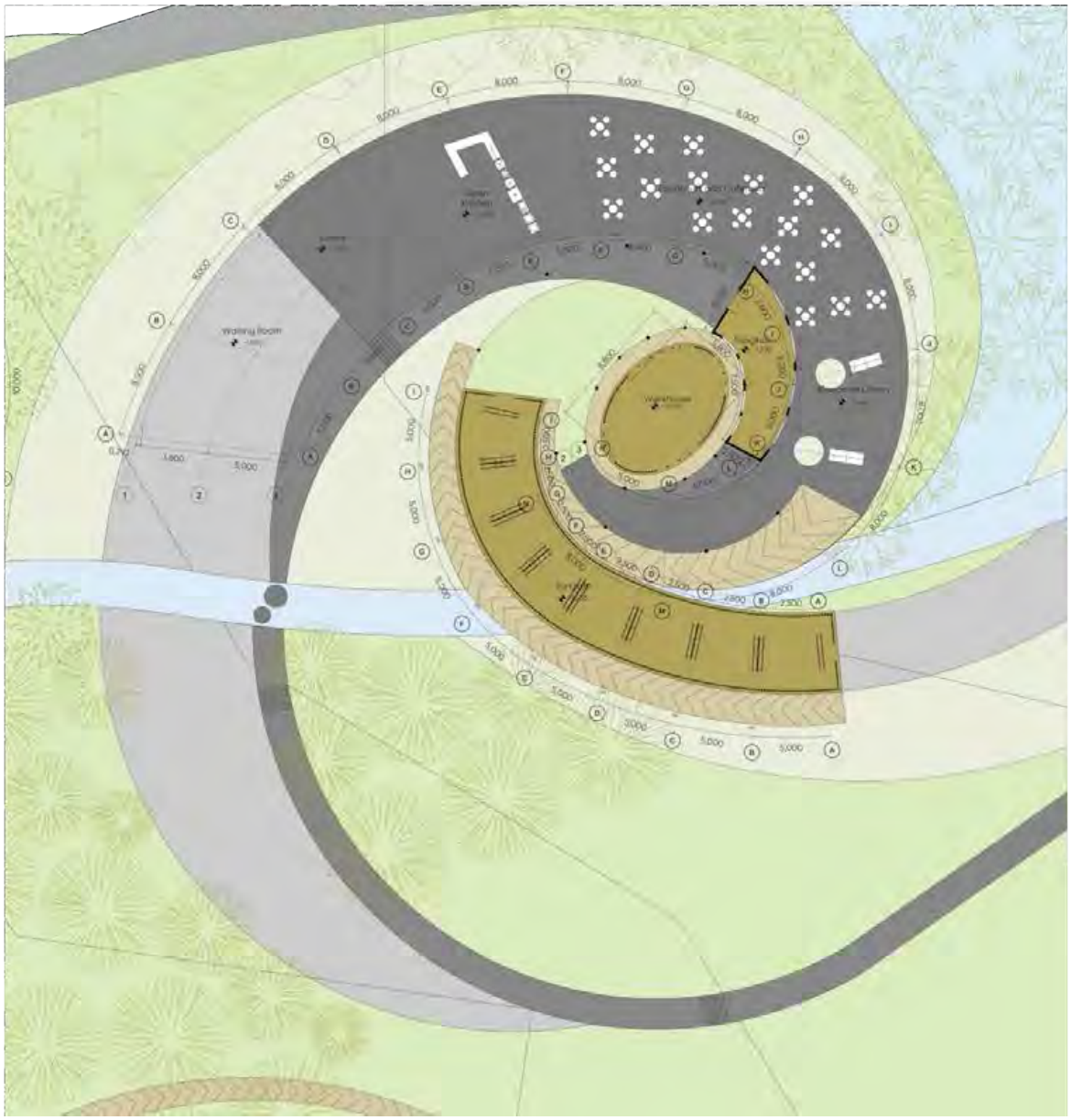
MANGROVE LABORATORY
Ground FLOOR PLAN

Mangrove Sanctuary Hub



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Mangrove Laboratory Ground Floor Plan

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Student Name

Shafira Satya Nurshanti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

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Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

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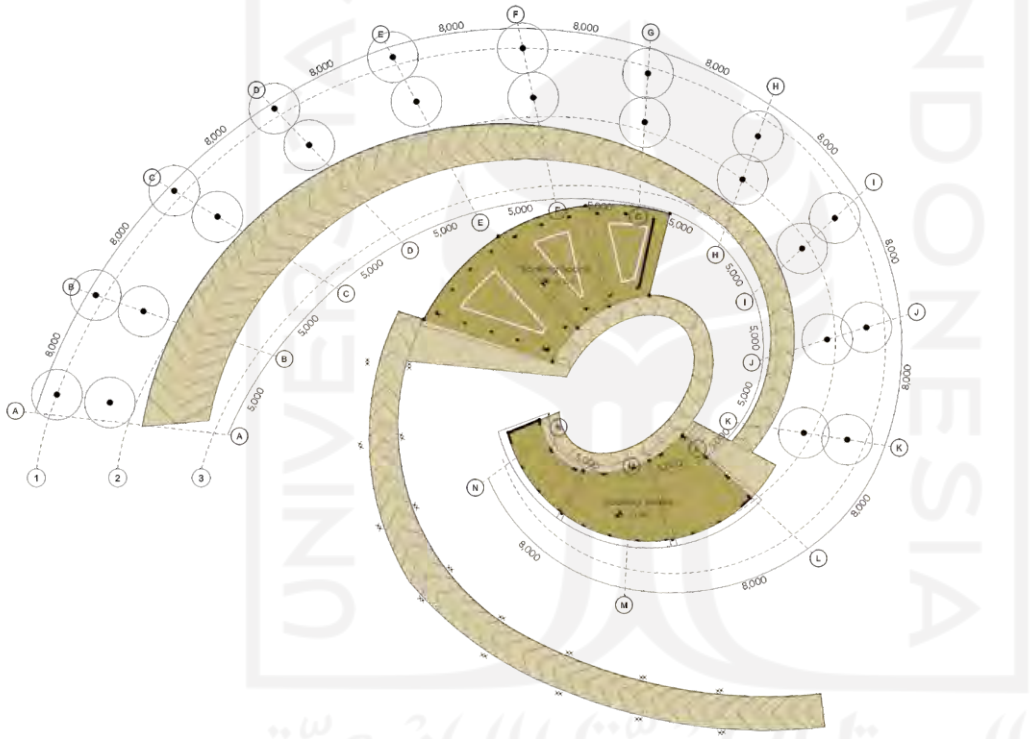
MANGROVE LABORATORY
Ground Split FLOOR PLAN

Mangrove Sanctuary Hub



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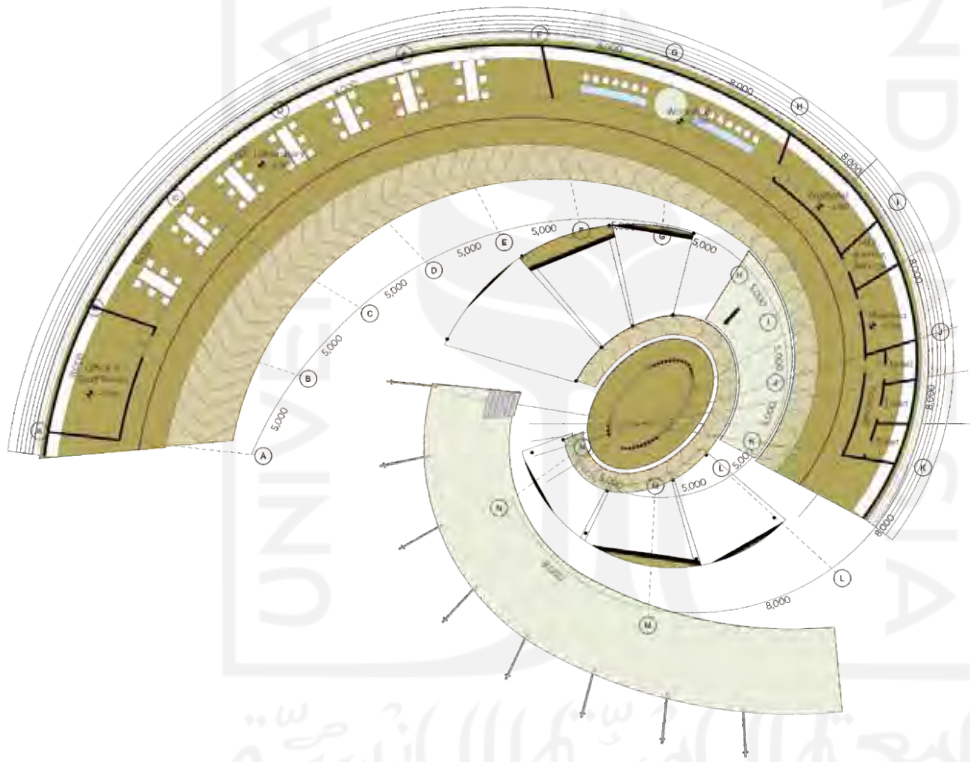
MANGROVE LABORATORY 1st FLOOR PLAN

Mangrove Sanctuary Hub



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18512025

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Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

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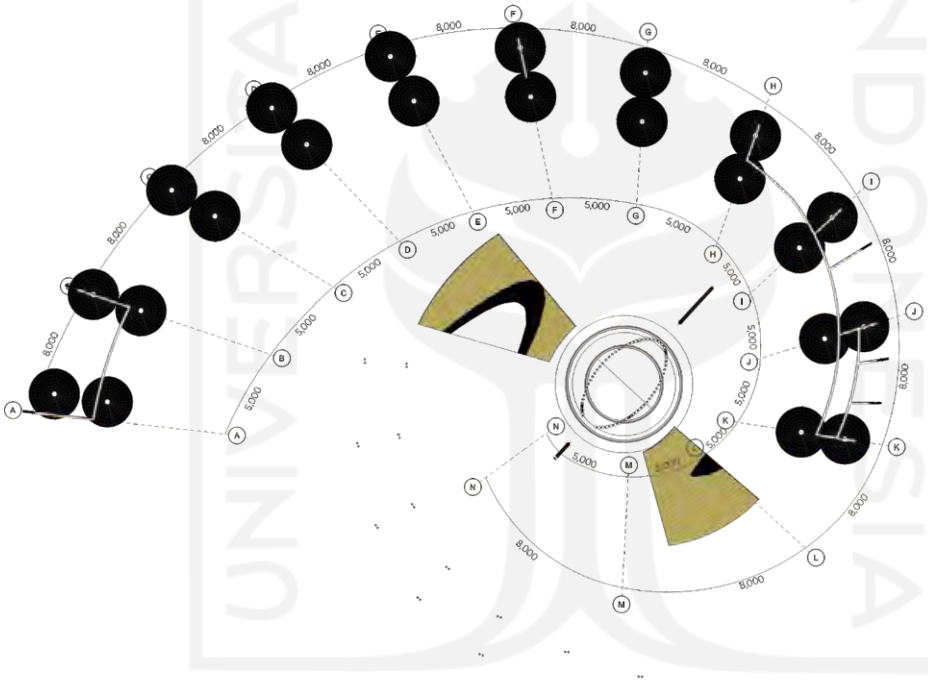
Mangrove Sanctuary Hub



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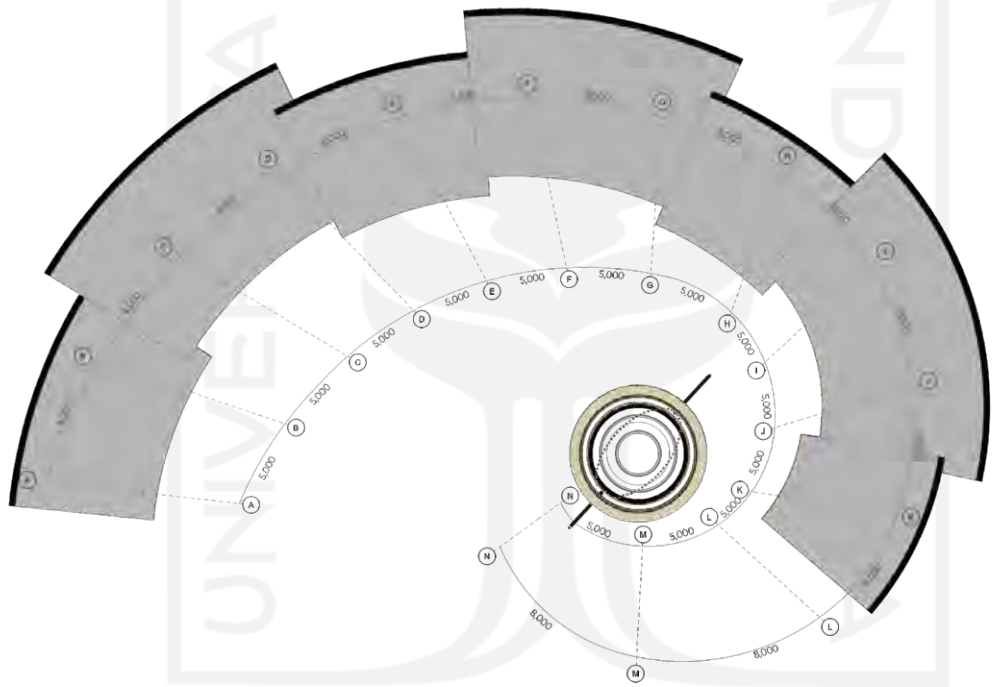
MANGROVE LABORATORY
2nd FLOOR PLAN

Mangrove Sanctuary Hub



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Location
Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title
Mangrove Laboratory 2nd Floor Plan

Scale
1 : 500

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Student Name
Shafira Satya Nurshanti

Student ID
18512025

Supervisor
Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01
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TEMATIC BOTANICAL GARDEN
Ground FLOOR PLAN

Mangrove Sanctuary Hub

Location	Mangrove Baros Conservation, Bantul, Yogyakarta Special Region
Drawing Title	Tematic Botanical Garden Ground Floor Plan
Scale	1 : 500
Note	
Student Name	Shafira Satya Nurshanti
Student ID	18512025
Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
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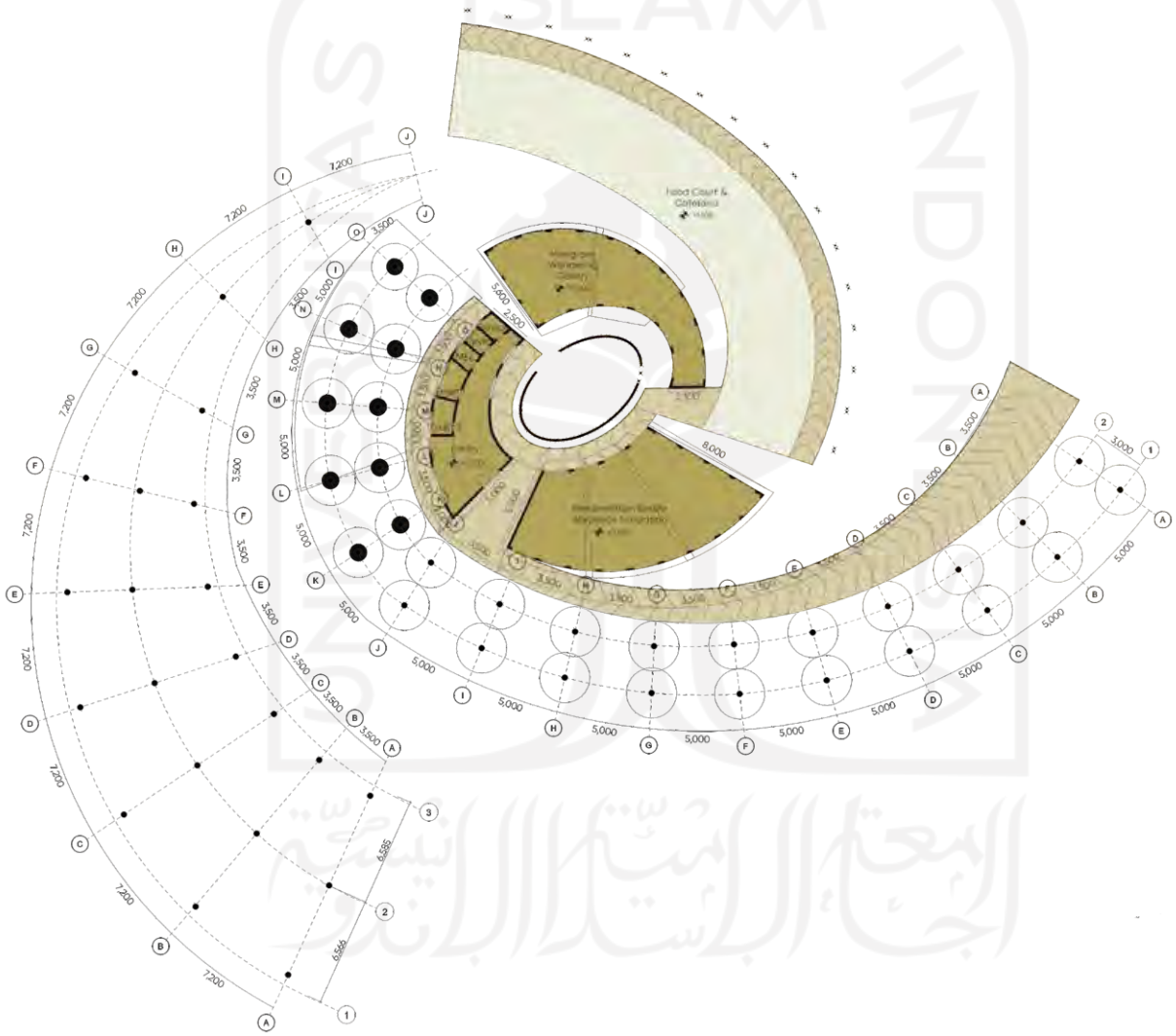
TEMATIC BOTANICAL GARDEN
Ground Split FLOOR PLAN

Mangrove Sanctuary Hub



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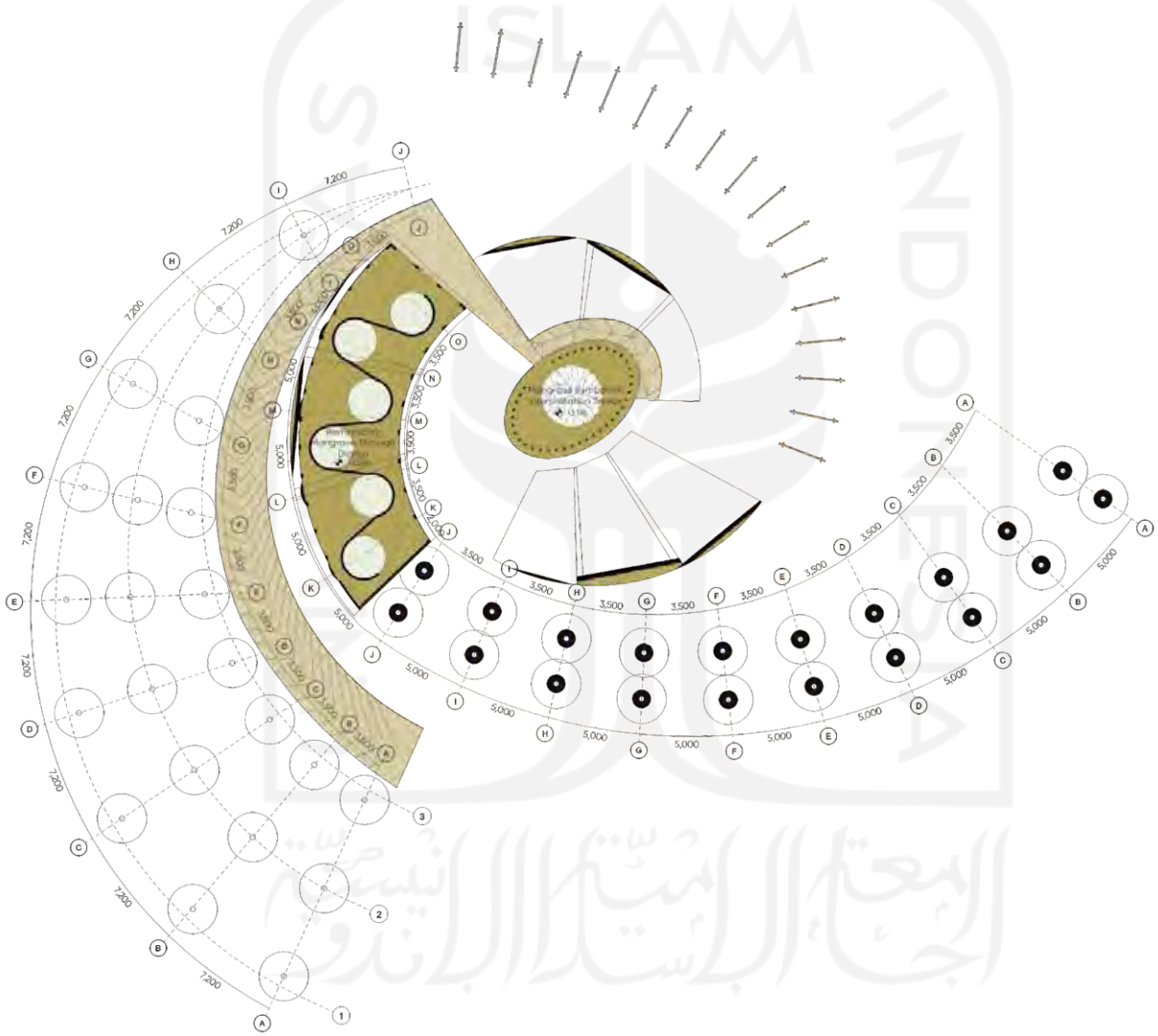
FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING | MANGROVE SANCTUARY HUB

PAGE

TEMATIC BOTANICAL GARDEN 1st FLOOR PLAN

Mangrove Sanctuary Hub



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TEMATIC BOTANICAL GARDEN 1st Split FLOOR PLAN

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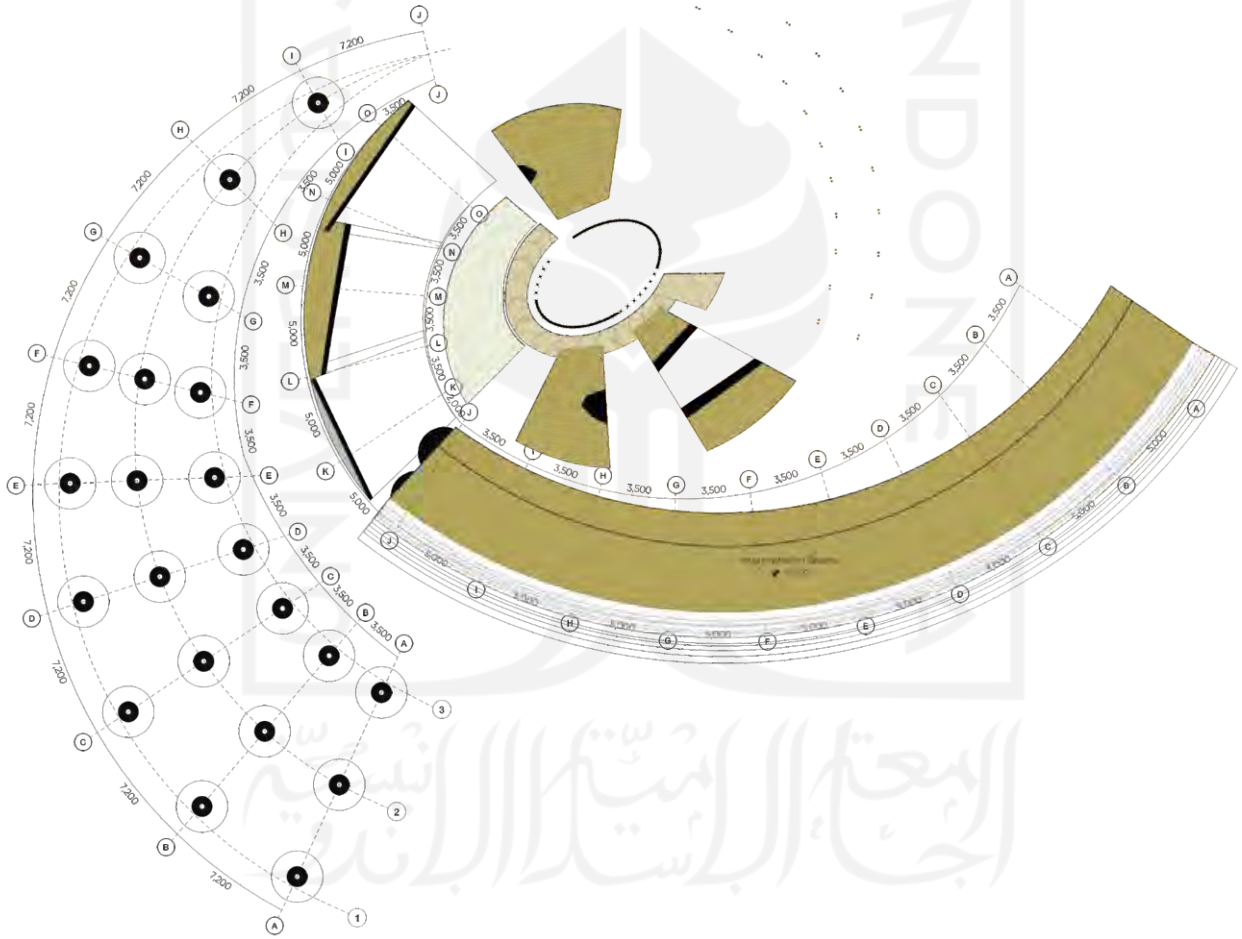

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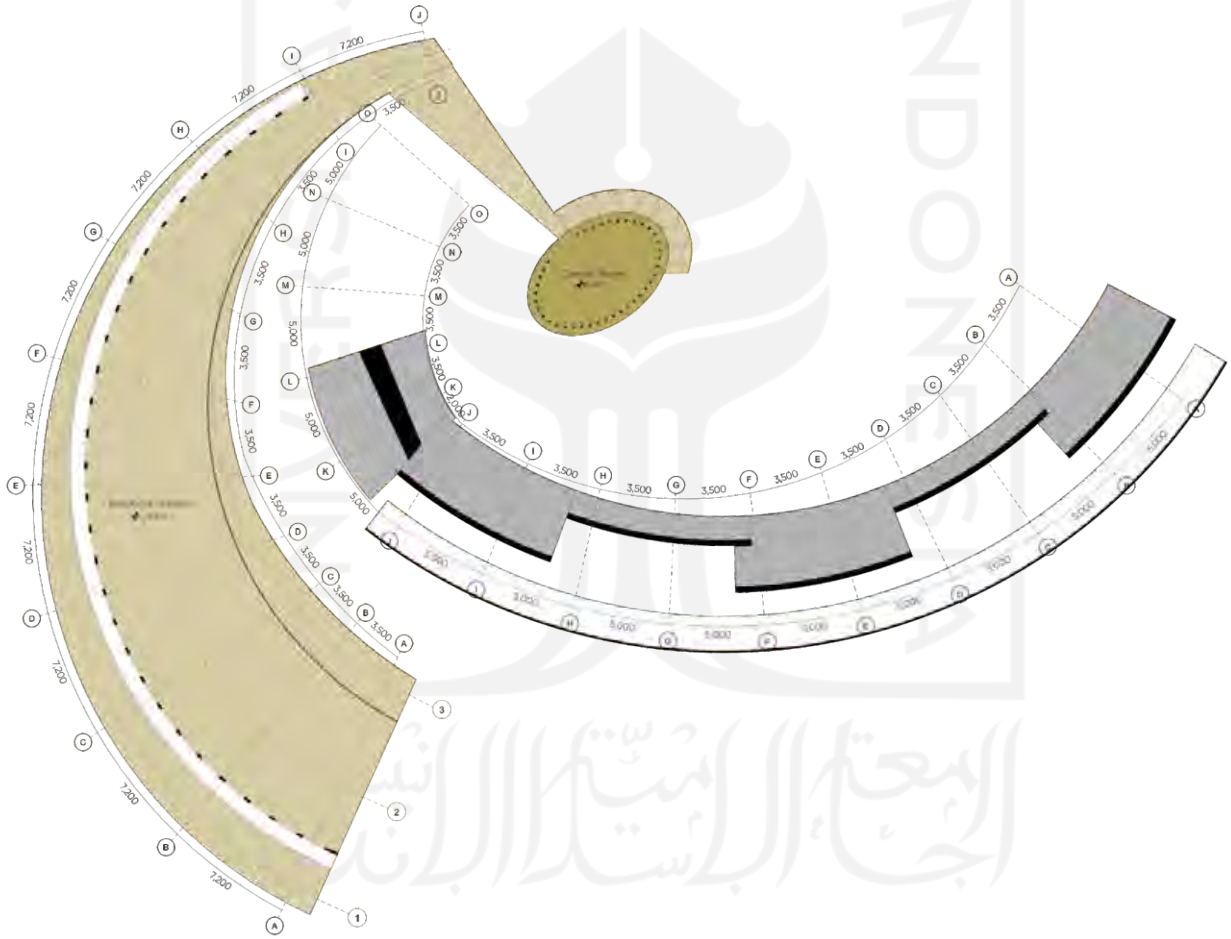
Jury 02	Dr-ing Putu Ayu P. Agustiananda, S. T, M. A
Date	

FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING | MANGROVE SANCTUARY HUB

PAGE

TEMATIC BOTANICAL GARDEN
2nd FLOOR PLAN

Mangrove Sanctuary Hub



Location	Mangrove Baros Conservation, Bantul, Yogyakarta Special Region
Drawing Title	Tematic Botanical Garden 2nd Floor Plan
Scale	1 : 500
Note	
Student Name	Shafira Satya Nurshanti
Student ID	18512025
Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
Jury 01	Prof. Noor Cholis Idham, ST., M. Arch., Ph. D
Jury 02	Dr-ing Putu Ayu P. Agustiananda, S. T, M. A
Date	

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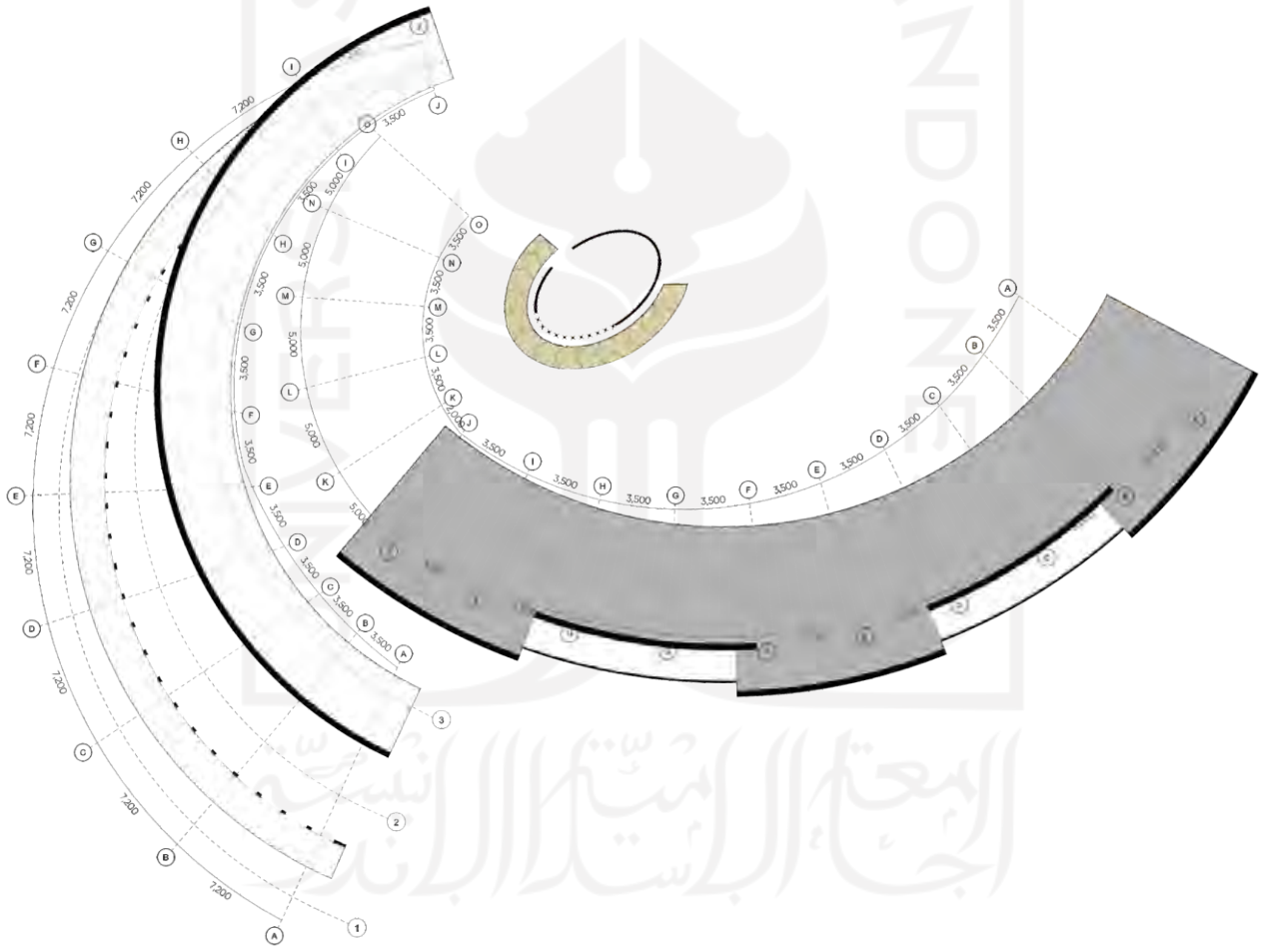
TEMATIC BOTANICAL GARDEN
2nd Split FLOOR PLAN

Mangrove Sanctuary Hub



Location	Mangrove Baros Conservation, Bantul, Yogyakarta Special Region
Drawing Title	Tematic Botanical Garden 2nd Split Floor Plan
Scale	1 : 500
Note	
Student Name	Shafira Satya Nurshanti
Student ID	18512025
Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
Jury 01	Prof. Noor Cholis Idham, ST., M. Arch., Ph. D
Jury 02	Dr-ing Putu Ayu P. Agustiananda, S. T, M. A
Date	

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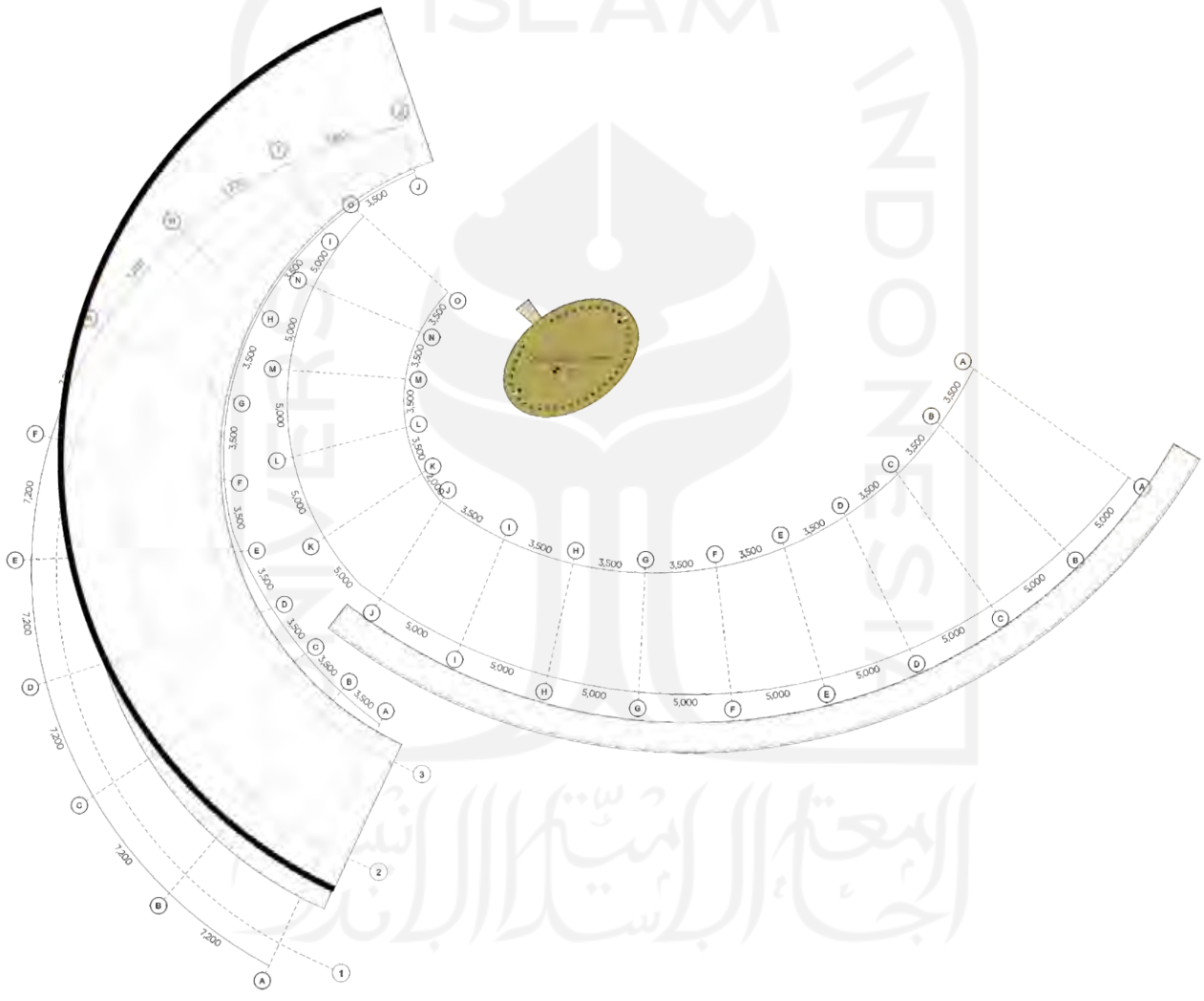
TEMATIC BOTANICAL GARDEN 3rd FLOOR PLAN

Mangrove Sanctuary Hub



Location	Mangrove Baros Conservation, Bantul, Yogyakarta Special Region
Drawing Title	Tematic Botanical Garden 3rd Floor Plan
Scale	1 : 500
Note	
Student Name	Shafira Satya Nurshanti
Student ID	18512025
Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
Jury 01	Prof. Noor Cholis Idham, ST., M. Arch., Ph. D
Jury 02	Dr-ing Putu Ayu P. Agustiananda, S. T, M. A
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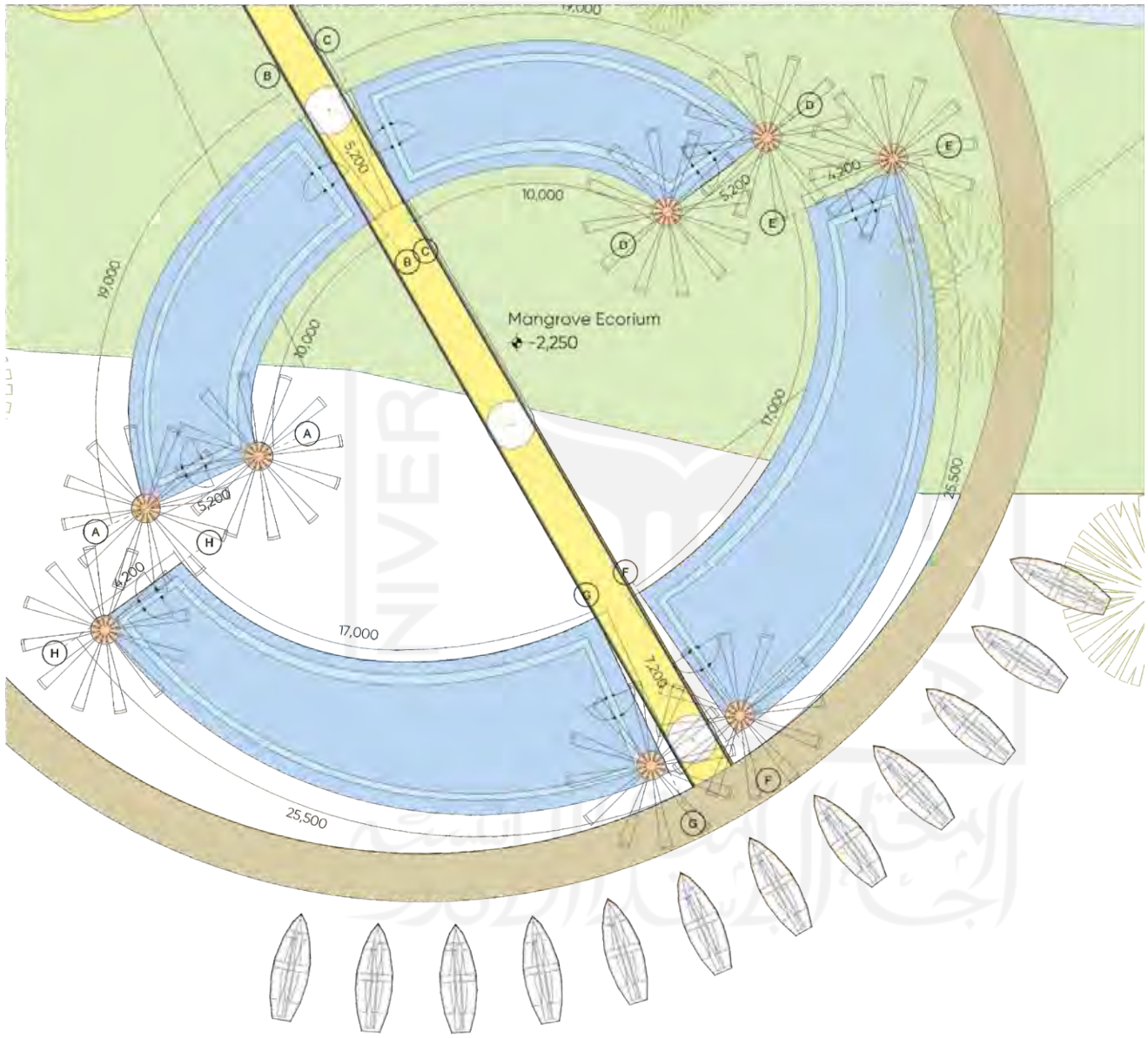
FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING | MANGROVE SANCTUARY HUB

MANGROVE ECORIUM Ground FLOOR PLAN

Mangrove Sanctuary Hub



Location	Mangrove Baros Conservation, Bantul, Yogyakarta Special Region
Drawing Title	Mangrove Ecorium Ground Floor Plan
Scale	1 : 500
Note	
Student Name	Shafira Satya Nurshanti
Student ID	18512025
Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
Jury 01	Prof. Noor Cholis Idham, ST., M. Arch., Ph. D
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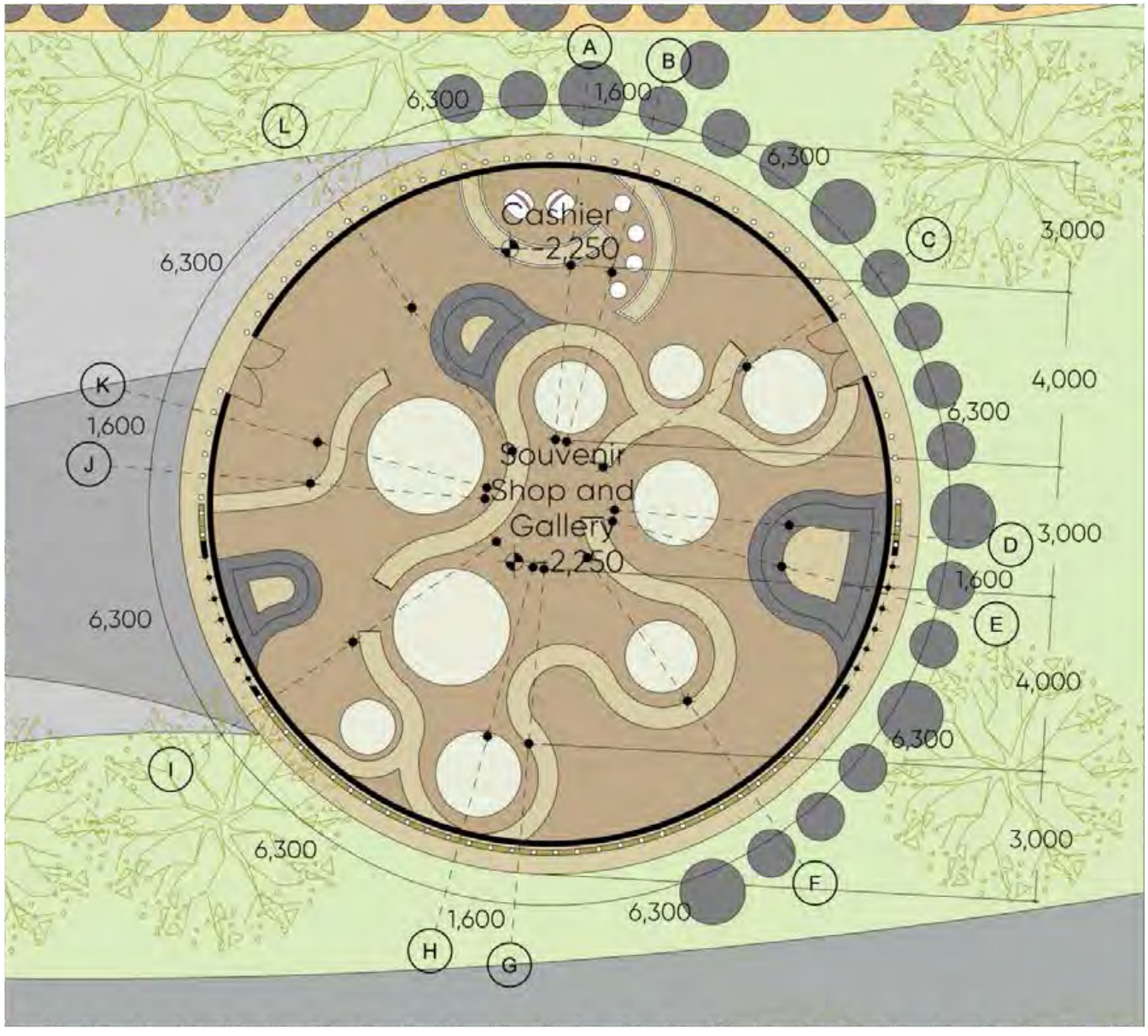
FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING | MANGROVE SANCTUARY HUB

SOUVENIR SHOP AND GALLERY
Ground FLOOR PLAN

Mangrove Sanctuary Hub



UNIVERSITAS ISLAM INDONESIA

Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Souvenir Shop and Gallery Ground Floor Plan

Scale

1 : 500

Note

Student Name

Shafira Satya Nurshanti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

Jury 02

Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

Date

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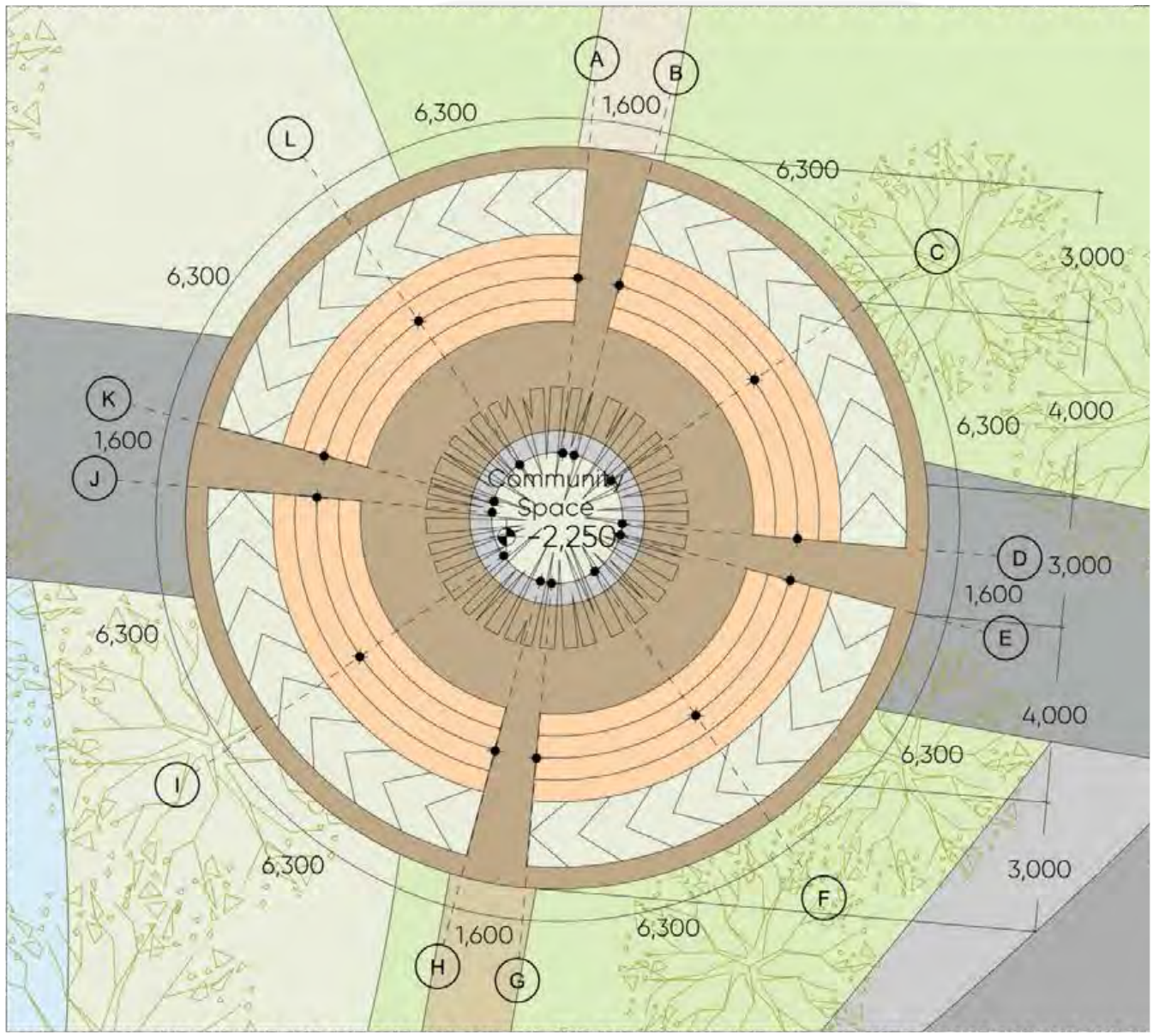
FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING | MANGROVE SANCTUARY HUB

COMMUNITY SPACE Ground FLOOR PLAN

Mangrove Sanctuary Hub



Location	Mangrove Baros Conservation, Bantul, Yogyakarta Special Region
Drawing Title	Community Space Ground Floor Plan
Scale	1 : 500
Note	
Student Name	Shafira Satya Nurshanti
Student ID	18512025
Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
Jury 01	Prof. Noor Cholis Idham, ST., M. Arch., Ph. D
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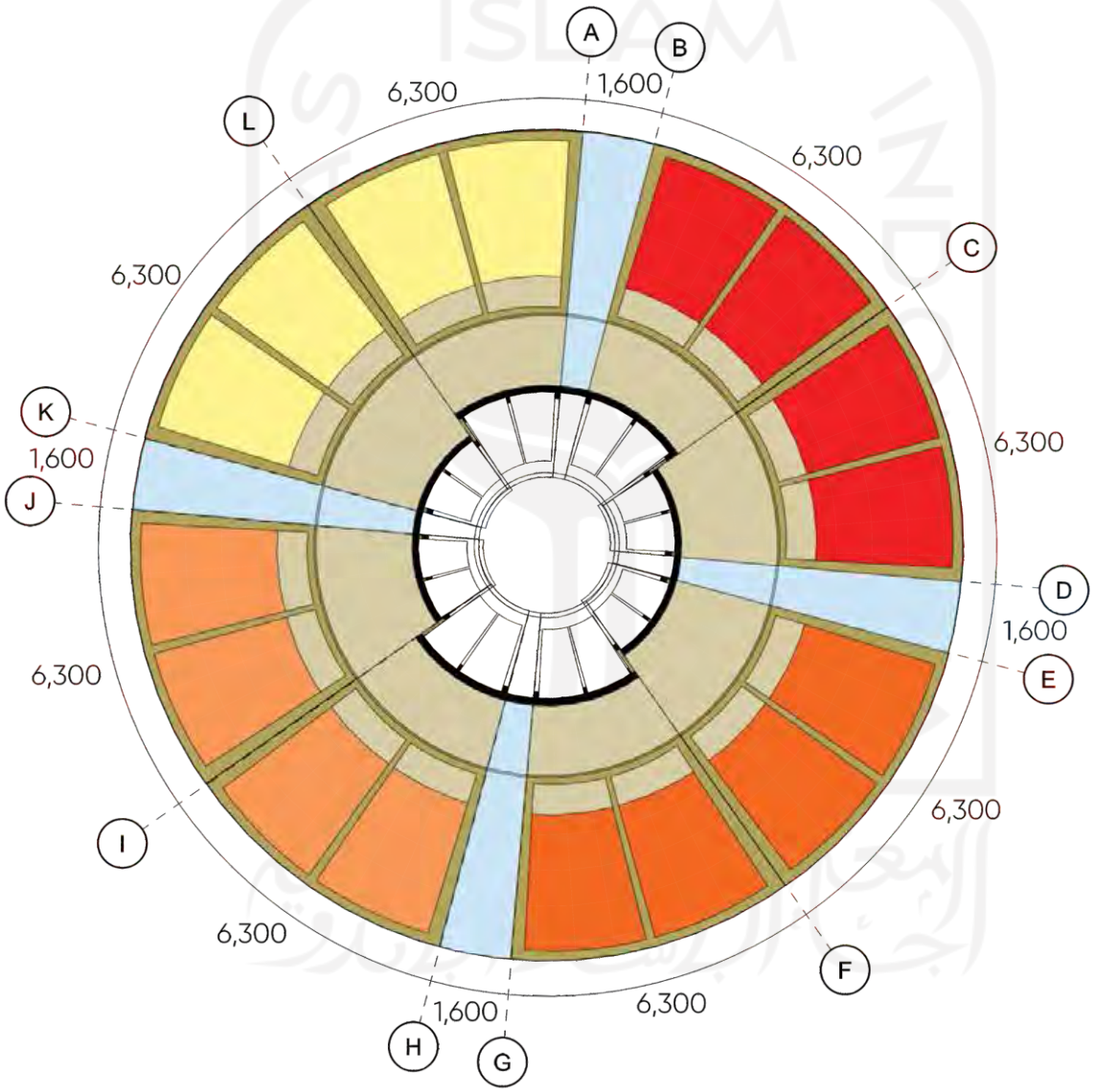
COMMUNITY SPACE, SOUVENIR SHOP, & GALLERY 1st Roof FLOOR PLAN

Mangrove Sanctuary Hub



Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Community Space, Souvenir Shop, & Gallery 1st Roof Floor Plan

Scale

1 : 500

Note

Student Name

Shafira Satya Nurshanti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

Jury 02

Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

Date

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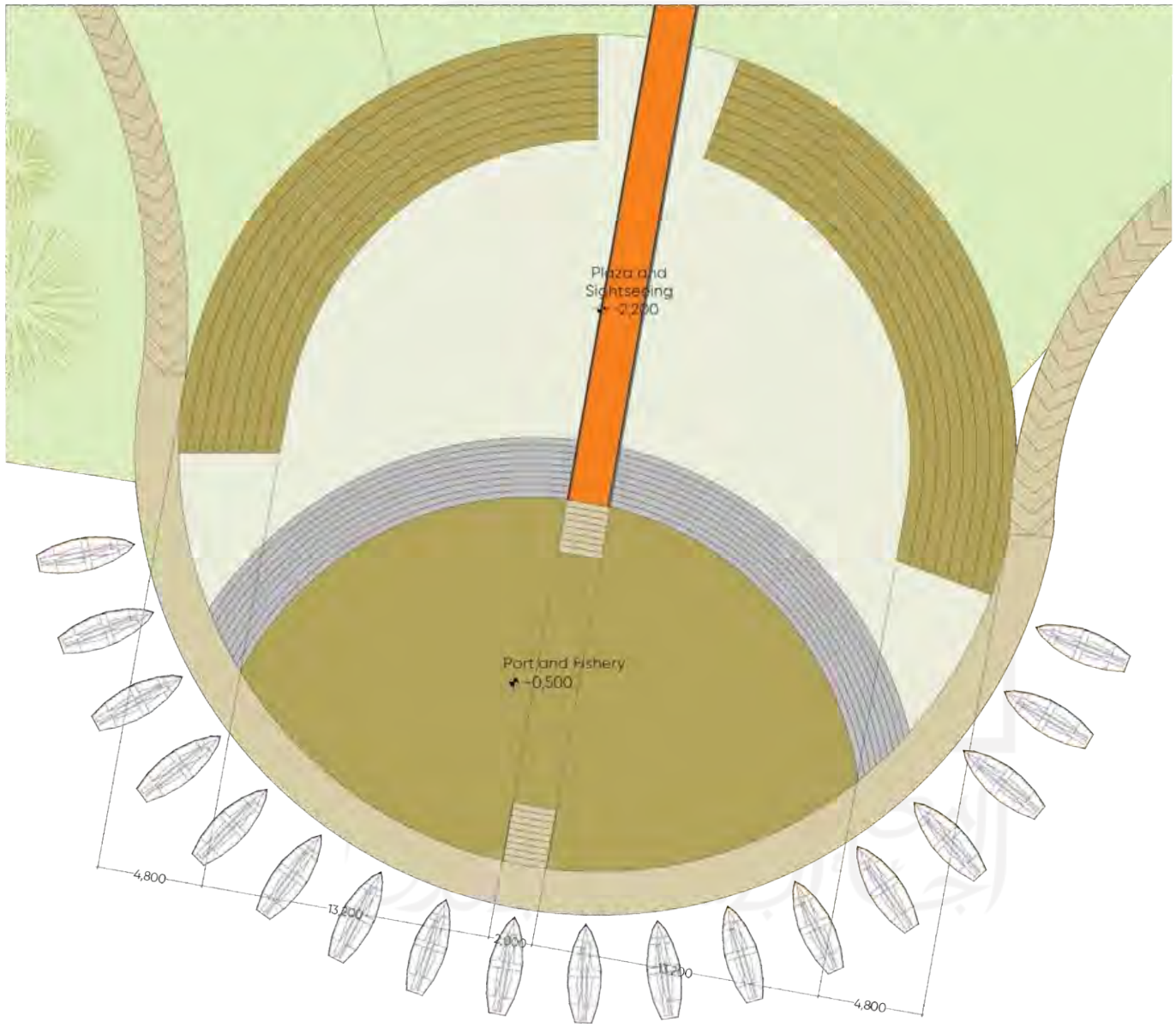
FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING | MANGROVE SANCTUARY HUB

PLAZA AND PORT

Mangrove Sanctuary Hub



Location	Mangrove Baros Conservation, Bantul, Yogyakarta Special Region
Drawing Title	Plaza and Port
Scale	1 : 500
Note	
Student Name	Shafira Satya Nurshanti
Student ID	18512025
Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
Jury 01	Prof. Noor Cholis Idham, ST., M. Arch., Ph. D
Jury 02	Dr-ing Putu Ayu P. Agustiananda, S. T, M. A
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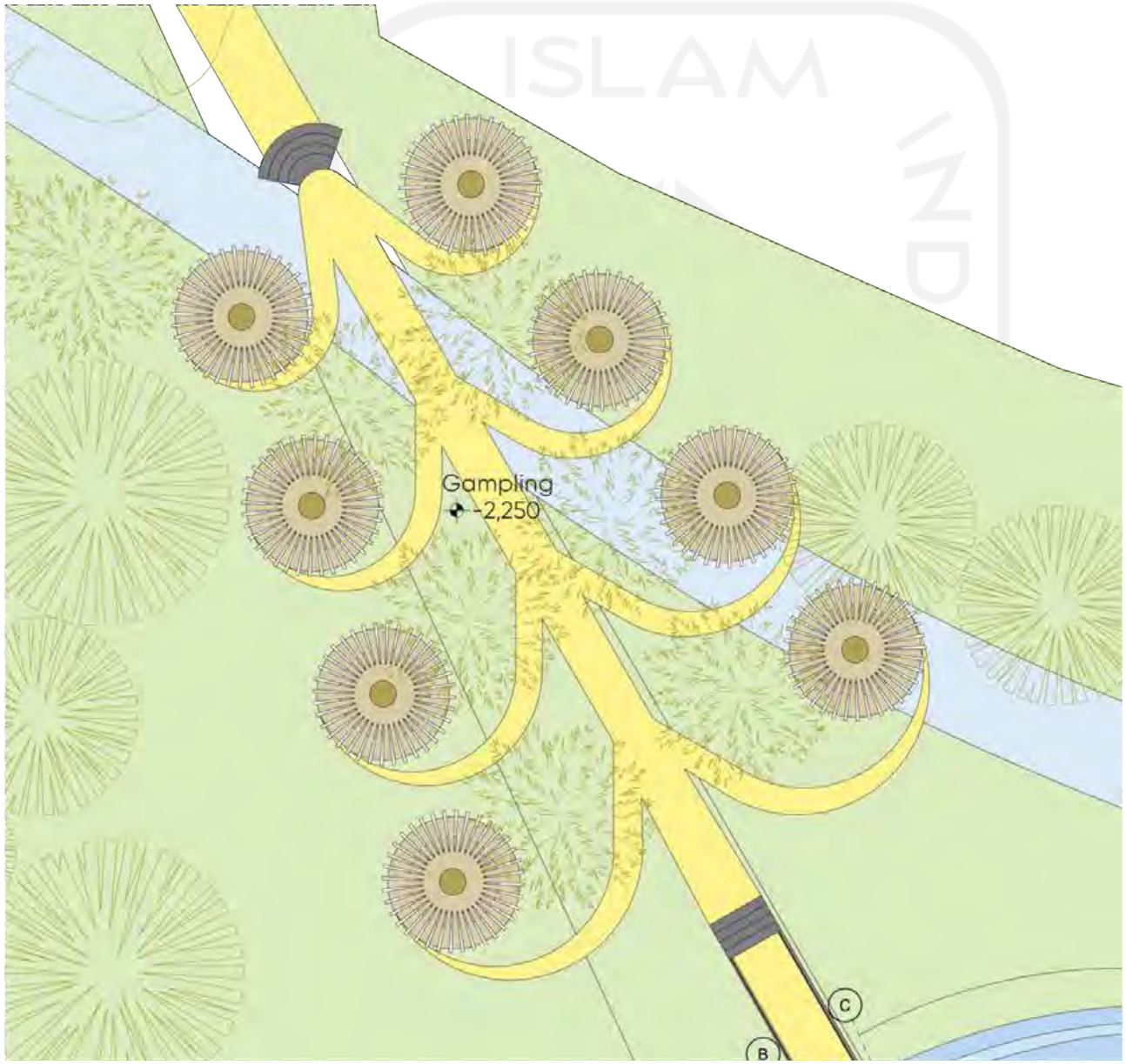
PAGE

GAMPLING

Mangrove Sanctuary Hub



ISLAM INDONESIA
UNIVERSITAS

Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Gampling

Scale

1 : 500

Note

Student Name

Shafira Satya Nurshanti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

Jury 02

Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

Date

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FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING | MANGROVE SANCTUARY HUB

NURSERY SOWING ELEVATION

Mangrove Sanctuary Hub

Location	Mangrove Baros Conservation, Bantul, Yogyakarta Special Region
Drawing Title	Nursery Sowing Elevation
Scale	1 : 300
Note	
Student Name	Shafira Satya Nurshanti
Student ID	18512025
Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
Jury 01	Prof. Noor Cholis Idham, ST., M. Arch., Ph. D
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FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING | MANGROVE SANCTUARY HUB

PAGE

NURSERY WEANING ELEVATION

Mangrove Sanctuary Hub

Location	Mangrove Baros Conservation, Bantul, Yogyakarta Special Region
Drawing Title	Nursery Weaning Elevation
Scale	1 : 300
Note	
Student Name	Shafira Satya Nurshanti
Student ID	18512025
Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
Jury 01	Prof. Noor Cholis Idham, ST., M. Arch., Ph. D
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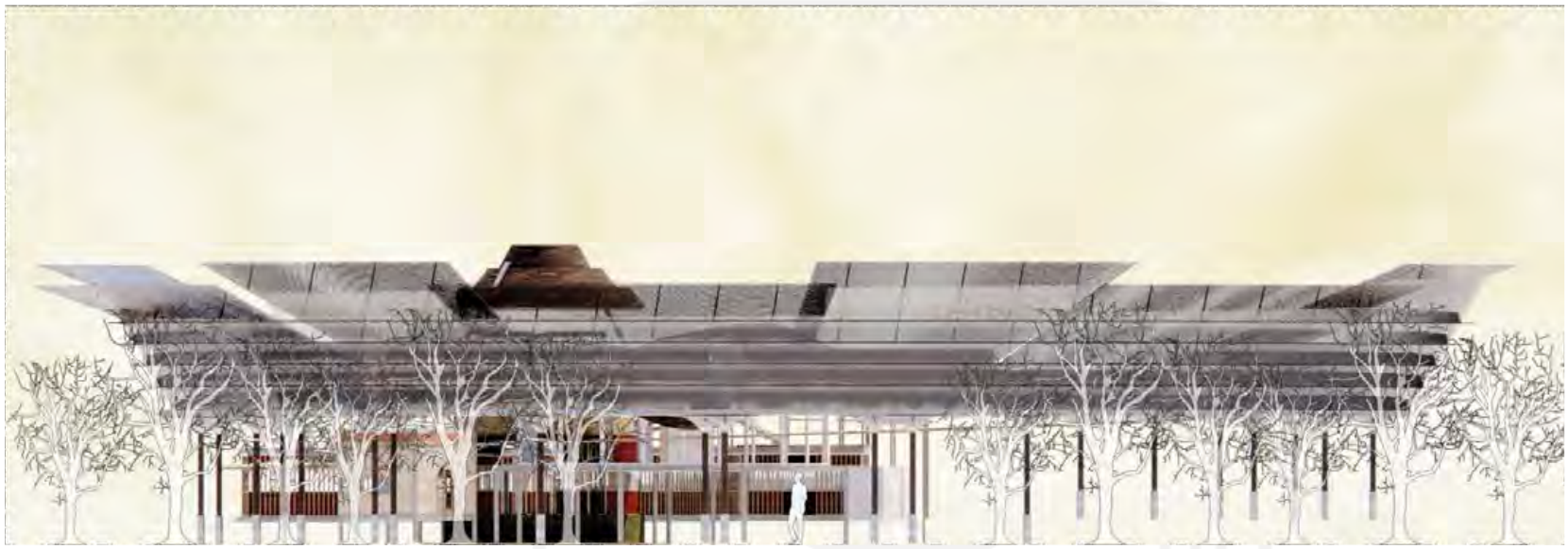
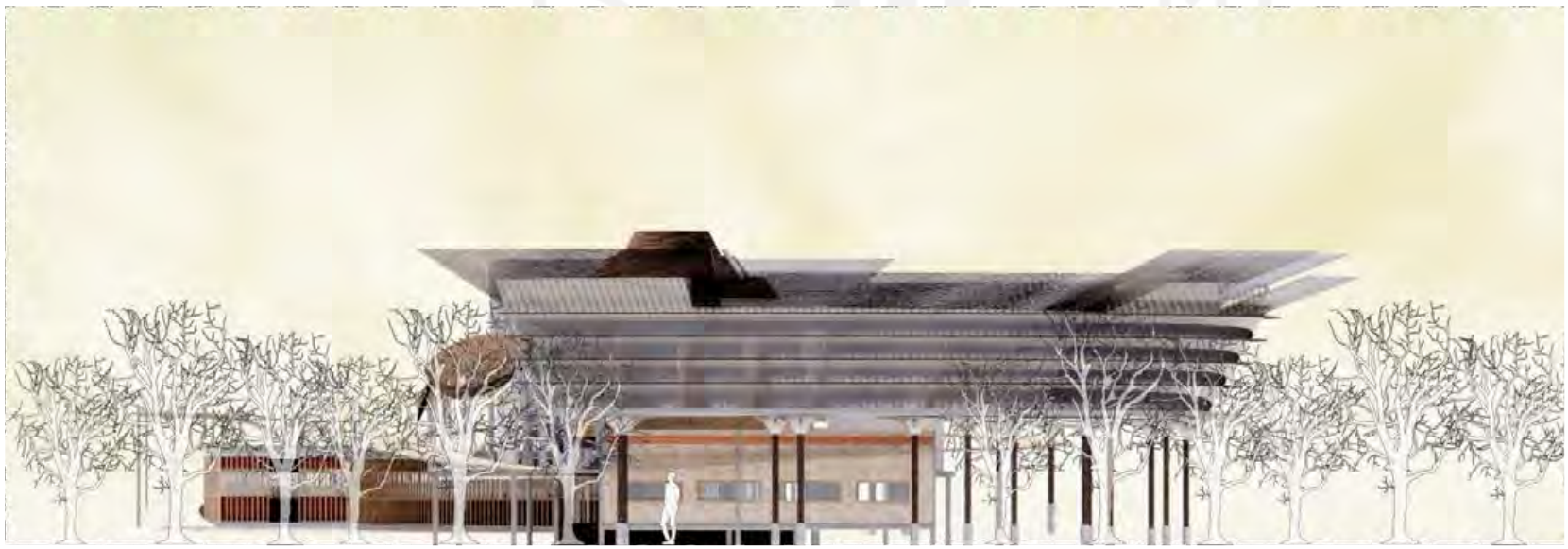
PAGE

MANGROVE LABORATORY ELEVATION

Mangrove Sanctuary Hub





Location	Mangrove Baros Conservation, Bantul, Yogyakarta Special Region
Drawing Title	Mangrove Laboratory Elevation
Scale	1 : 300
Note	
Student Name	Shafira Satya Nurshanti
Student ID	18512025
Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
Jury 01	Prof. Noor Cholis Idham, ST., M. Arch., Ph. D
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PAGE

MANGROVE LABORATORY ELEVATION

Mangrove Sanctuary Hub

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Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Mangrove Laboratory Elevation

Scale

1 : 300

Note

Student Name

Shafira Satya Nurshanti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

Jury 02

Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

Date

FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING | MANGROVE SANCTUARY HUB

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TEMATIC BOTANICAL AND INTERPRETATION SPACE ELEVATION

Mangrove Sanctuary Hub

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Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Tematic Botanical Garden and Interpretation Space Elevation

Scale

1 : 300

Note

Student Name

Shafira Satya Nurshanti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

Jury 02

Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

Date

PAGE

TEMATIC BOTANICAL AND INTERPRETATION SPACE ELEVATION

Mangrove Sanctuary Hub

Location	Mangrove Baros Conservation, Bantul, Yogyakarta Special Region
Drawing Title	Tematic Botanical Garden and Interpretation Space Elevation
Scale	1 : 300
Note	
Student Name	Shafira Satya Nurshanti
Student ID	18512025
Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
Jury 01	Prof. Noor Cholis Idham, ST., M. Arch., Ph. D
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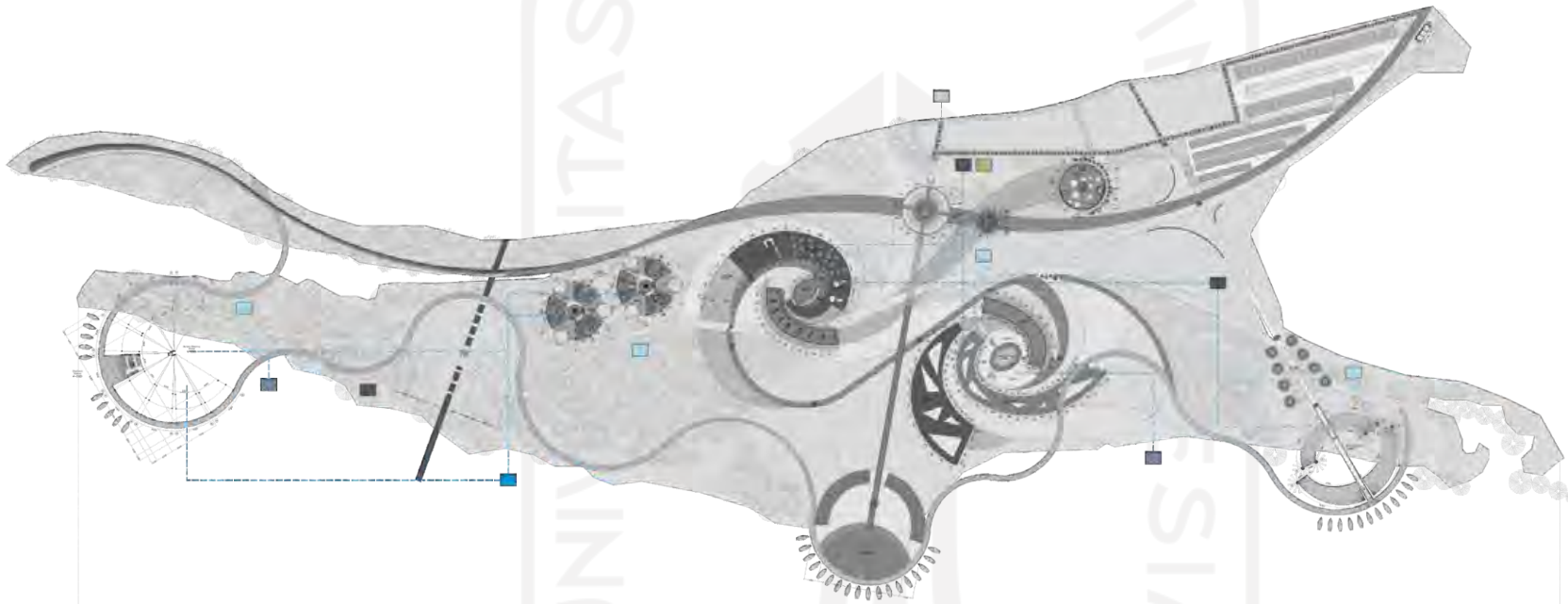
Date	
PAGE	

FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING | MANGROVE SANCTUARY HUB

WATER DISTRIBUTION PLAN

Mangrove Sanctuary Hub



- PDAM
- Infiltration Well
- Brakish Water
- Fresh Water
- Ground Water Tank
- Septic Tank
- Clean Water
- Waste Water

Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Water Distribution Scheme Plan

Scale

1 : 1000

Note

Student Name

Shafira Satya Nurshanti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

Jury 02

Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

Date

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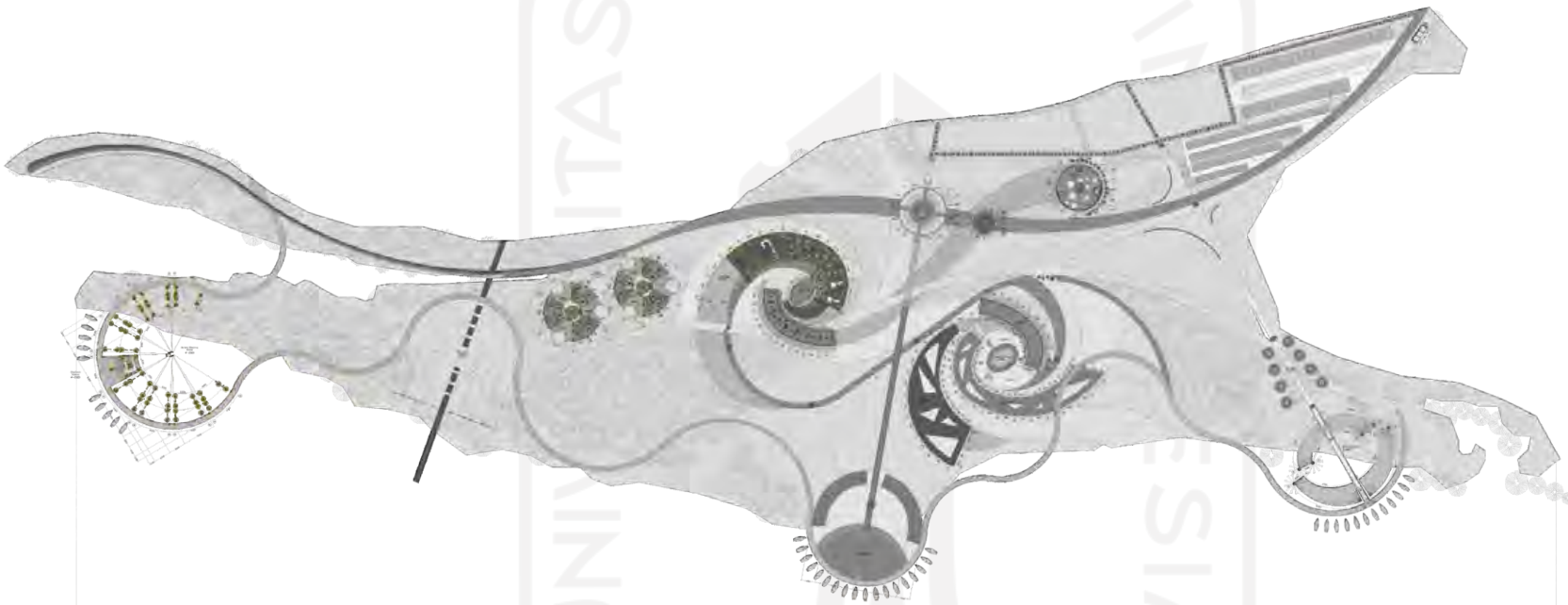
FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING | MANGROVE SANCTUARY HUB

LAMP POINT ELECTRICAL PLAN (ARTIFICIAL LIGHTING)

Mangrove Sanctuary Hub



Warm Lamp Point

Lamp Scheme

Location	Mangrove Baros Conservation, Bantul, Yogyakarta Special Region
Drawing Title	Lamp Point Electrical Plan (Artificial Lighting)
Scale	1 : 1000
Note	
Student Name	Shafira Satya Nurshanti
Student ID	18512025
Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
Jury 01	Prof. Noor Cholis Idham, ST., M. Arch., Ph. D
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Date	
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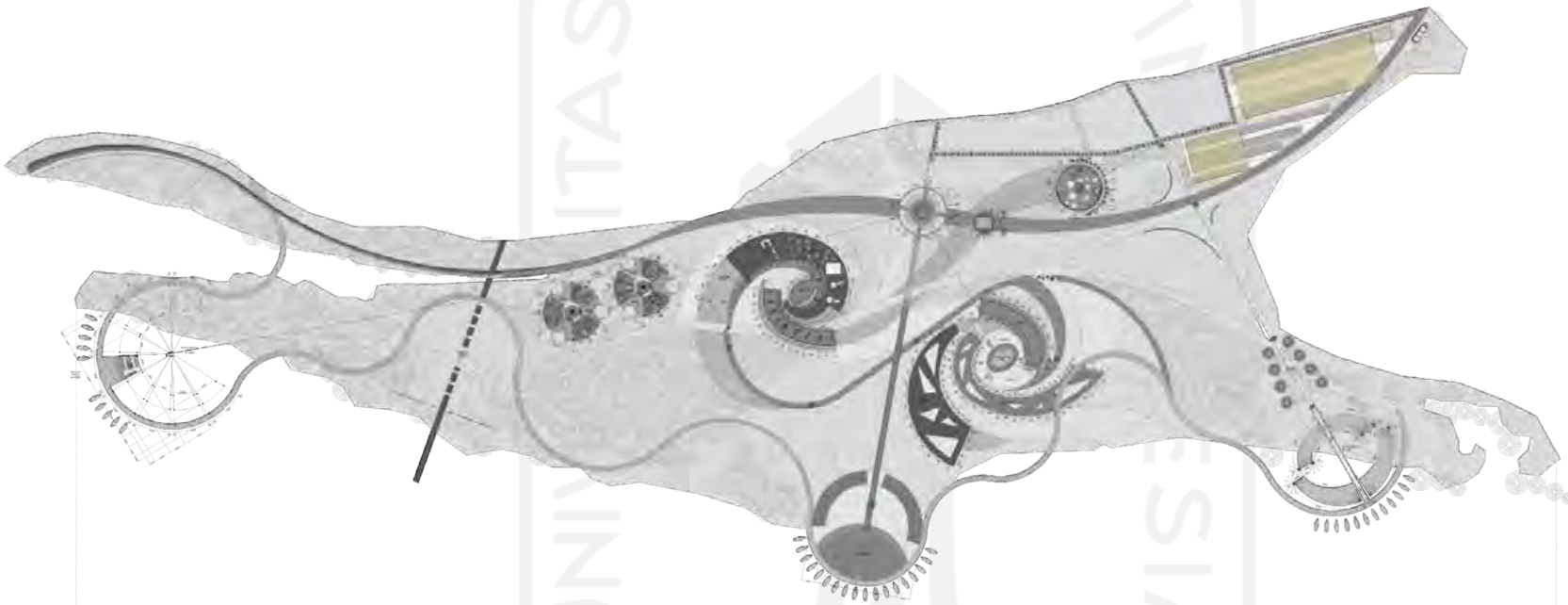
FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING | MANGROVE SANCTUARY HUB

BARRIER FREE DESIGN PLAN

Mangrove Sanctuary Hub



510,000

- Diffable Toilet
- Diffable Parking
- Public Parking
- Service Accessible
- Universal Accessible
- Ramp Circulation

Location
Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title
Barrier Free Design Plan

Scale
1 : 1000

Note

Student Name
Shafira Satya Nurshanti

Student ID
18512025

Supervisor
Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01
Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

Jury 02
Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

Date

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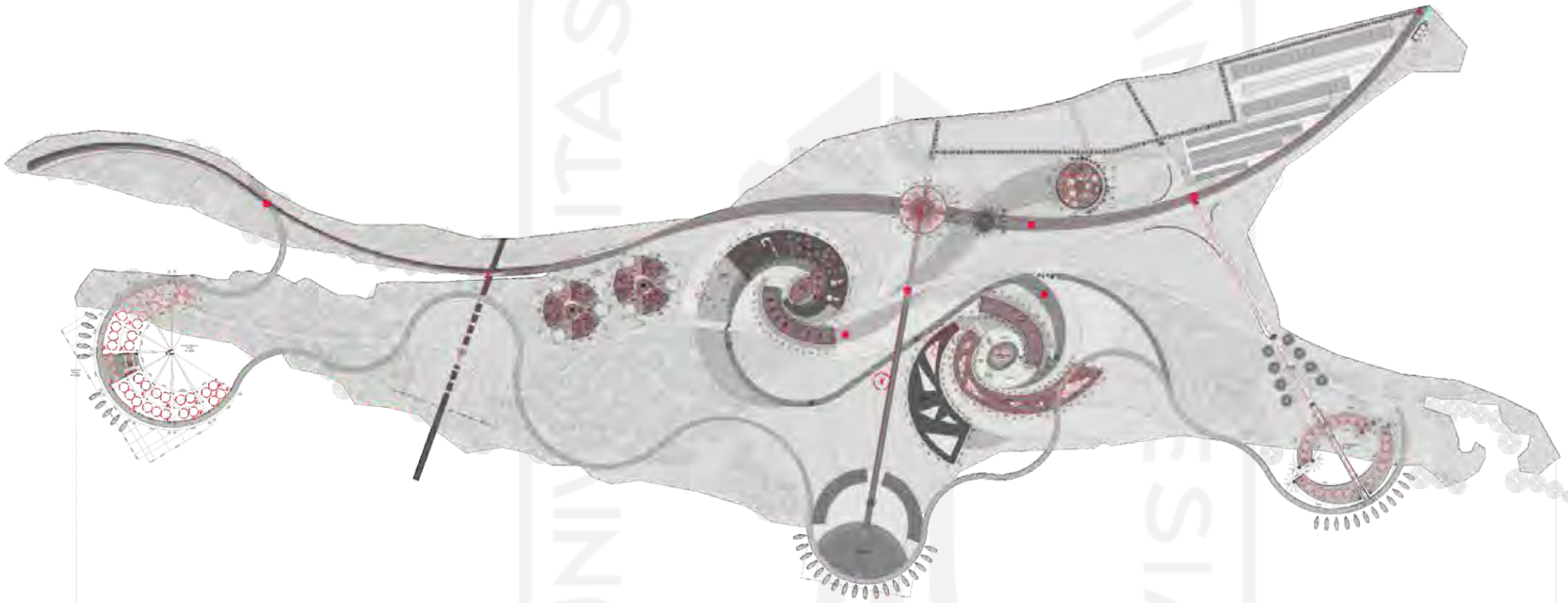
FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING | MANGROVE SANCTUARY HUB

FIRE PROTECTION AND EVACUATION PLAN

Mangrove Sanctuary Hub



510,000

- APAR
- Meeting Point
- Sprinkler
- Evacuation Route Fire Truck

UNIVERSITAS ISLAM INDONESIA

Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Fire Protection and Evacuation Plan

Scale

1 : 1000

Note

Student Name

Shafira Satya Nurshanti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

Jury 02

Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

Date

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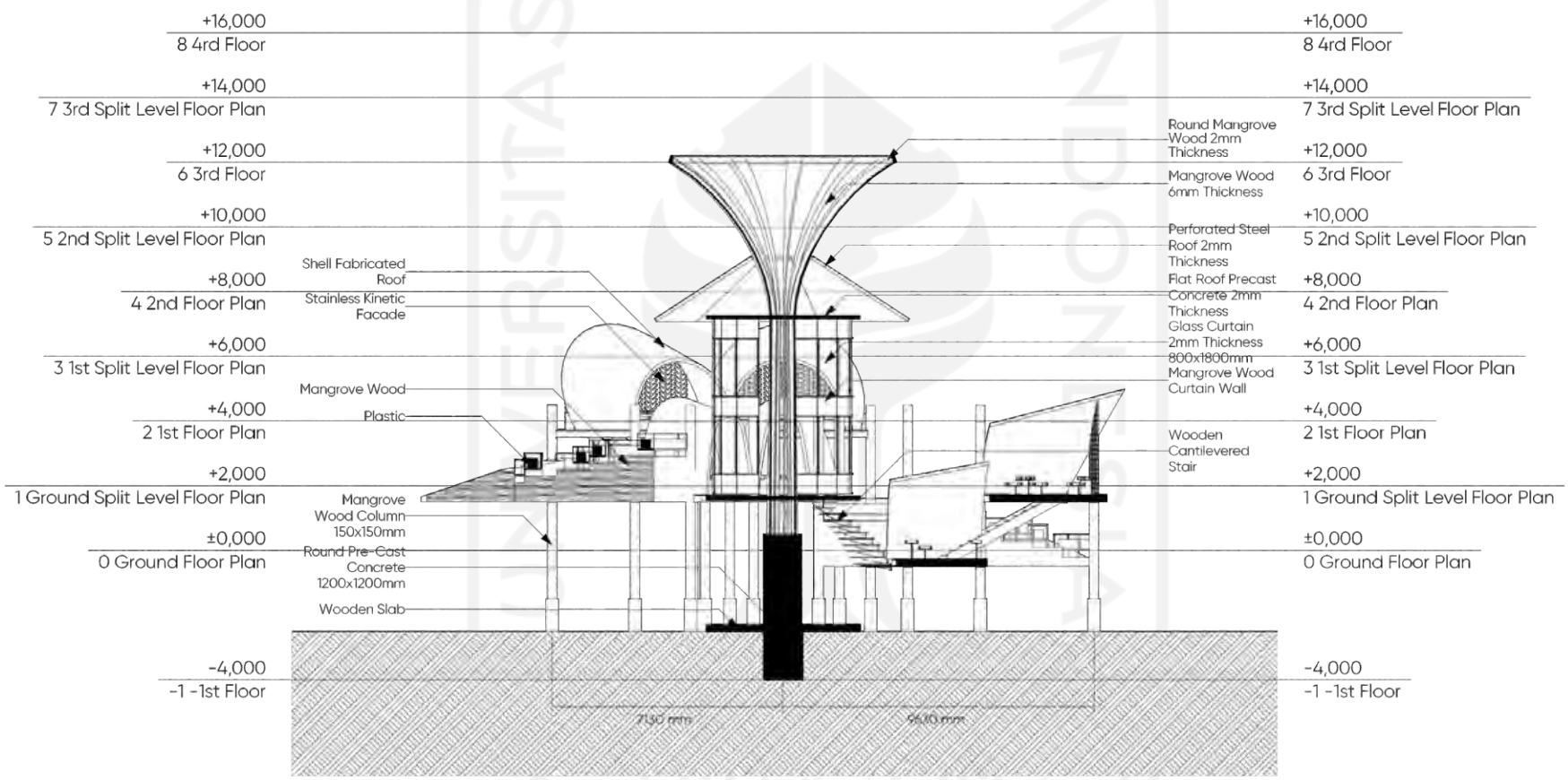
NURSERY SOWING SECTION AA'

Mangrove Sanctuary Hub



Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Nursery Sowing Section AA'

Scale

1 : 100

Note

Student Name

Shafira Satya Nursharti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

Jury 02

Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

Date

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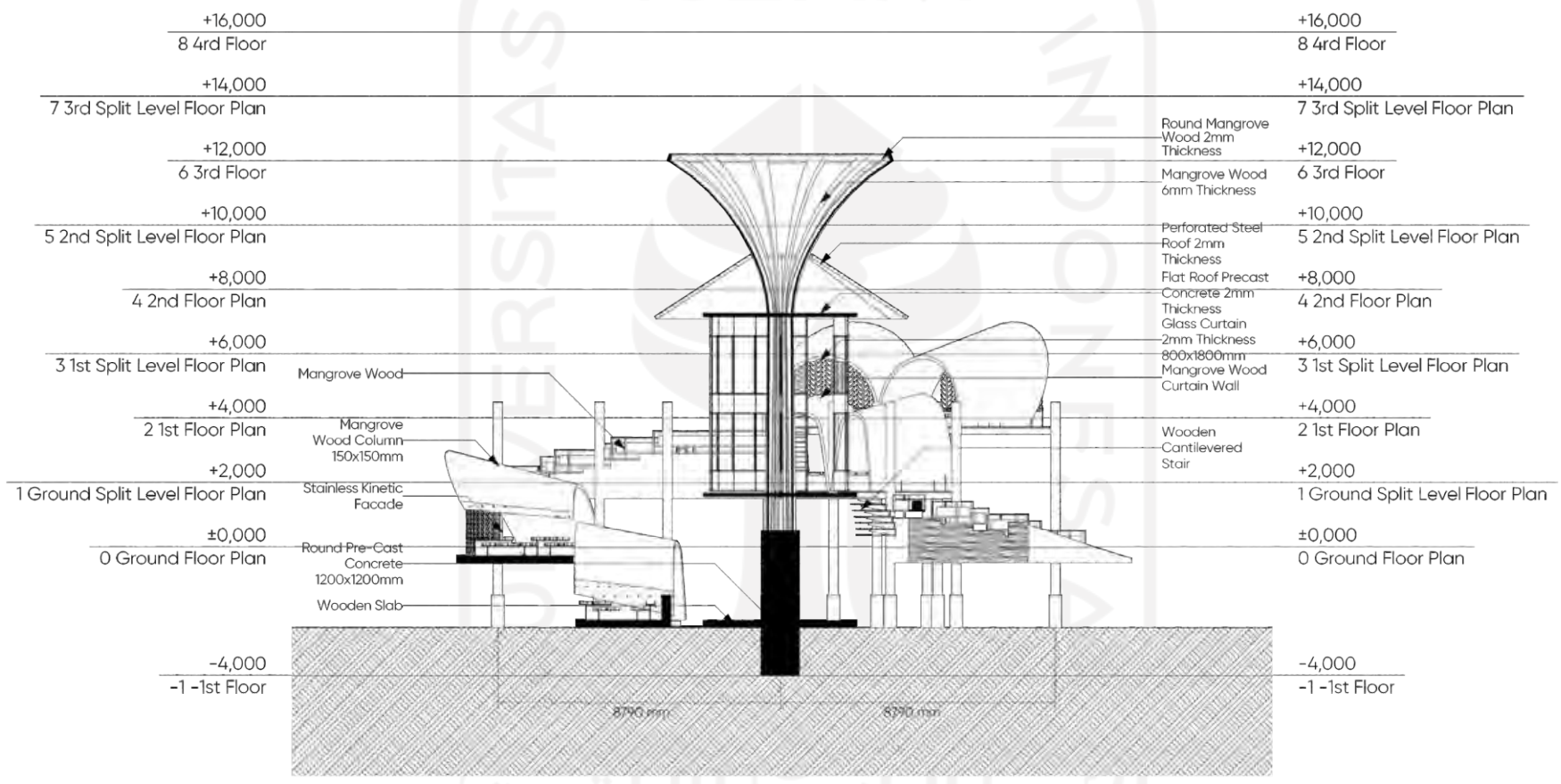
MANGROVE SANCTUARY HUB | FACULTY OF CIVIL ENGINEERING AND PLANNING | INTERNATIONAL BACHELOR PROGRAM | FINAL ARCHITECTURAL DESIGN STUDIO

NURSERY SOWING SECTION BB'

Mangrove Sanctuary Hub



Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Nursery Sowing Section BB'

Scale

1 : 100

Note

Student Name

Shafira Satya Nurshanti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

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Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

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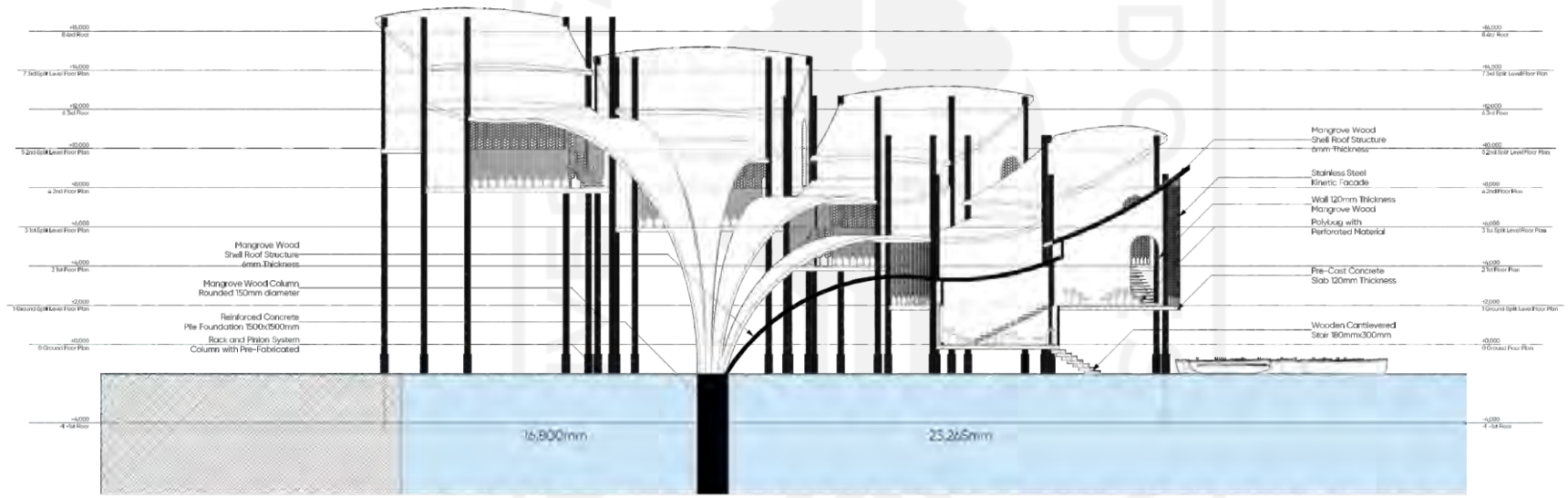
FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING | MANGROVE SANCTUARY HUB

NURSERY WEANING SECTION AA'

Mangrove Sanctuary Hub



Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Nursery Weaning Section AA'

Scale

1 : 200

Note

Student Name

Shafira Satya Nurshanti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

Jury 02

Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

Date

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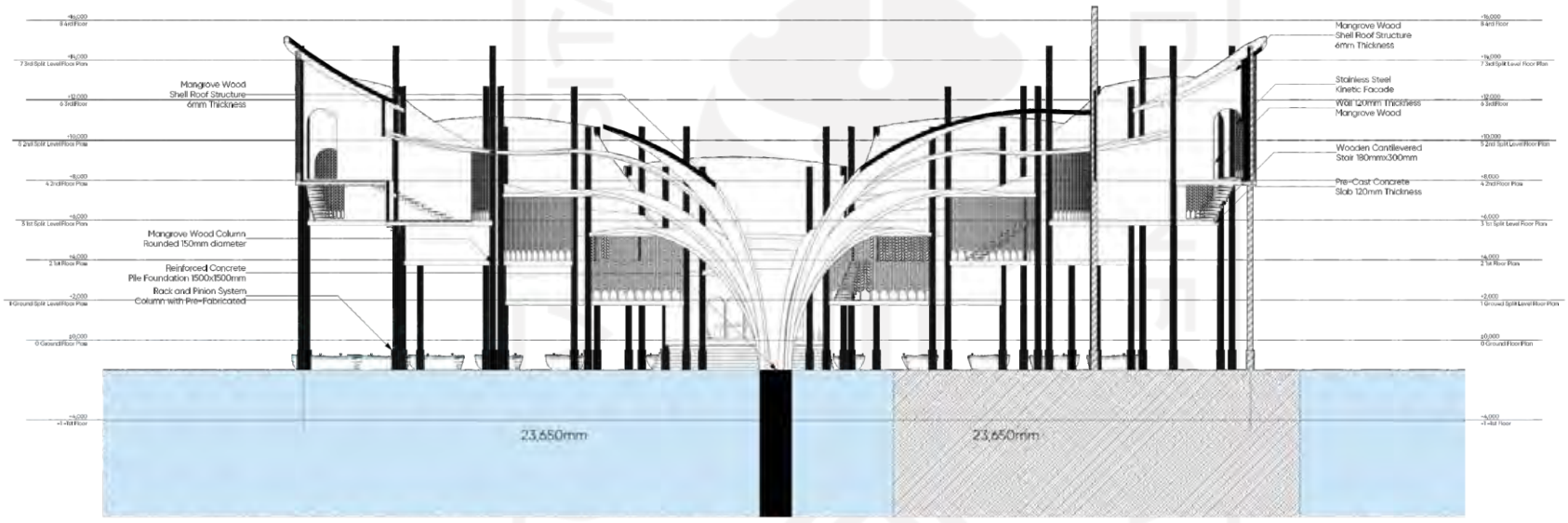
FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING | MANGROVE SANCTUARY HUB

NURSERY WEANING SECTION BB'

Mangrove Sanctuary Hub



Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Nursery Weaning Section BB'

Scale

1 : 200

Note

Student Name

Shafira Satya Nurshanti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

Jury 02

Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

Date

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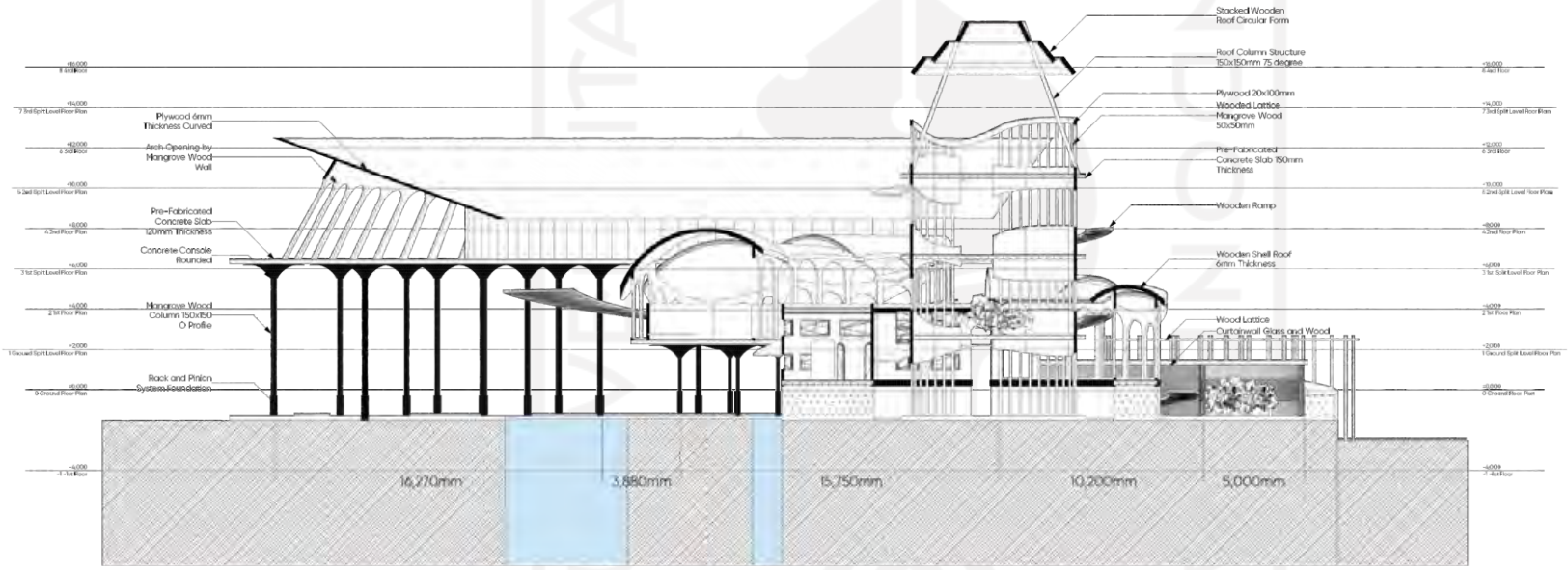
MANGROVE SANCTUARY HUB | FINAL ARCHITECTURAL DESIGN STUDIO | INTERNATIONAL BACHELOR PROGRAM | FACULTY OF CIVIL ENGINEERING AND PLANNING

TEMATIC BOTANICAL GARDEN AND INTERPRETATION SPACE SECTION AA'

Mangrove Sanctuary Hub



Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Tematic Botanical Garden and Interpretation Space Section AA'

Scale

1 : 200

Note

Student Name

Shafira Satya Nurshanti

Student ID

18512025

Supervisor

Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.

Jury 01

Prof. Noor Cholis Idham, ST., M. Arch., Ph. D

Jury 02

Dr-ing Putu Ayu P. Agustiananda, S. T, M. A

Date

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TEMATIC BOTANICAL GARDEN AND INTERPRETATION SPACE SECTION BB'

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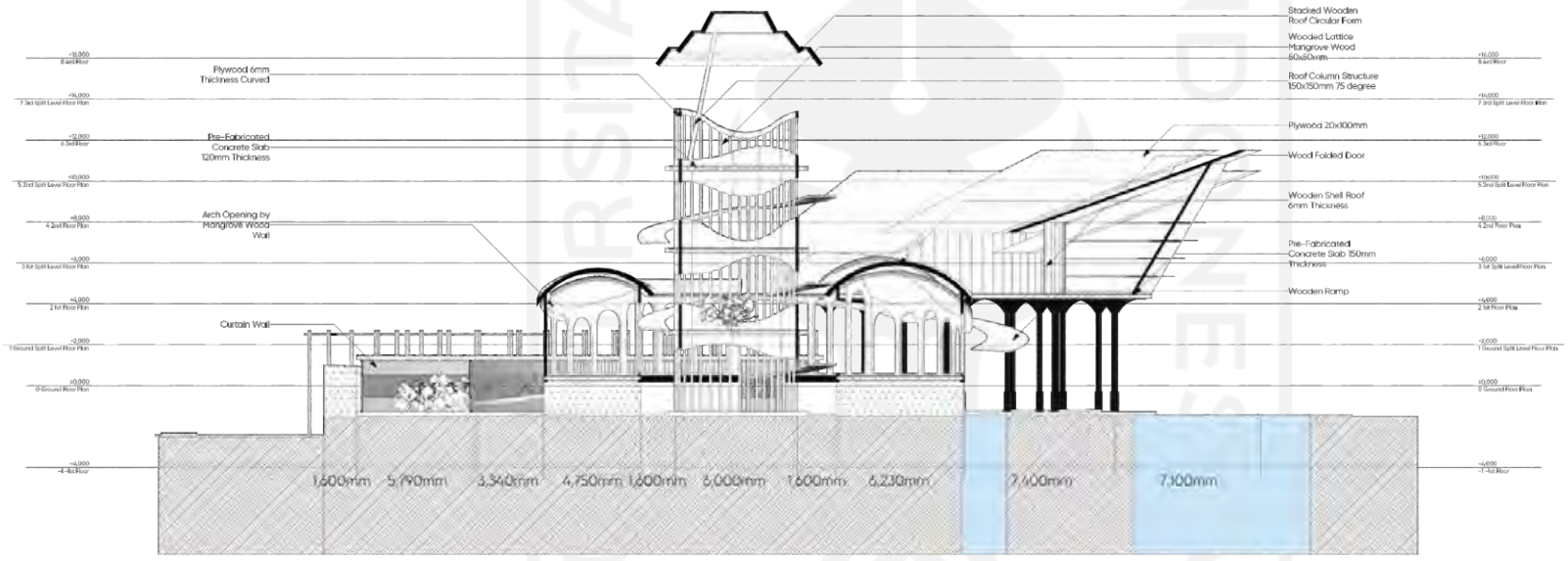

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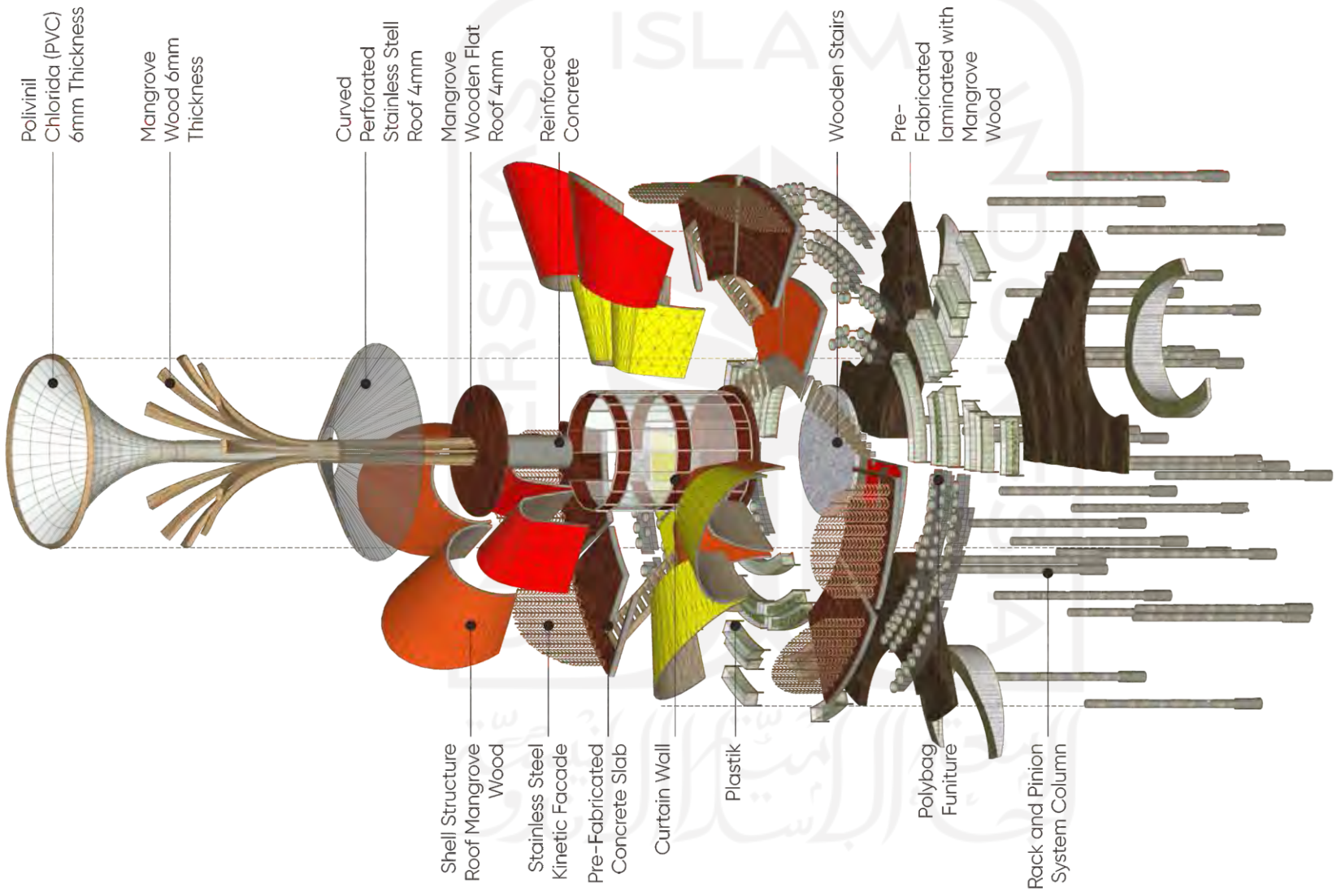
SOWING NURSERY EXPLODED AXONOMETRY

Mangrove Sanctuary Hub



Location	Mangrove Baros Conservation, Bantul, Yogyakarta Special Region
Drawing Title	Sowing Nursery Exploded Axonometry
Scale	
Note	
Student Name	Shafira Satya Nurshanti
Student ID	18512025
Supervisor	Dr. Yulianto P. Prihatmaji, ST., MT., IPM, IAI.
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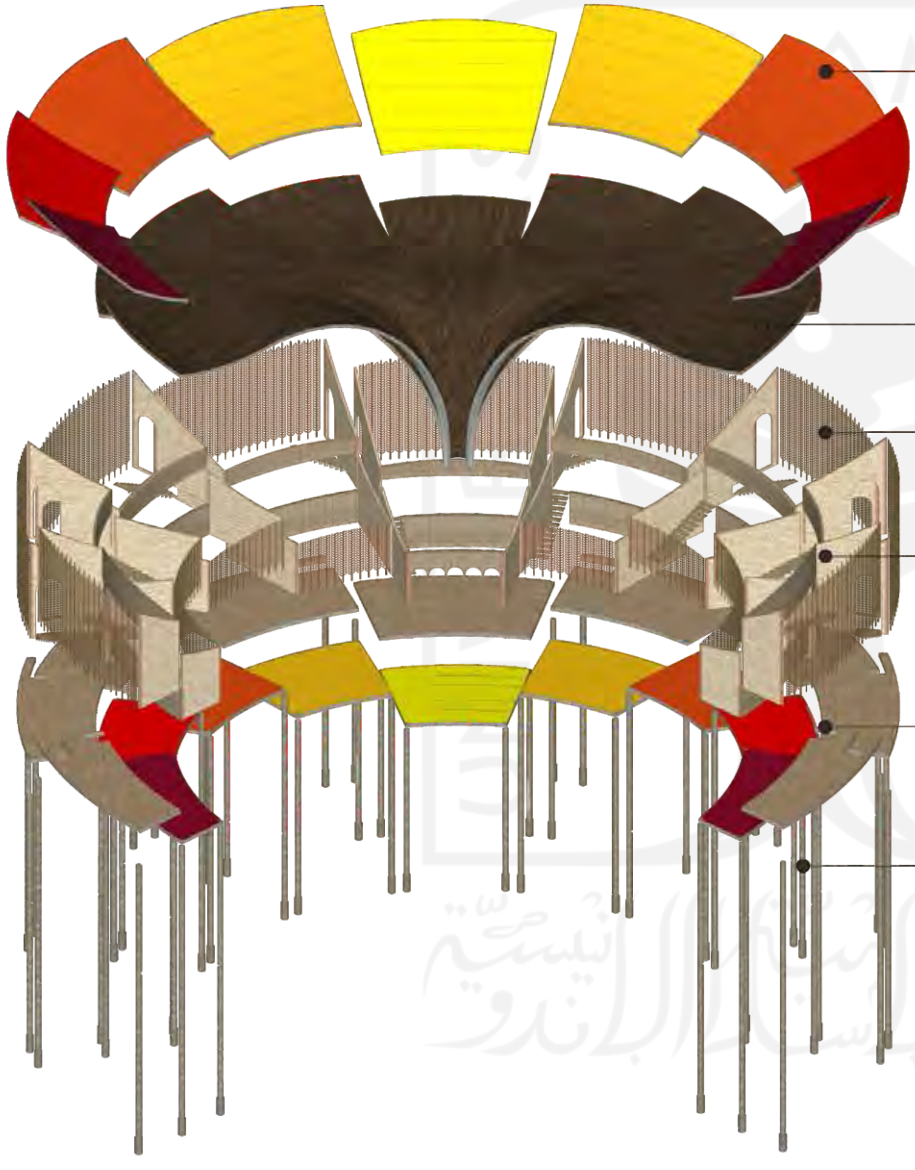
PAGE

WEANING NURSERY
EXPLODED AXONOMETRY

Mangrove Sanctuary Hub



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Drawing Title
Weaning Nursery Exploded Axonometry

Scale

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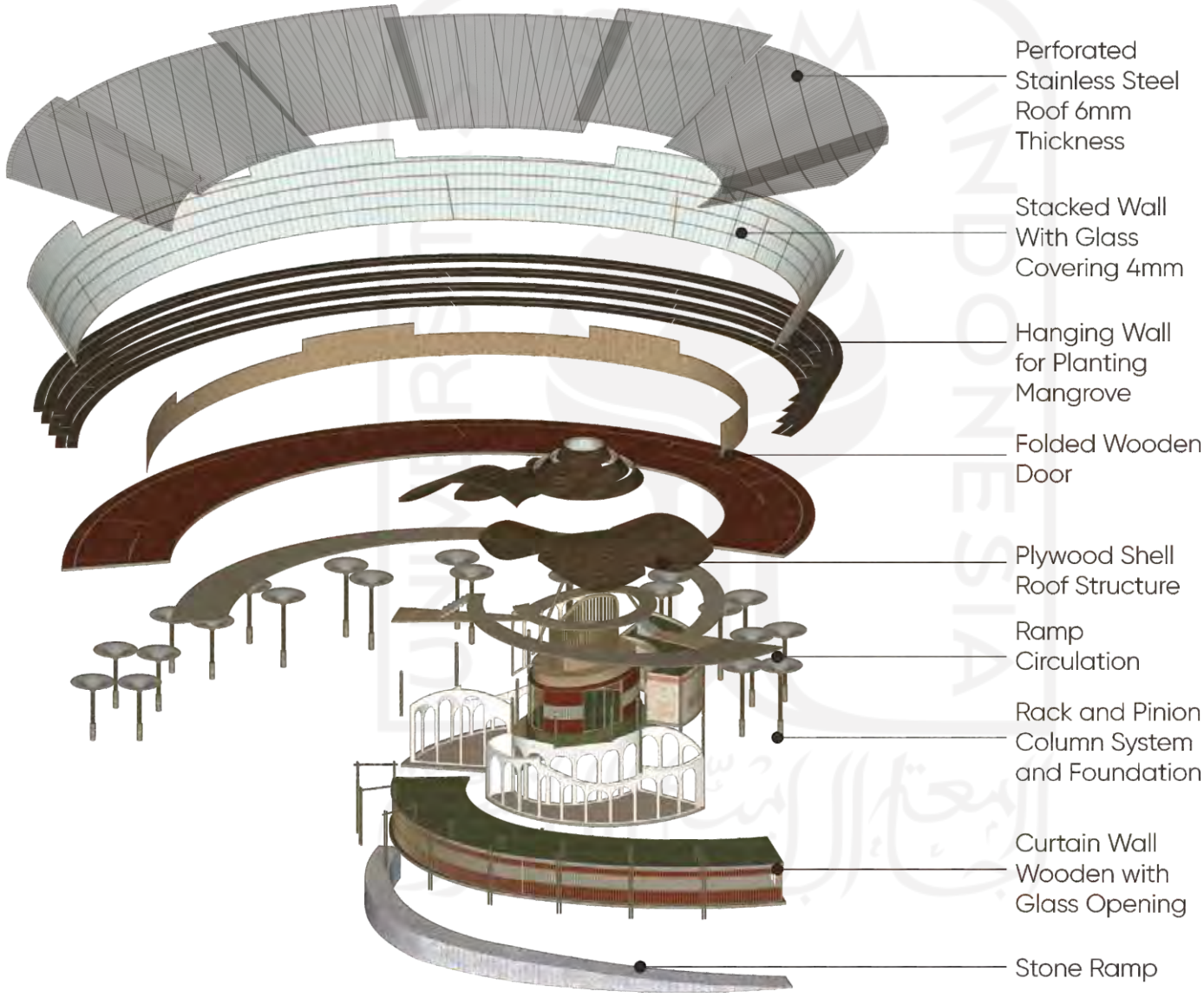
LABORATORY
EXPLODED AXONOMETRY

Mangrove Sanctuary Hub



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Drawing Title
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EXTERIOR PERSPECTIVE

Mangrove Sanctuary Hub

Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Exterior Perspective

Scale

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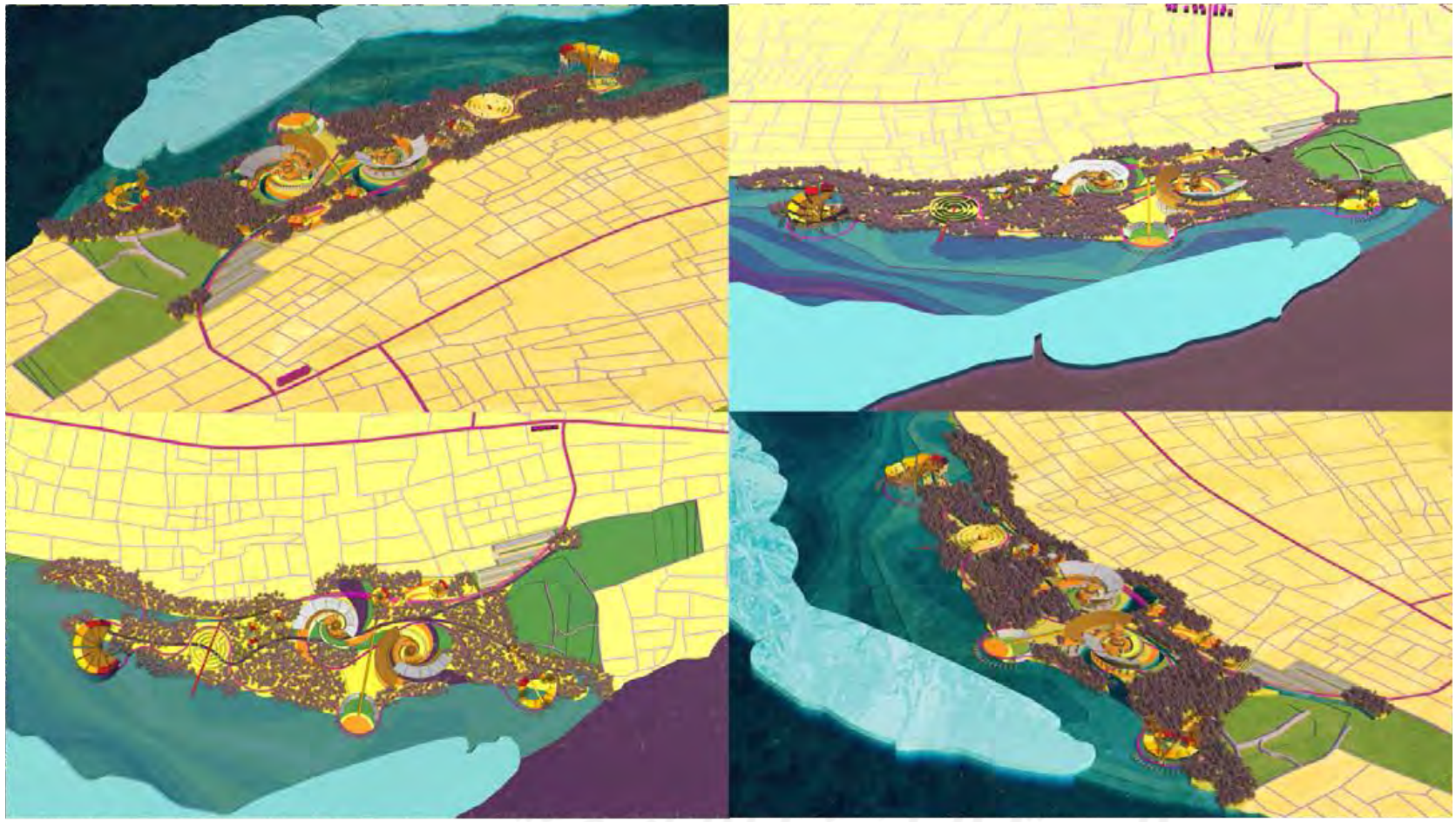
EXTERIOR PERSPECTIVE

Mangrove Sanctuary Hub



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INTERIOR PERSPECTIVE

Mangrove Sanctuary Hub

Location

Mangrove Baros Conservation, Bantul, Yogyakarta Special Region

Drawing Title

Interior Perspective

Scale

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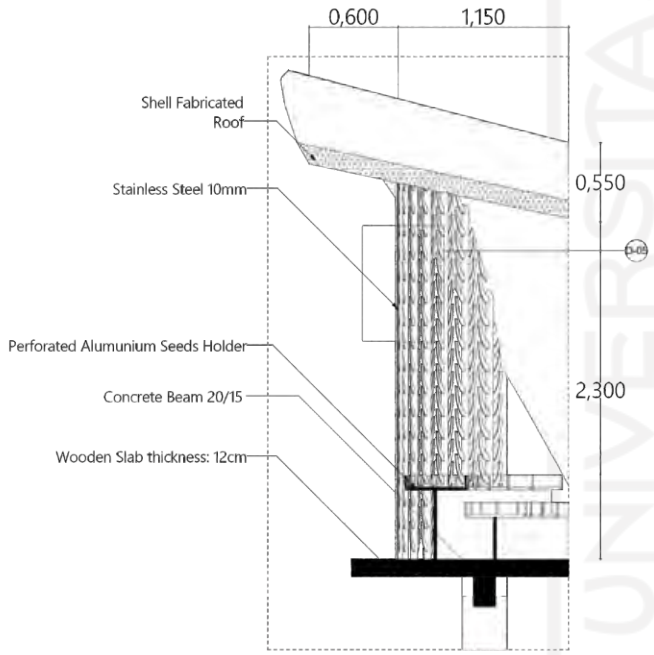
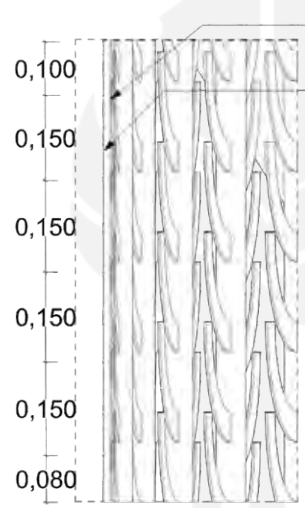
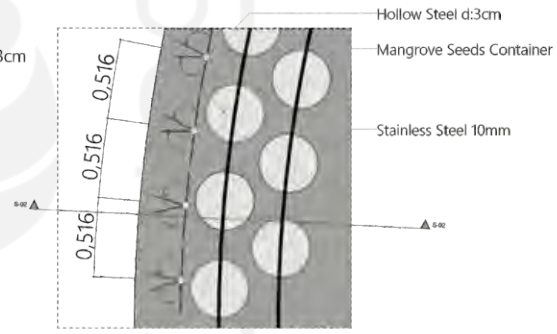
PAGE

DETAIL: BUILDING ENVELOPE MOVEMENT RESPOND TO CLIMATE AND PREDATOR

Mangrove Sanctuary Hub







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Drawing Title

Detail Kinetic Facade
1:100, 1:50, 1:200

Scale

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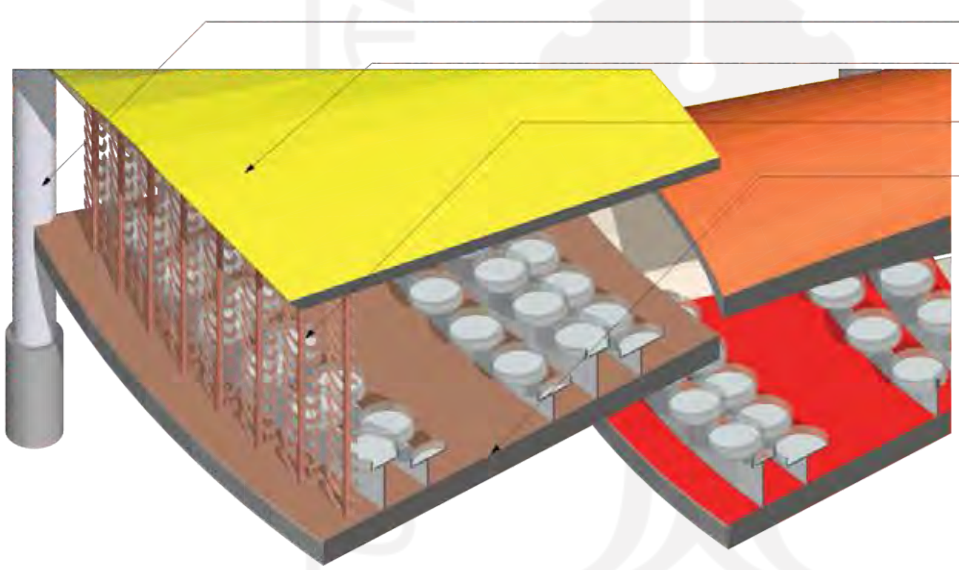

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MANGROVE SANCTUARY HUB | FACULTY OF CIVIL ENGINEERING AND PLANNING | INTERNATIONAL BACHELOR PROGRAM | FINAL ARCHITECTURAL DESIGN STUDIO

DETAIL: BUILDING CONSTRUCTION MODULAR FLOATING STRUCTURE AND HARD CORROSION MATERIAL

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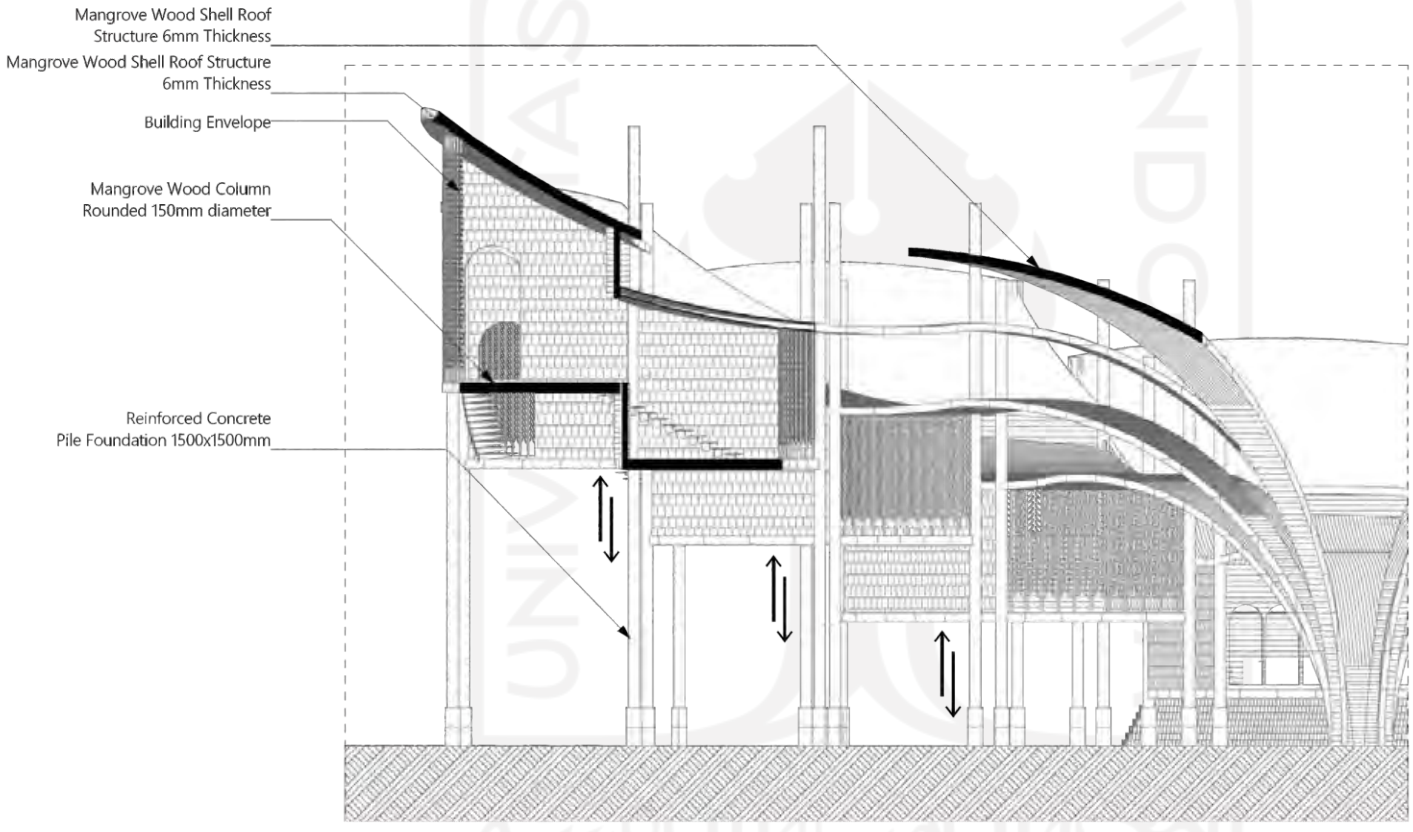

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Drawing Title
Detail Floating Structure

Scale
1:50

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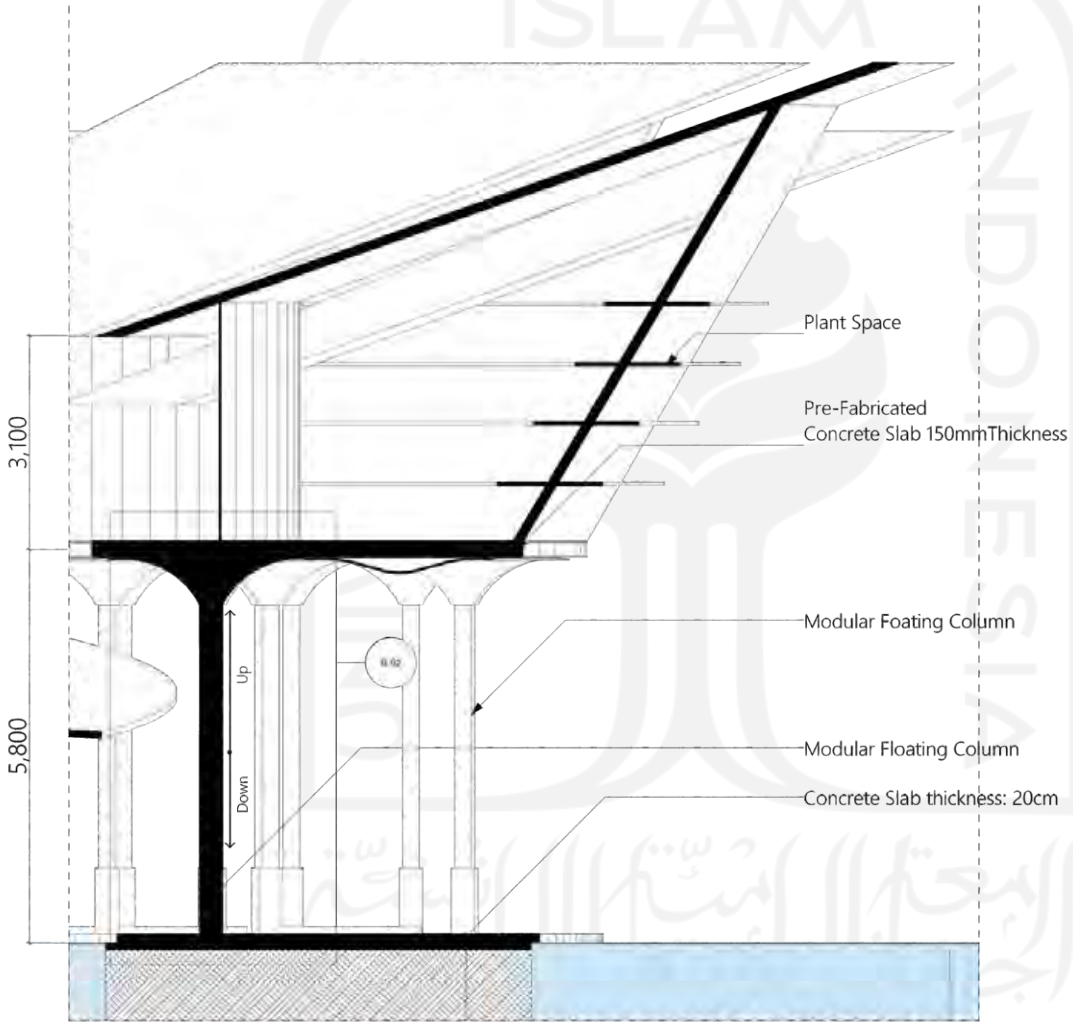

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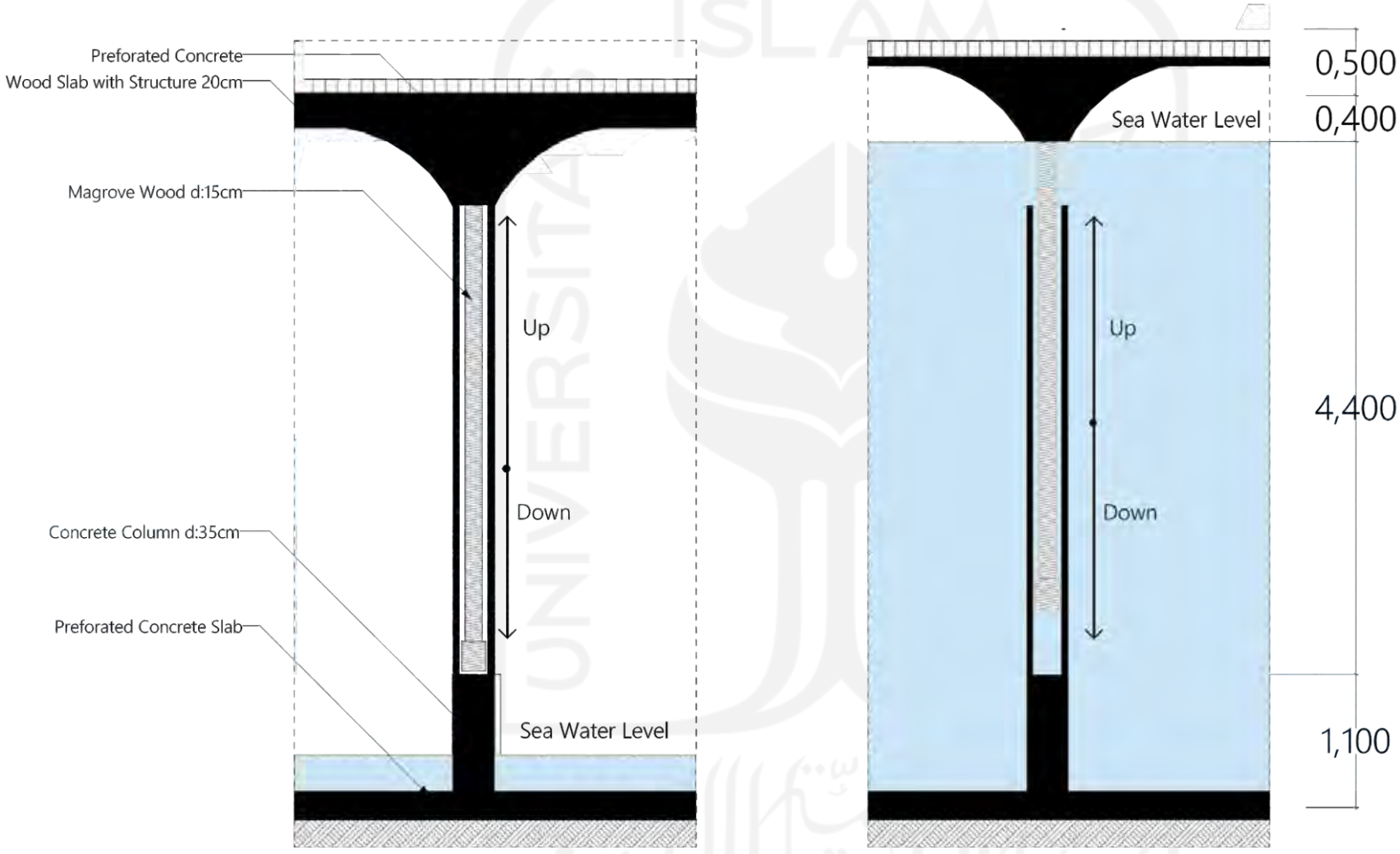

Location
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Drawing Title
Detail Floating Structure

Scale
1:25

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MANGROVE SANCTUARY HUB
BAROS ECO-EDU TOURISM

A MULTI-SENSORY BASED DESIGN

CONSERVATION

INTERPRETATION

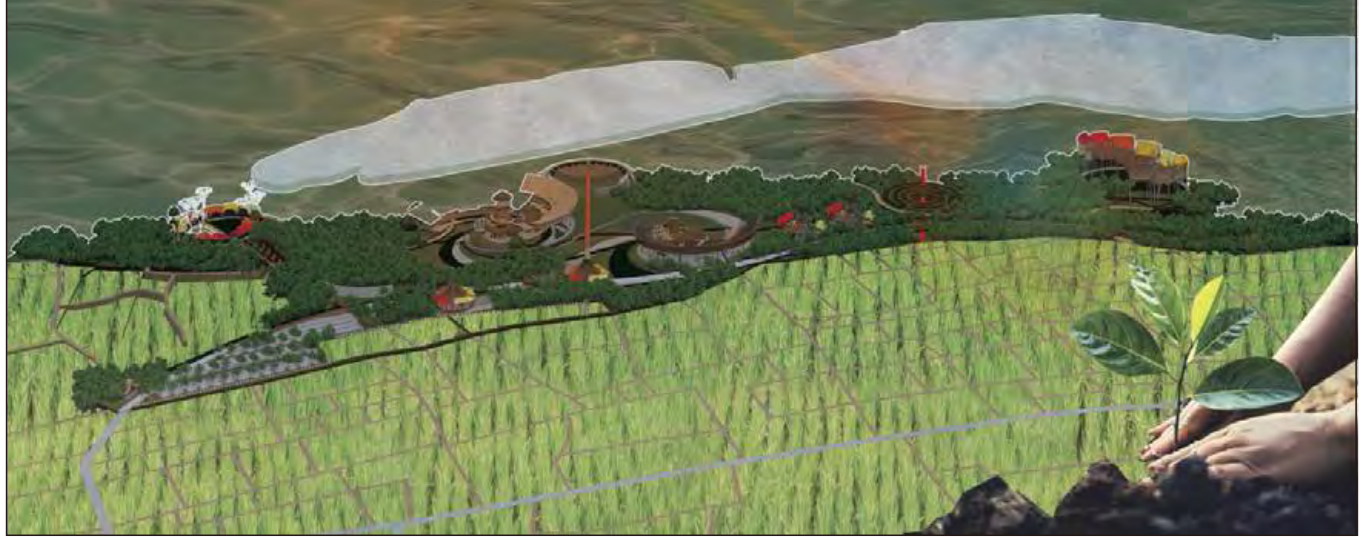
CULTIVATION

RECREATION

Indonesia as one of the countries with the largest red list for the list of habitat and animal species that are on the verge of extinction. The potential of mangrove forests that can be utilized in the form of preventing from natural hazard and make balanced ecosystem. Mangroves provide many benefits, especially for habitat animals.

Raising the issue of conservation in mangrove forest which has an impact on food security with a coastline. The coast of Bantul Regency, mangroves are found that can grow well, precisely in the estuary area, which is the confluence of the south coast with the mouth of the Opak River. Mangroves are a group of plants that can live in tidal areas that are still affected by the influence of the sea and land. Baros Hamlet which is overgrown with mangroves is designated as a coastal conservation area.

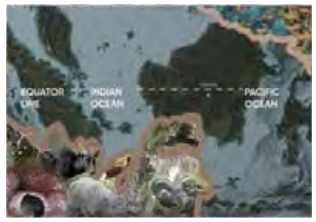
Mangrove sanctuary for preserving the biodiversity is urgently needed. The conservation building facilities consist of conservation centre, nursery centre, and interpretation centre. Multisensory is adopted in order to make people more aware and built interaction of the environment, in addition to maintaining the balance of nature, it will lift the economy and value an interactive educational place. Humans, mangroves, and species will build a mutually beneficial symbiosis.



PROJECT BACKGROUND STUDIES

01

BALANCING OF BIODIVERSITY GOING THROUGH DEGRADATION & EXTINCTION IN ECOSYSTEM



02

HOTSPOT: INDONESIA AS ONE OF MEGA-BIODIVERSITY ARCHIPELAGO COUNTRY IN EQUATOR AXIS

03

THE CAUSES: ENVIRONMENTAL DAMAGE, ECONOMIC CRISIS, AND SOCIAL WELFARE IMPACT

ISSUE: WHAT HAPPEN WITH MANGROVE FOREST IN BAROS?

01

CULTIVATION: LACK OF AWARENESS & KNOWLEDGE IN PERCEPTION AS AN EDUCATION DAMAGE THE AREA

Need to raise the interaction because of lack human knowledge and awareness to protect, respect, and empower biodiversity in Mangrove Baros areas.

02

THE SHRINKING OF MANGROVE FOREST: BY COASTAL ILLEGAL SAND MINNING ESTUARY, PREDATOR

Extinction & Threatened of Biodiversity will be disruption for productivity of mangrove and can damage the missing food chain security in Coastal Mangrove Forest.

03

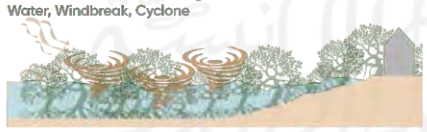
RISING SEA LEVELS: ABRATION & EROTION DESTROYING THE MANGROVE HABITAT

The sustainability function of conservation and eco-edu tourism building and area is not optimal need to pay attention of mangrove productivity.

PROJECT FUNCTIONS

Physical Function
Stabilize Mud Substrate & Sediment Consolidation

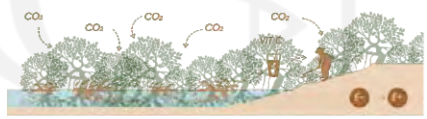
Natural Hazard Barrier: Rising Sea Water, Windbreak, Cyclone



Metal Industrial Waste

Biologycal Function
Biodiversity Habitat

Organic Food Chain System & Energy for Living Things



Economic Function
Raw Materials & Construction

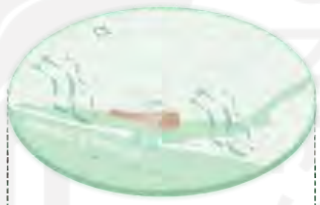
Supporting Fisheries, Agriculture, and Community by Sea Salt Pond (Silvofishery, Silviculture)

Education, Tourism, Conservation, & Research

SITE PROFILE

SITE ANALYSIS

The topography is between agricultural areas, ponds, rivers, and the sea has different land elevations. The shape of the site tends to be irregular and elongated facing the shoreline flanking the estuary. As an anticipation of tidal waves. This site has muddy soil with high intensity of pH and salinity. The site also contain 2 kind of water, land water and brakish water.



22nd in June and December the data shows that the north direction of the site is tilted less than 45 degrees and more than 45 degrees during the day. The eastern and western solar radiation needs to be anticipated so that the room remains in a comfortable condition and has an optimal temperature for breeding mangroves.

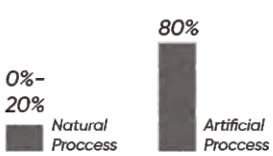
Baros Conservation Mangrove is located in Baros Village, Kretek District, Bantul Regency, Yogyakarta Special Region Province. Currently, it is a tourism-based conservation area with the ownership of the sultan's land which is then given to the village to manage it. Overall, it has a land area of 10ha which then experienced shrinkage due to abrasion and erosion that occurred naturally as well as illegal mining activities of sand mining and shrinking to 3ha.

The typology of surrounding buildings that have the same function, namely conservation, includes turtle, mangrove, and sea pine tree. This affects the formation of a design building typology. Alas rondho, a building with a joglo roof made of tile that responds to contours, semi-outdoor. Samas Respiration, has hatchling ponds with open buildings. Clicker, with amphibious floating structure. For the noise, come from river, sea, vehicle, and people.

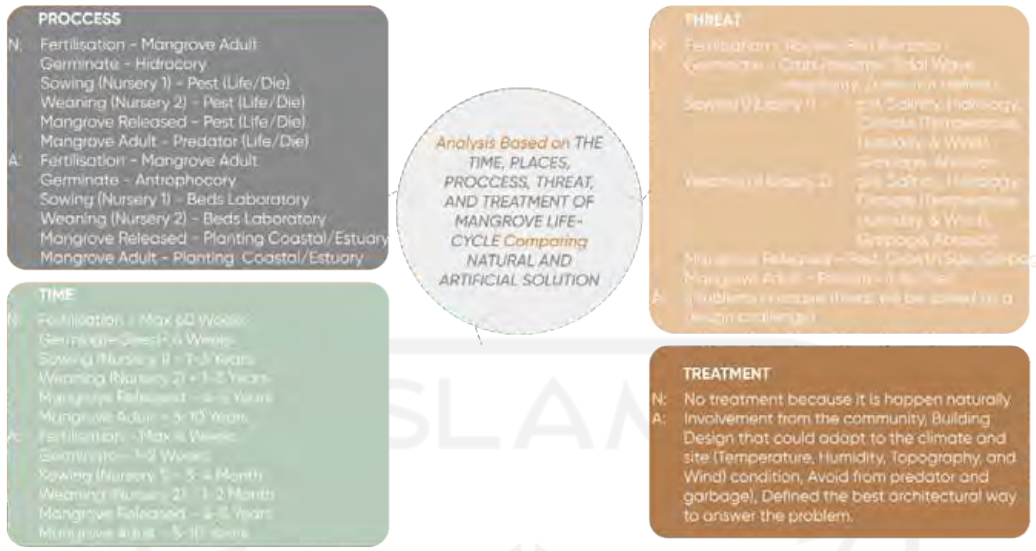
Water is also needed so that mangroves do not die as a means of irrigation which requires fresh water and brackish water. Rainwater can be temporarily stored before the dry season. The data shows that the highest rainfall in December is 651 mm/hours, which includes more than normal and the lowest is 12mm/hours, which will cause a long drought.

The Baros area is designated as a conservation area based on eco-edu tourism, which is surrounded by facilities and zones including agriculture, rural areas, settlements, tourism, fish and shrimp ponds, conservation areas, and mix-use as a means of trade and recreation. Existing facilities are included in the tenuous density.

WHY MANGROVE NURSERY SHOULD HAVE A BUILDING?



ANALYSIS BASED ON MANGROVE LIFE-CYCLE



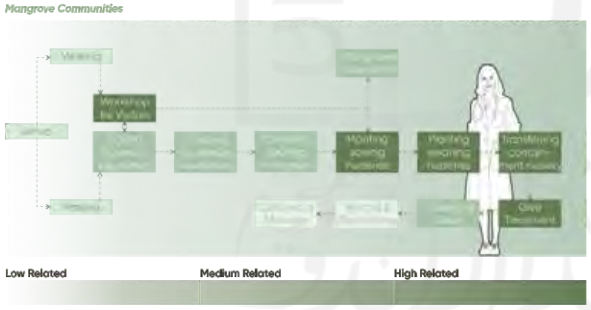
CONCEPT

1. Spatial Arrangement based on the Context, Time and with Freedom & Growth Storyline — **MSAU**
2. Color as Experiencing The User and That Can Avoid and/or Attract Predators — **MSAB + MSAU**
3. Kinetic System Envelope Respond to the Climate & Predators in Coastal Area — **MSAB**
4. B. Construction by using Modular Floating Structure and Hard Corrosion Material — **MSAB**
5. Multi-sensory app. for Built Interaction for the People to the People, Building, & Nature — **MSAU**
6. Water Irrigation Sponge System & Water Sensitive Arch. for Brakish & Fresh Water for Nursery Building
7. Maintaining Room Temperature at Night for Nursery Building by Worm Lighting

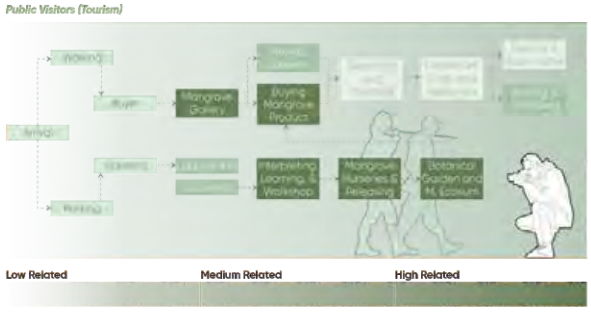
USER ACTIVITY FLOW CONCEPT

The activity flow want to consider of arranging the spaces and connection (spatial arrangement) that could make the interactive learning and emphasize the user empathy for conserving the mangrove by giving the stimulation of multi-sensory experience. The sense should be enhancing and highlighted the nursery order based on mangrove Life-cycle. It can be divided on the 3 group consist of, Mangrove Community in term of cultivating and conserving, Public Visitor (Tourism) in term of give interpretating, and Management for supporting.

Mangrove Communities



Public Visitors (Tourism)

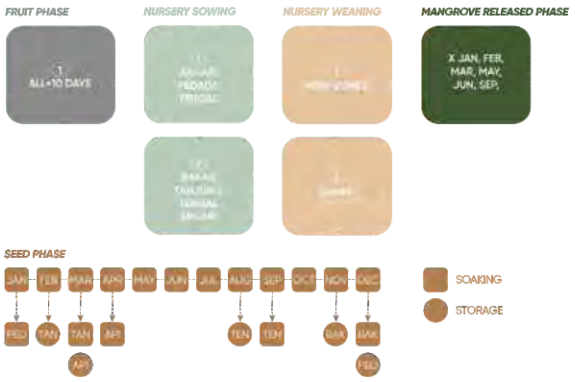


SPATIAL ARRANGEMENT: NUMBER OF SEED AND PATTERN

In order to respond the site with moderate-high wind velocities and wave so the pattern planting should be have arrangement that distinguish and separate not blocking just in some part.

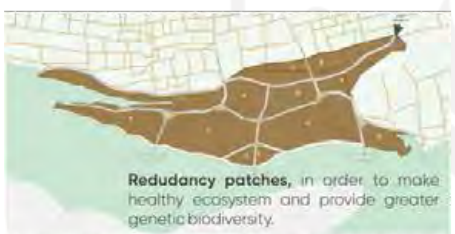
Number 2 and 3 will be selected pattern because it can separated the wind equally in every part. If the species being planted requires 0,0625 m2 per seedling and the zone for that species is 14 m2 will need 14:0,0625 = 224 seedlings to fill the area. If the species being planted requires 0,0625 m2 per seedling and the zone for that species is 7 m2 will need 6:0,0625 = 96 seedlings to fill the area. The survival rate is expected to be 80%, then 320:0.8 = 256 seedlings need to be raised.

SPATIAL ARRANGEMENT: ZONING AND LAYOUT BASED ON TIME AND SPECIES




STAGE 6
STAGE 5
STAGE 0
STAGE 1
STAGE 2
STAGE 3
STAGE 4
LEGEND
Stage 6: Abudance
Stage 5: Independence
Stage 4: Security
Stage 3: Freedom
Stage 2: Stability
Stage 1: Survive
Stage 0: Dependence
SPATIAL ARRANGEMENT: ZONING & LAYOUT BASED ON STORYLINE
LEGEND
CONCEPT according to the problem
SPATIAL ARRANGEMENT: zoning and layout for vegetation based time and type
Nypa Fructicane (Mainland Zone)
Rhizopora Apiculata (Middle Zone)
Avinnecia sp. (Open Zone)
MAIN ENTRANCE
CONCEPT according to the problem
SPATIAL ARRANGEMENT: accessability corridor and patch arrangement
LEGEND
Water Transportation Platform
Along Coastal Skybridge
Possibility of Encounters
Connect The Dots
a Branch of Linear Movement
Junction terminal
Village Ricefields

SPATIAL ARRANGEMENT: PATCH AND CORRIDOR



FORM TRANSFORMATION DIAGRAM

1

Existing conditions on the site have nursery buildings, places to buy and sell products, and gathering space. Supported by circulation of linear composition on land and water transportation. There is potential for rivers, seas, villages, and land.

2

The mass divided based on the zoning criteria of conservation as a guardian of nature, interpretation as a means of providing education to visitors, and tourism to attract visitors based on function, needs analysis based on the mangrove life-cycle, and space activities that will be provided.

3

The basic shape of the mass responds to the existing vegetation and adds volume to the existing building. In the nursery, it is placed close to water sources and waves for the survival of mangroves that require brakish water. The basic shape of the circle is taken as a response and characteristic of the mangrove tree and the movement of water as well as the center for gathering activities.

4

Then the shape is transformed based on the philosophy of mangrove characteristics, namely balancing the ecosystem by having the same 2 sides and mirroring, movement, growth, irregular, and radial. While the other building masses are designed radially and centered like mangrove roots as the main foundation.

5

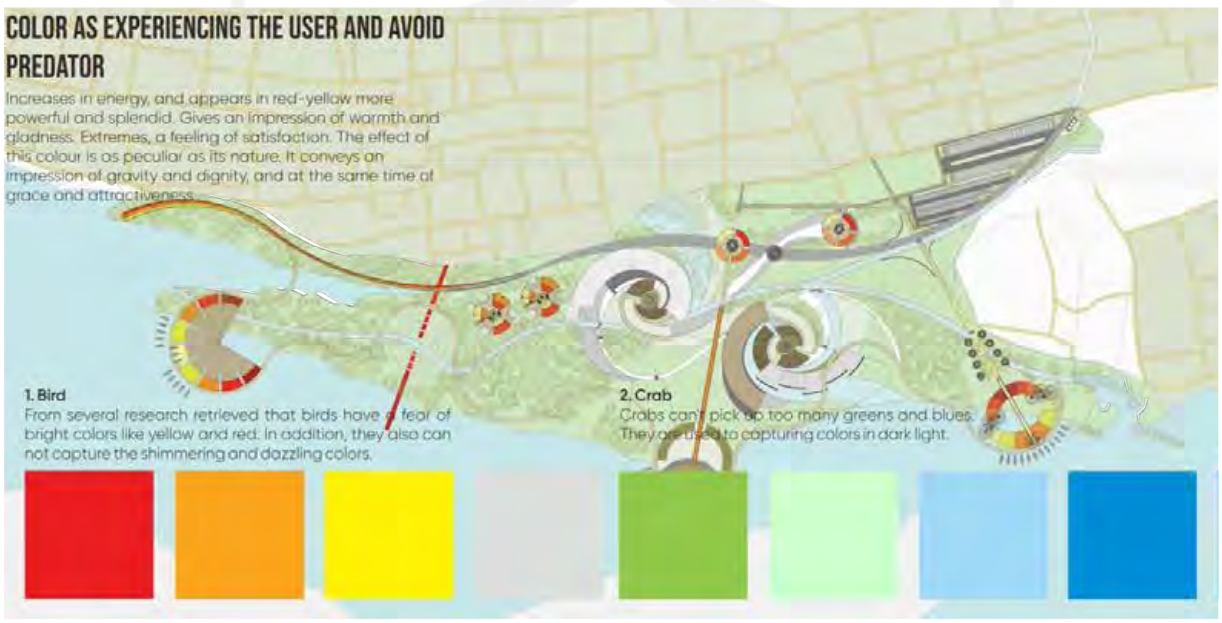
The placement of the circulation transformation takes into account the principles of corridors and natural patches to provide maximum biodiversity, connects the site with roads in villages and rice fields to increase the possibility, sweet flow movement to respond and break waves, linear which is transformed into curved as a representation of river and sea, and connect to the point of centered activity.

6

The orientation of the building mass is then directed to respond to the site's climate, namely wind conditions, lighting, and views towards the sea and rivers in order to maximize the potential of the site and environmentally friendly buildings. The mass is broken down to make it easier for the building modules to interact with the tides which are dynamic and unpredictable.

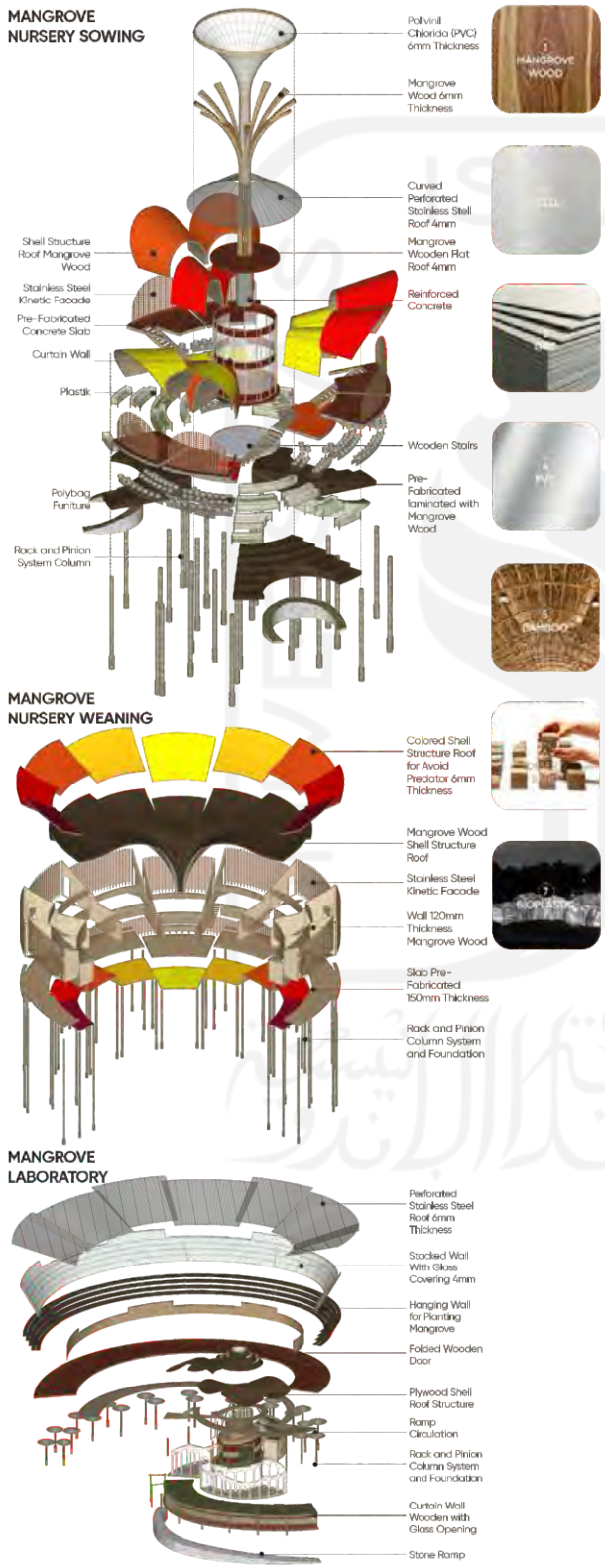
COLOR AS EXPERIENCING THE USER AND AVOID PREDATOR

Increases in energy, and appears in red-yellow more powerful and splendid. Gives an impression of warmth and gladness. Extremes, a feeling of satisfaction. The effect of this colour is as peculiar as its nature. It conveys an impression of gravity and dignity, and at the same time of grace and attractiveness.



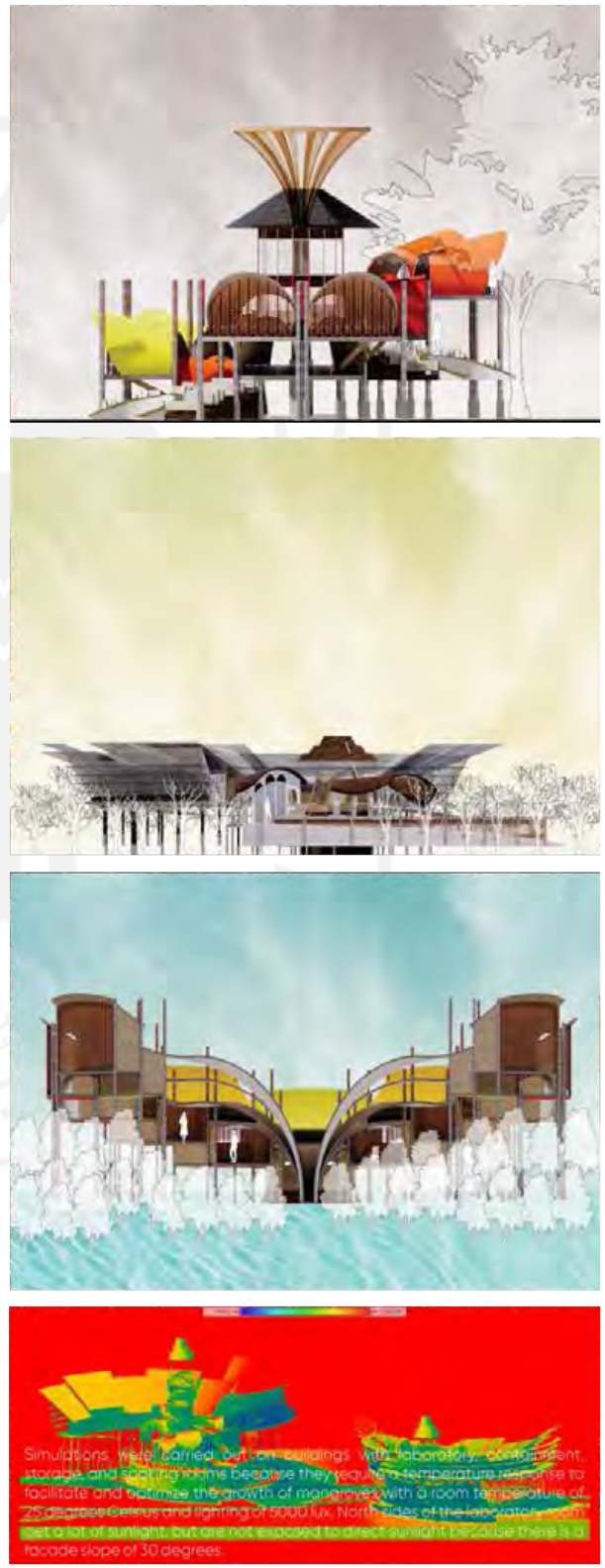
BUILDING CONSTRUCTION: BY USING MODULAR, RACK AND PINION, AND HARDLY CORROSSION MATERIAL

in order to respond the climate condition of increasing water surface and land degradation at least 1-2 meter from tidal wave based on the analysis schenario. The building should be able to adapt with abrassion to make it still stand and have stability while the tidal wave come. It is also can support the need of brakish water instead of fresh water for growing the mangrove. The structure focusing on growth concept, easier to arrange, and stable so the result of modular design. It has several alternatives concept to make it floating. The concept on multi-sensory approach is from the technology itself. It can respond to the intensity increasement (automobile).



BUILDING ENVELOPE: ADJUSTING TO THE COASTAL CLIMATE AND PREDATOR

The building envelope should be developed because in mangrove baros have relatively high temperature at 28 degree and high humidity level. So the concept is to provide kinetic system envelope as a strategy in order to respond different stimuli. The facade can be move by folding in the vertical way. It was also can protect it from bird predator, that are scared to movement, color, and dazling. The form of facade was transforming from the leaf and applied the sense of bud and bloom.

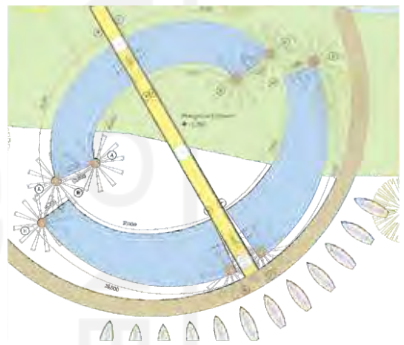


SITE PLAN

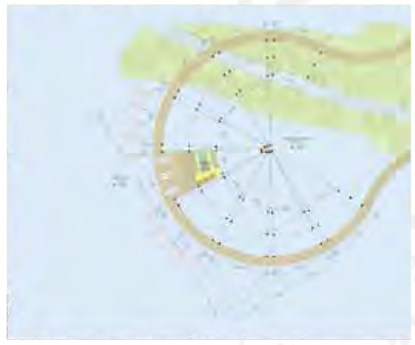
PLAN

Tematic Botanical Garden and Interpretation Space

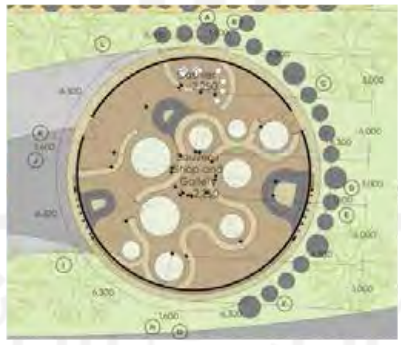
Mangrove Laboratory



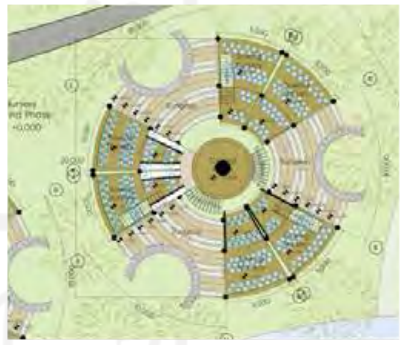
Mangrove Ecorium



Mangrove Nursery Weaning

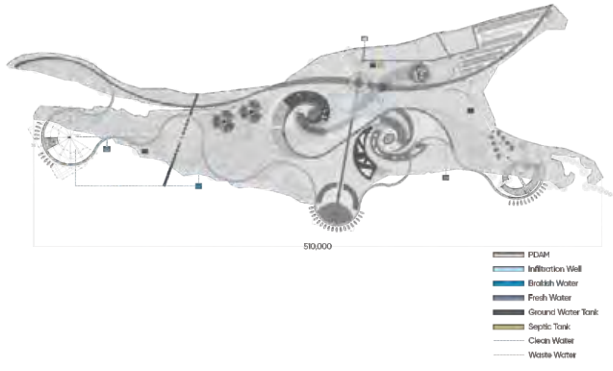


Souvenir Shop



Mangrove Nursery Sowing

WATER DISTRIBUTION PLAN



WARM LIGHTING AT NIGHT TYPE AND ARRANGEMENT


Shafira Safya Nurchanif
18812023
Dosen Pembimbing
Dr. Yulianto P. Prihatmaji, ST, MT, IPM, IAI
Multi-Sensory Mangrove
Sanctuary Hub
Skala
1 : 500


Shafira Satya Nurshanti
18512025
Multi-Sensory Mangrove Sanctuary Hub
Dosen Pembimbing
Dr. Yulianto P. Prihatmaji, ST., MT., IPM. IAI
Skala
1 : 100


Shafira Satya Nurshanti
18512025
Dosen Pembimbing
Dr. Yulianto P. Prihatmaji, ST., MT., IPM. IAI
Multi-Sensory Mangrove Sanctuary Hub
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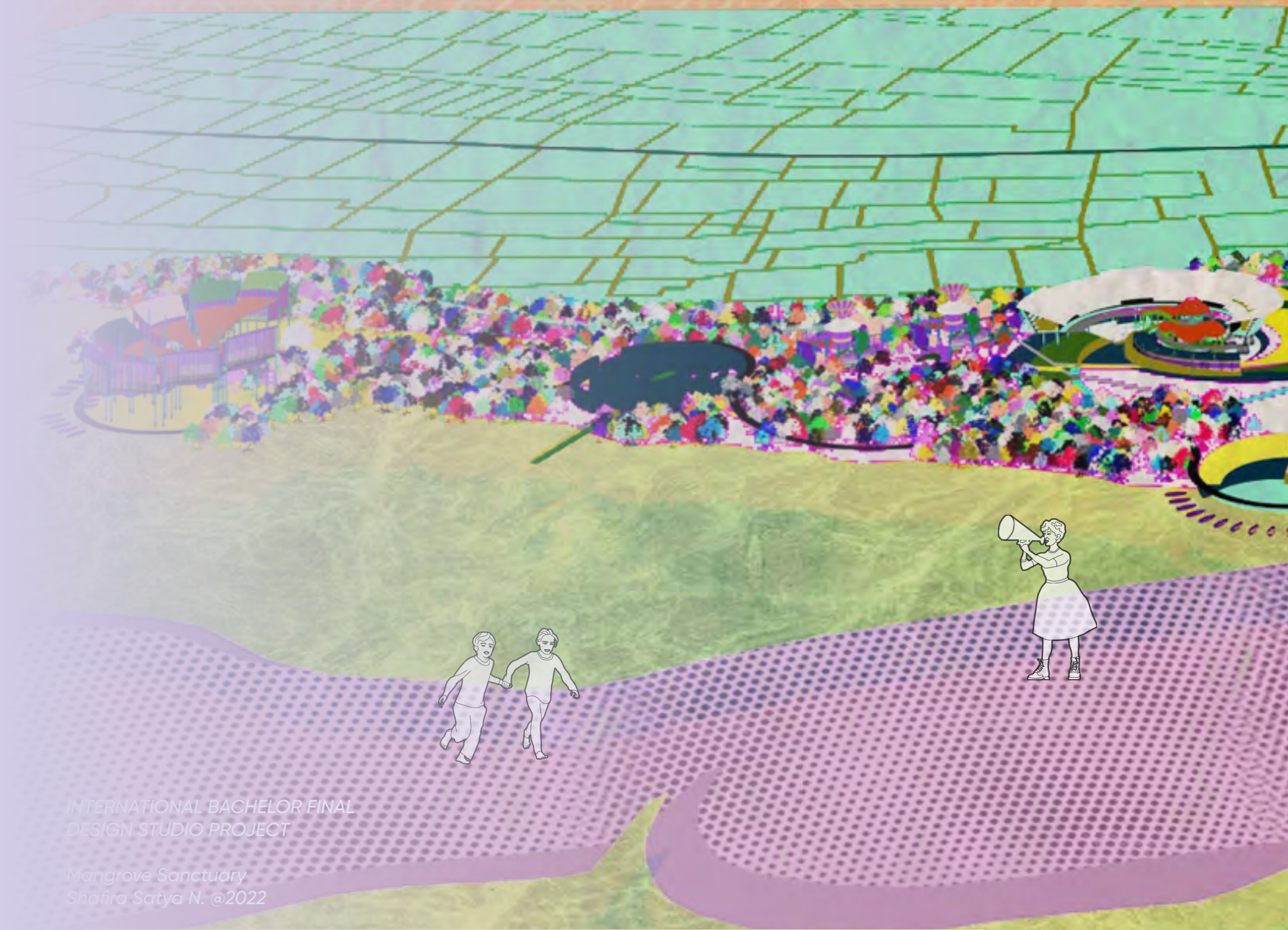
Nurturing Biodiversity



INTERNATIONAL BACHELOR FINAL
DESIGN STUDIO PROJECT

Mangrove Sanctuary
Shafira Satya N. @2022