



NATURE RETREAT

KARACHI BUNDAL ISLAND



BACKGROUND

CONTEXT

CASE STUDIES

LIT REVIEW



NATURE RETREAT

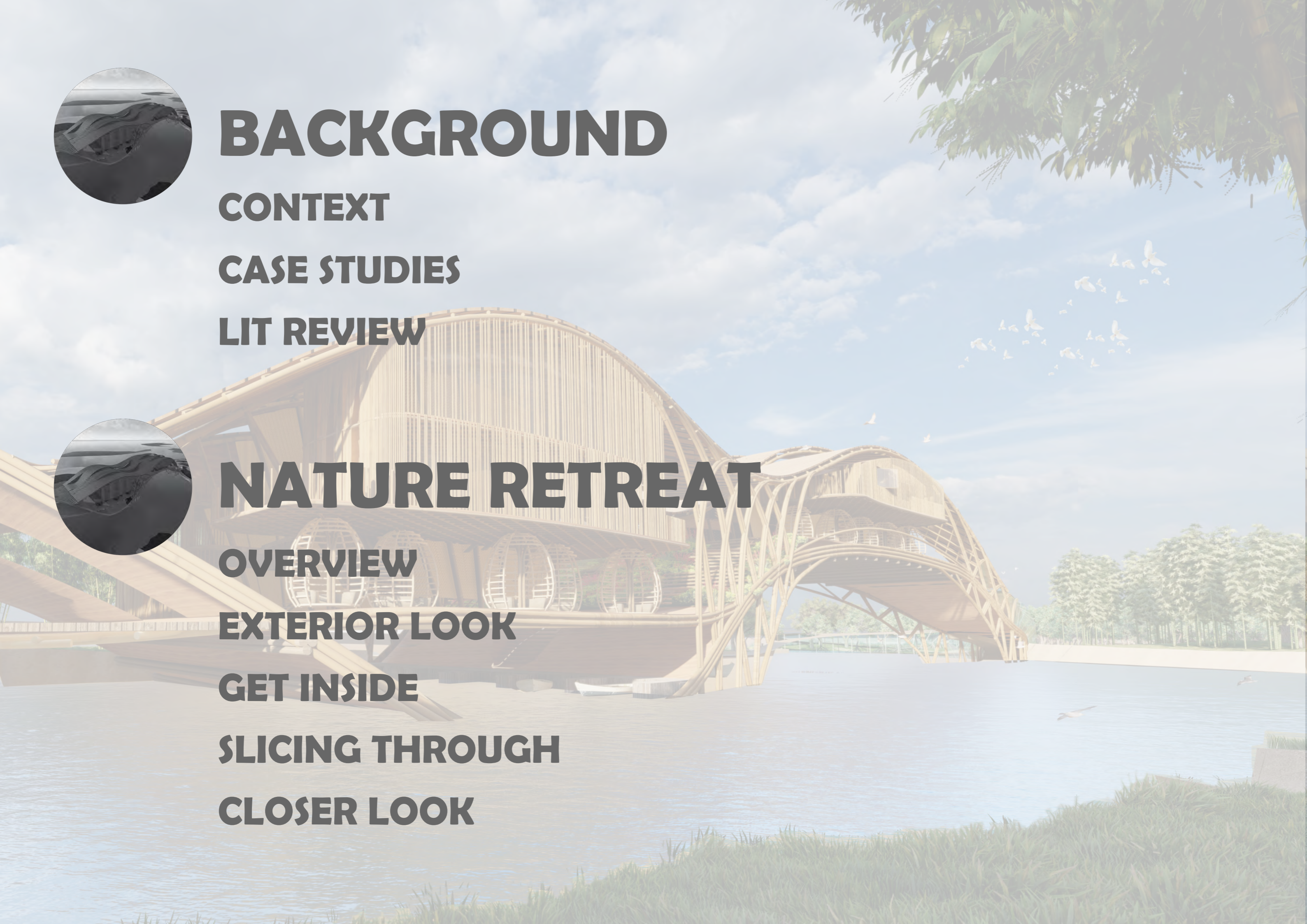
OVERVIEW

EXTERIOR LOOK

GET INSIDE

SLICING THROUGH

CLOSER LOOK



LIT REVIEW



CONTEXT

CASE STUDIES

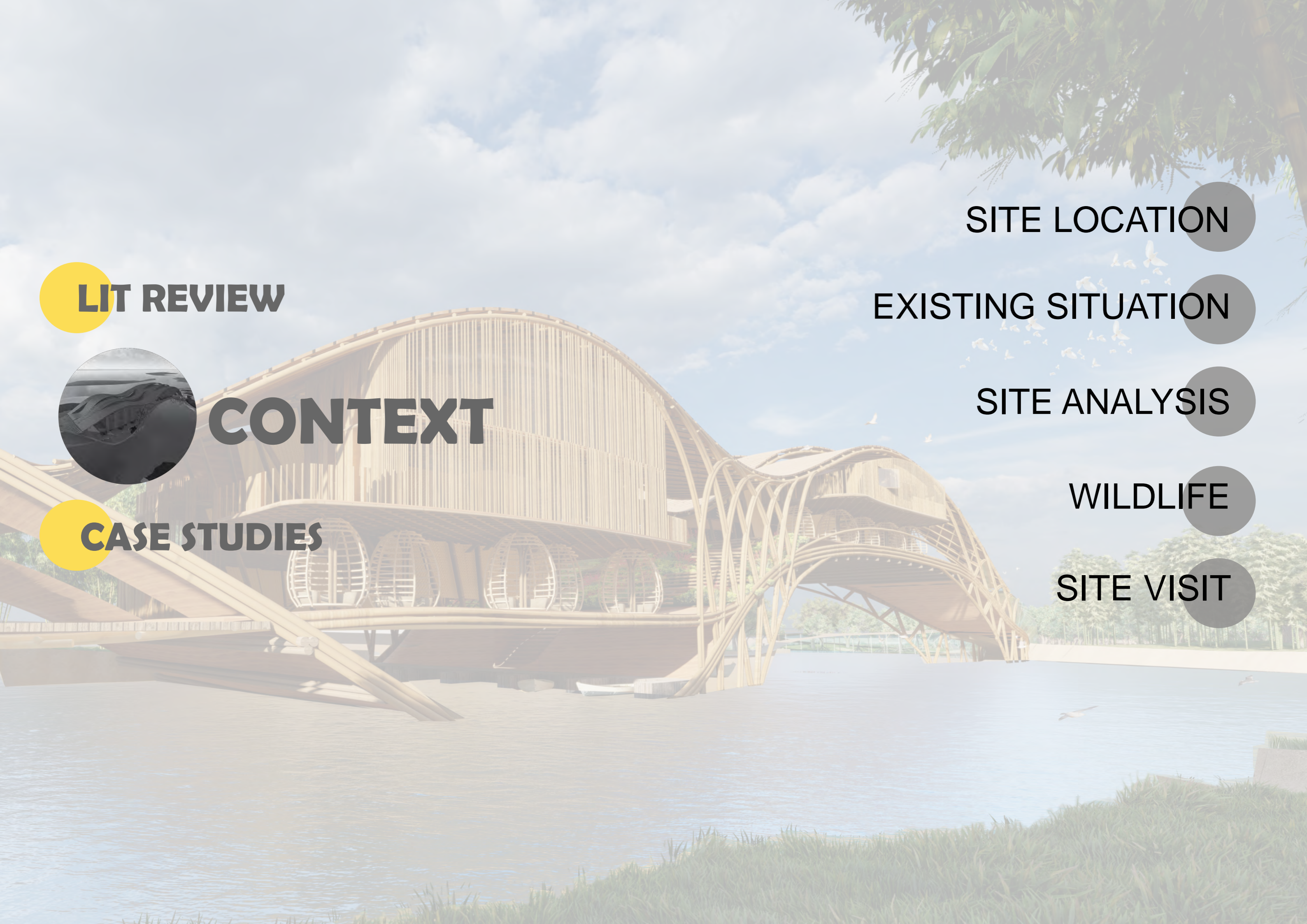
SITE LOCATION

EXISTING SITUATION

SITE ANALYSIS

WILDLIFE

SITE VISIT

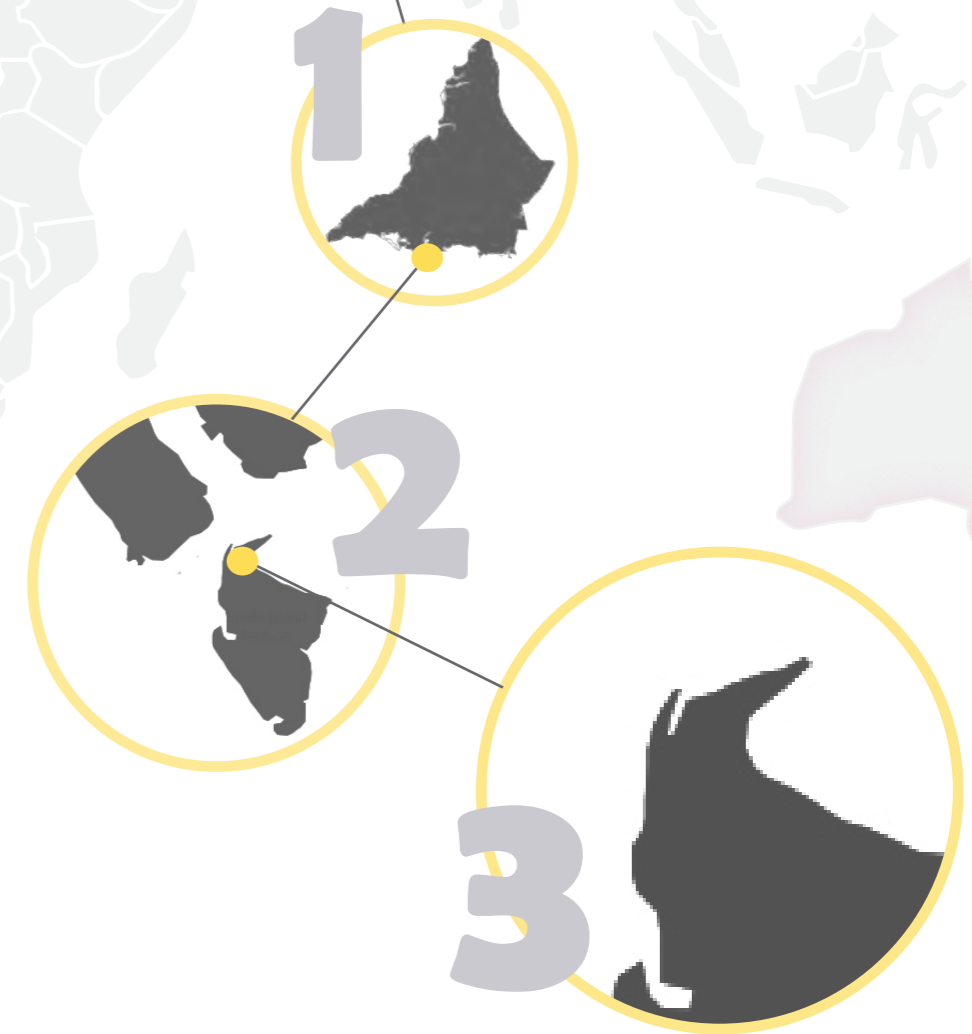


SITE LOCATION

1 **Karachi** is located on the coastline of Sindh province in southern Pakistan, along the Karachi Harbour which is a natural harbour on the Arabian Sea.

2 **Bundal Island** is a small island located in the Arabian Sea off the coast of Karachi, Sindh. It is inhabited by human, but has habitat and nursery for a wide variety of wildlife.

3 **Project site** is located on northern end of Bundal Island, with shortest sea circulation path to the dock in DHA Phase 8.





Unsustainable Methods in Construction

Javaria Saeed, Karachi

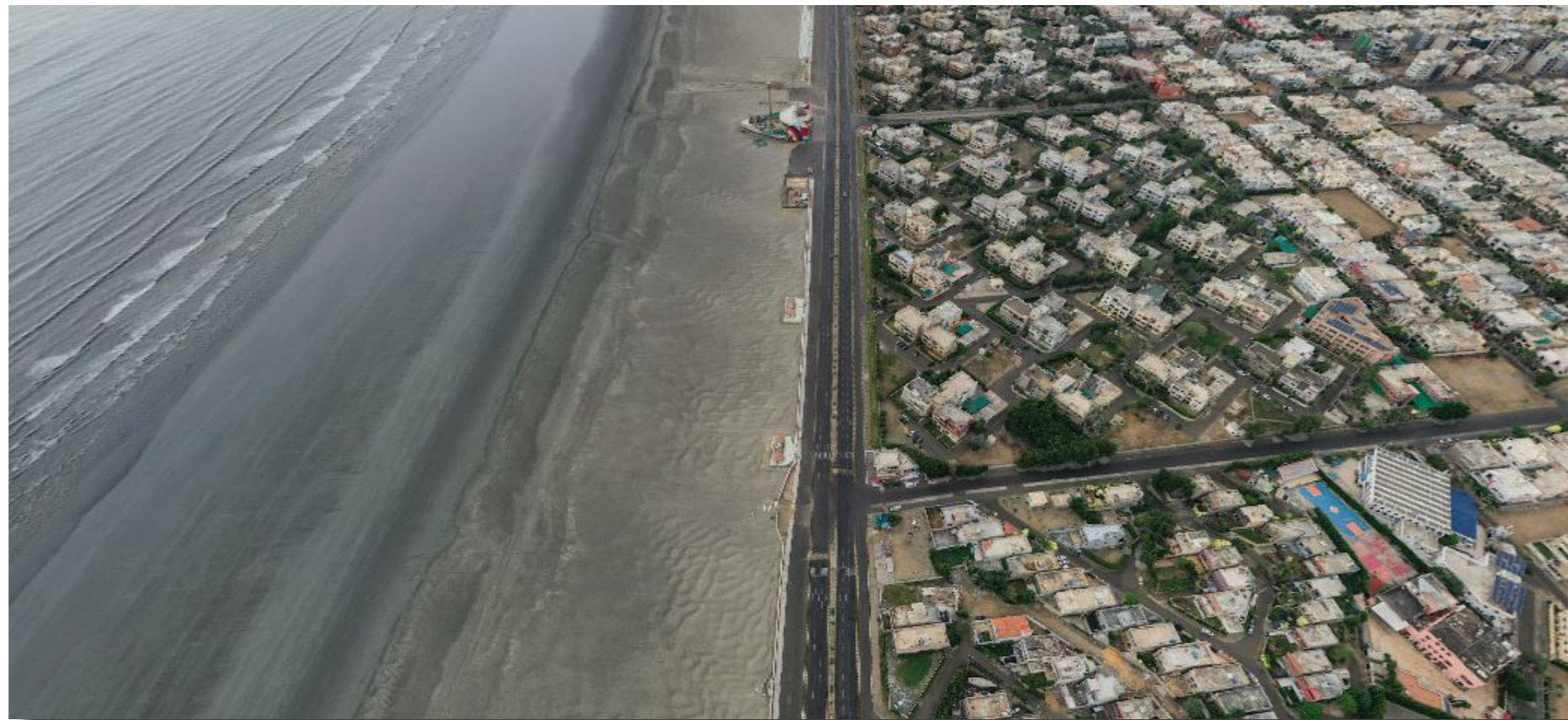
Sustainable construction means building with renewable and recyclable resources and materials. During construction projects, care must be taken to reduce waste and energy consumption where possible and protect the natural environment around the site.



Unsustainable coastal reclamation, unregulated construction, untreated sewage disposal, diminishing public spaces, polluted marine life — Pakistan's largest megalopolis is fast losing its coastline to ecological neglect and deterioration.

Can anything be done about it?

EXISTING SITUATION IN KARACHI - EXCESSIVE URBANIZATION



Smog & Air Pollution

Smog is air pollution that reduces visibility. When sunlight hits these chemicals, they form airborne particles and ground-level ozone—or smog. Ozone can be helpful or harmful. The ozone layer high up in the atmosphere protects us from the sun's dangerous ultraviolet radiation.

Smog is made up of a combination of air pollutants that can compromise human health, harm the environment, and even cause property damage. The ozone in smog also inhibits plant growth and can cause widespread damage to crops and forests.



Lack of proper Waste Water Management

This wastewater contaminates freshwater and coastal ecosystems, threatening food security, access to safe drinking and bathing water and being a major health and environmental management challenge.

Wastewater, too, requires processing. For the most part, these processes are made possible only by burning fossil fuels. This means wasting water also impacts carbon footprint and air quality.



Demise of Species

“We all have a responsibility to protect endangered species, both for their sake and for the sake of our own future generations.!”



DESTRUCTION OF MANGROVES

Javaria Saeed, Karachi

With some of the country's most high-profile residential and commercial projects popping up right along Karachi's edge, and our own wastewater and garbage threatening marine life, there is a dire need to focus on the preservation of our coast.



We have neglected our natural environment for far too long. We must now work to protect and conserve what is left; we must now become the saints and saviours of our own city. As the population continues to spike around the world and countries race to 'develop' and expand further, the demand for land has also increased rapidly. And so land reclamation — defined by the International Association of Dredging Companies as the process of creating new land by "raising the elevation of a waterbed or low-lying land and has emerged as a frequently applied solution.



“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!”



DENSE URBANIZATION

Dense Construction

Reclaimed Land - Losing Coastal edge

Unsustainable Construction Methods and Material

Air, Noise, Water & Light Pollution

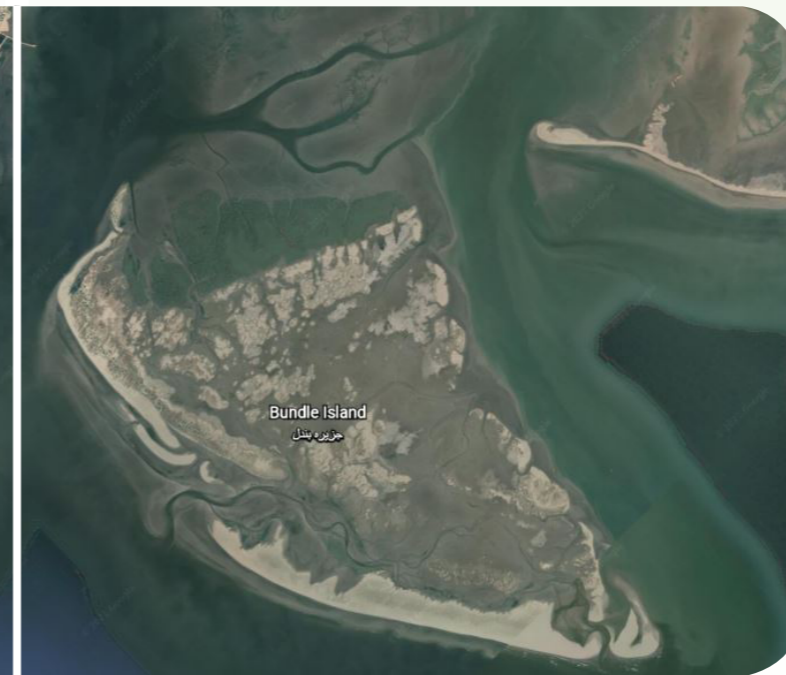
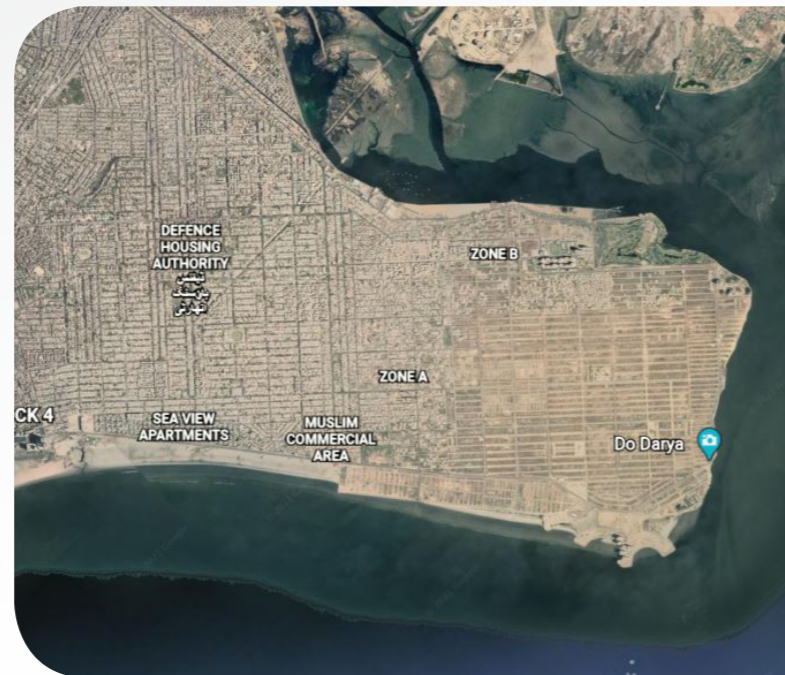
NATURE RETREAT

Dense Wetlands

Untouched land - with Wetland edge

Sustainable Construction Methods and Material

No Pollution source



! CAUTION

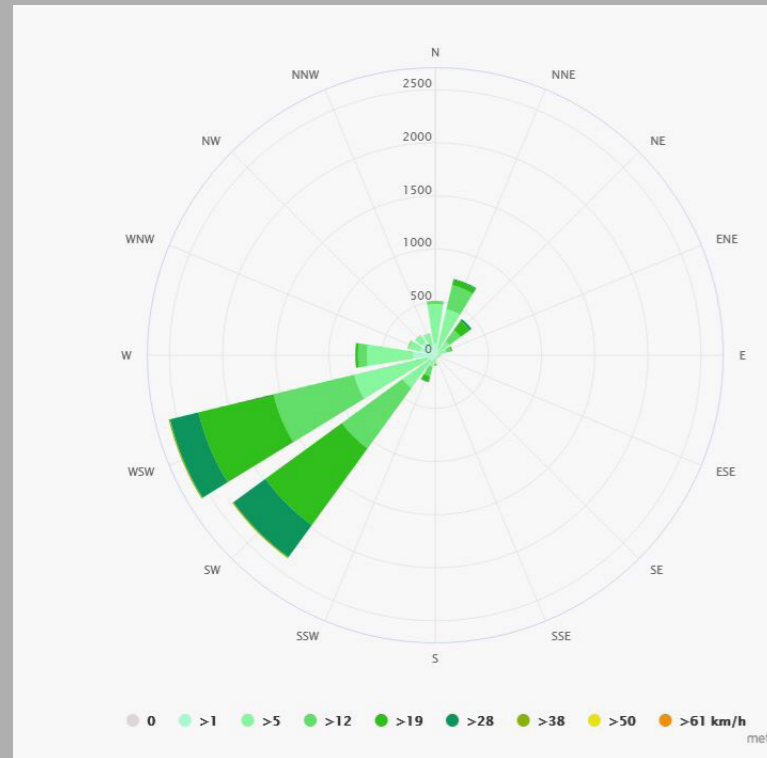


Bahria Town is to develop on Bundal Island with a cost of \$20 Billion. **Covering 12,000 acres of land**, this project will be developed in a span of 5–10 years .



The global attractions of the project comprise **world's tallest building**, world's largest shopping mall, sports city, educational & medical city, international city and a media city – all having the most modern facilities and amenities and the most advanced infrastructure.

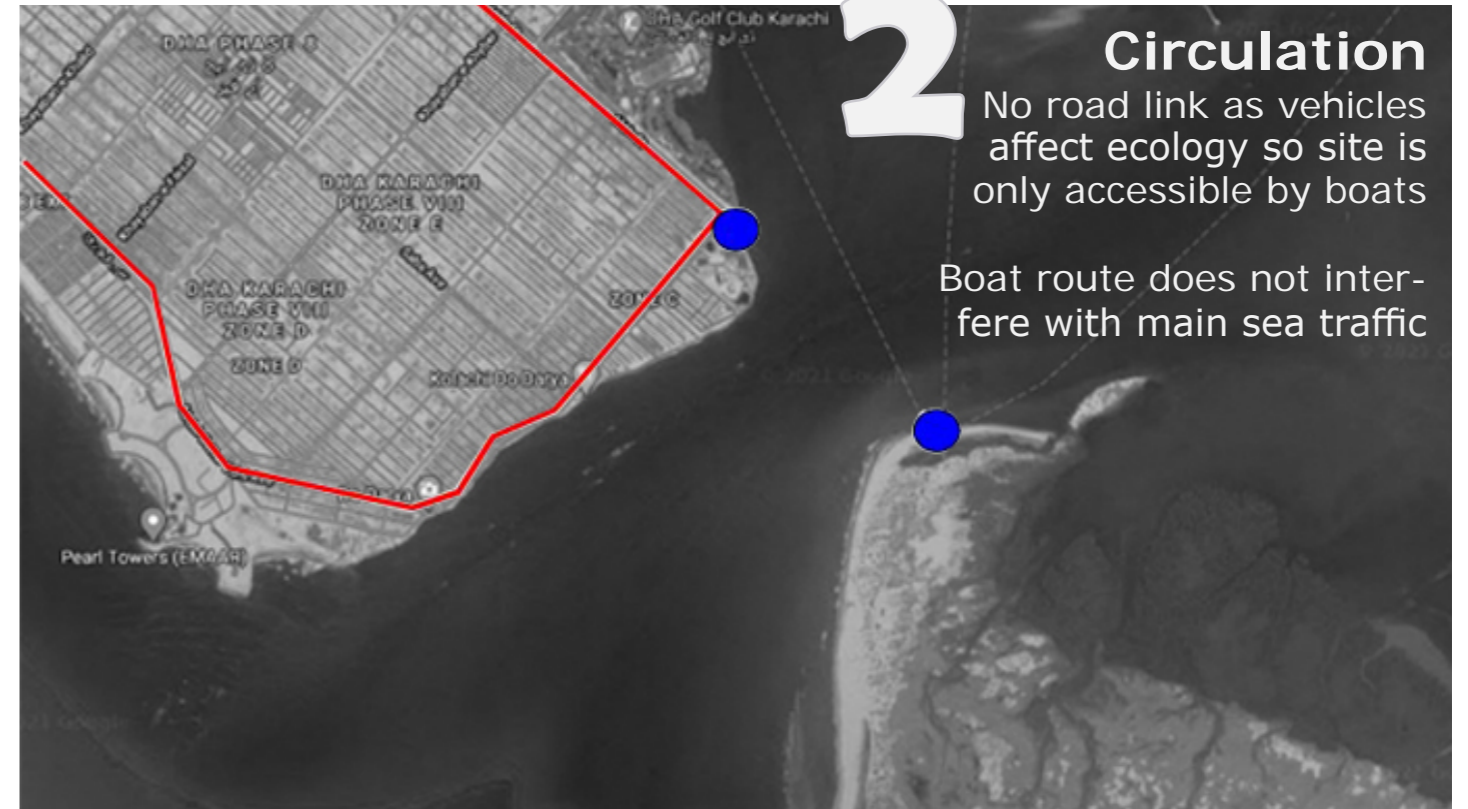
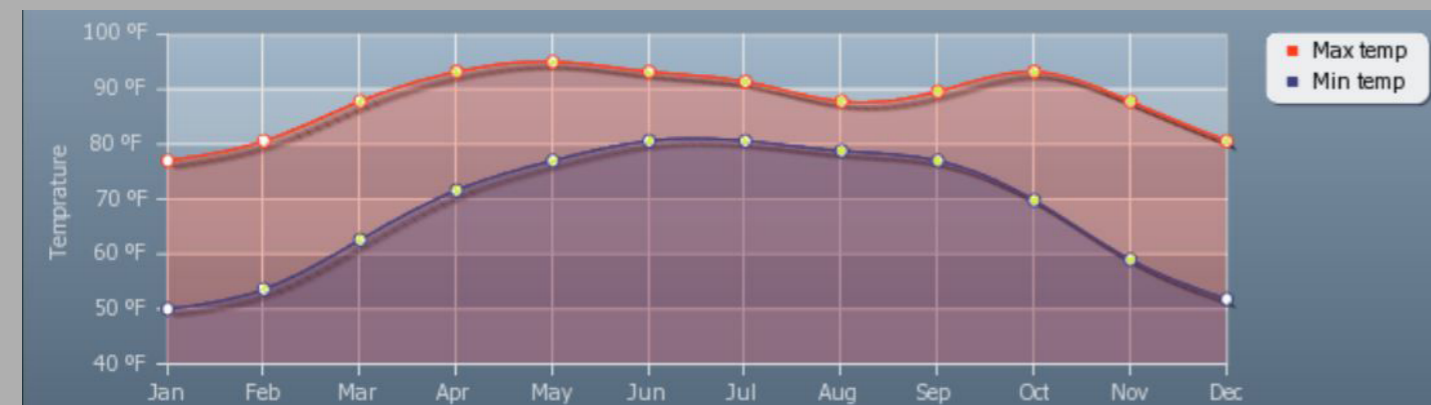
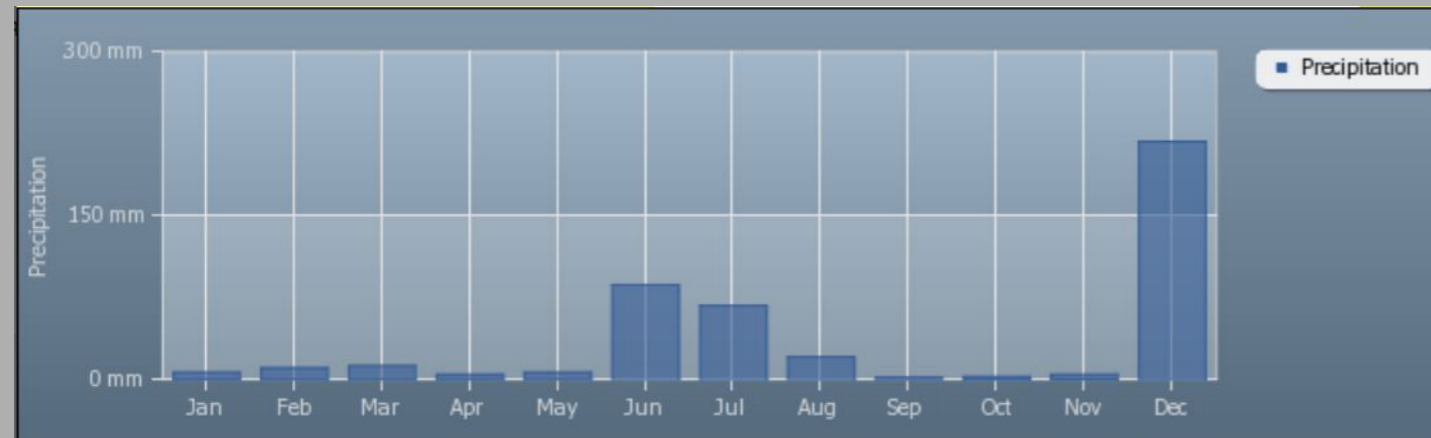
SITE ANALYSIS



1 Wind, Temperature and Precipitation

Data is used as a reference for creating spaces in tropical coastal area - with high temperature and high humidity in order to create passively ventilated spaces.

Literature Review - Tropical Architecture



2 Circulation

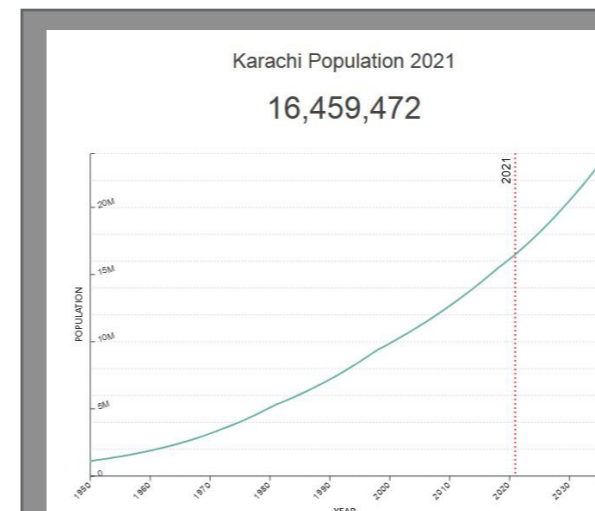
No road link as vehicles affect ecology so site is only accessible by boats

Boat route does not interfere with main sea traffic

3 Light And Noise

Light and noise should be limited as both disturb ecology. For instance, turtles lay eggs on beach at night time - light and noise scares them away hence halting reproduction.

No vehicular access will help in reducing this issue. Moreover design should not be too close to hatching areas of wildlife.



4 OverCrowded City - no Natural Escapes

Karachi has population of 16 million with over urbanized cities with desperate need of Natural buffers and Nature Escapes for the public.

4



Fin Whale



Blue Whale

WHALES



Dwarf Sperm



Bryde's Whale



Loggerhead sea turtle



Hawksbill sea turtle

TURTLES



Green sea turtle



Kemp's Ridley sea turtle

DOLPHINS



Common Bottlenose Dolphin



Long-beaked Common Dolphin



Spinner Dolphin



Risso's Dolphin

FISH



Rays



Mullets



Queen Fish



Ribbon Fish

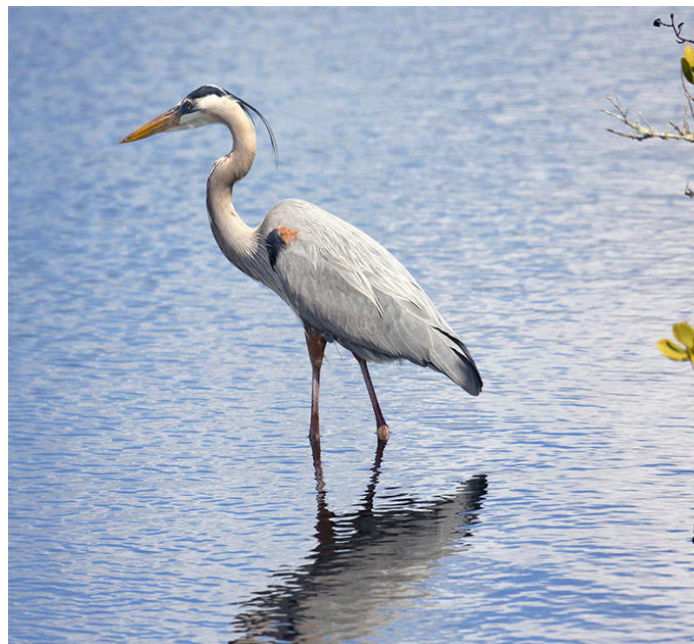
BIRDS



Golden-backed woodpeckers



Green bea Eaters



Hérons



Shrikes



Egrets



Bluethroat

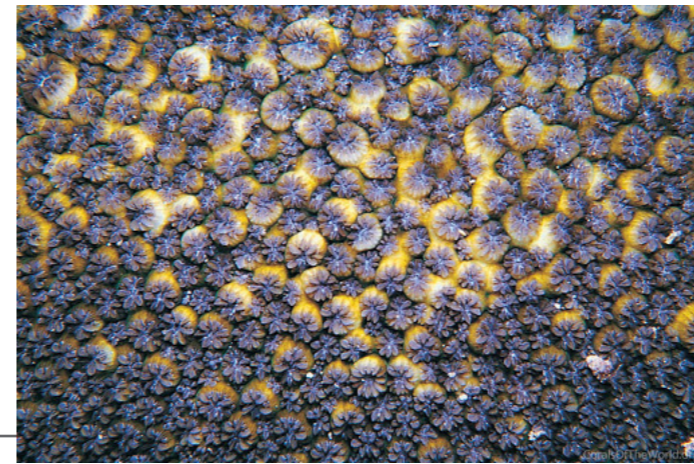


Greater flamingos

CORAL



Goniopora albiconus



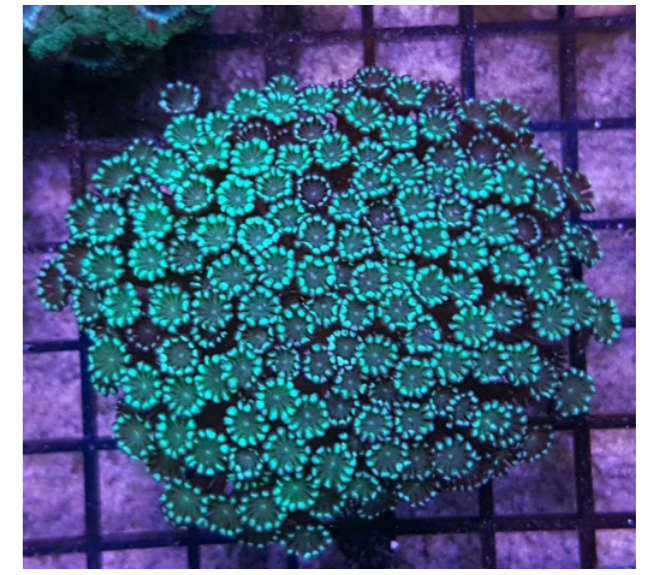
Leptastrea cf. bottae



Psammocora superficialis



Dendrophyllia robusta



Alveopora sp.



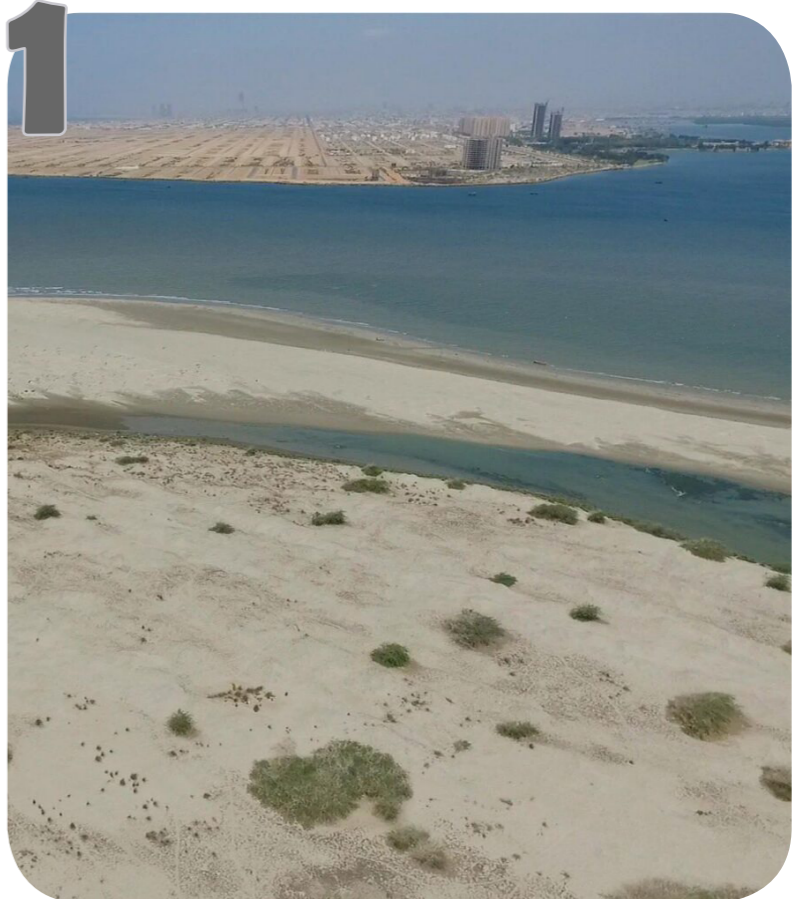
Coscinaraea monile



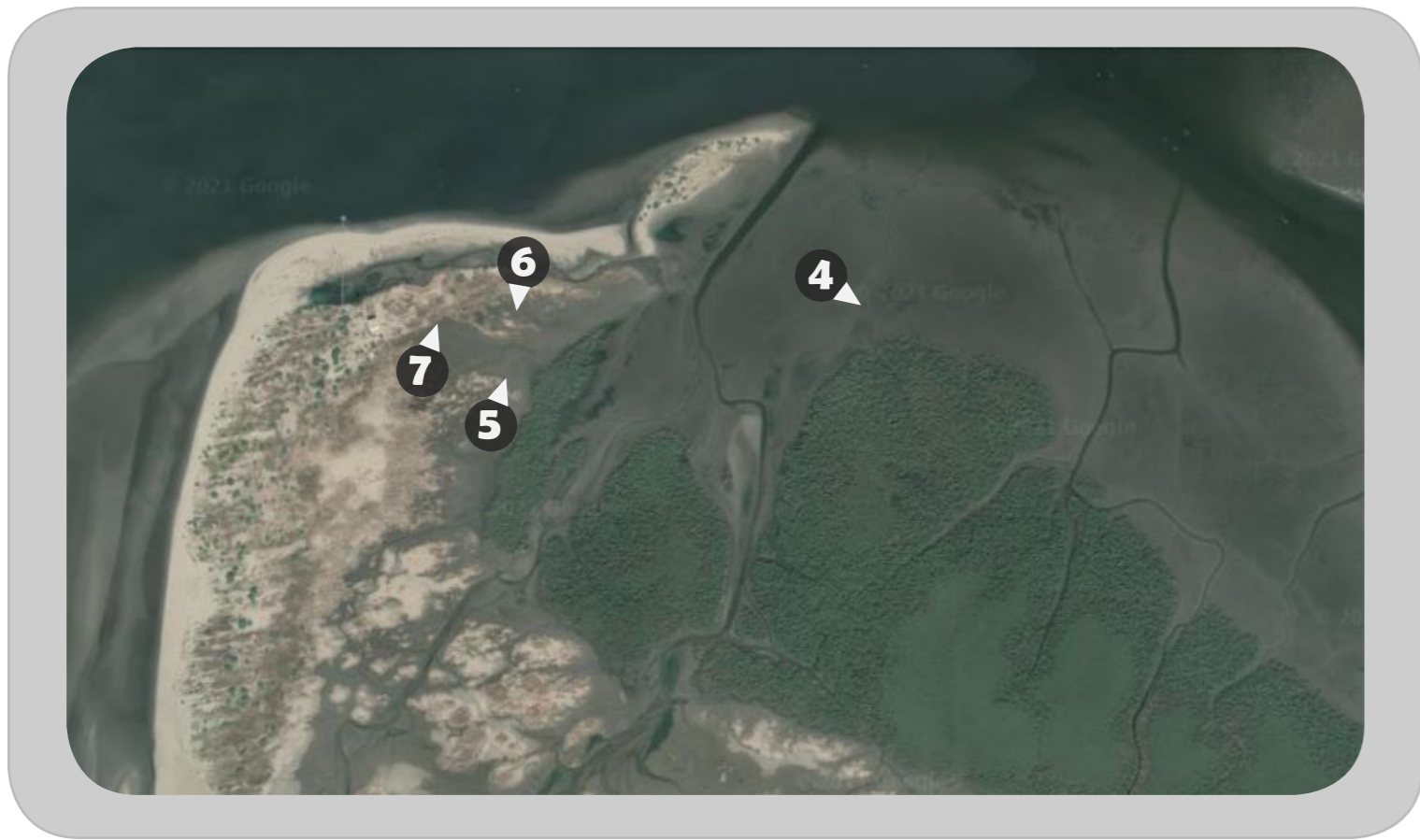
Goniopora columna

<https://www.reef2reef.com/threads/coral-of-the-week-dendro-dendrophyllia-fistla.86039/>

WALDLIFFE



JUST VISIT



ITSIWA 311TS

EXISTING POPULATION



“

Some fisherman communities live on this island, in temporary elevated houses made out of local material like Bamboo and wood.

They make their living by fishing, selling firewood, livestock and boat tours in wetlands.

”





CONTEXT

HONG KONG WETLAND PARK



CASE STUDIES

IBUKU CONSTRUCTION



LIT REVIEW

THE MILLENIUM BRIDGE

Hong Kong Wetland Park

Social/ Environmental



CASE STUDIES

The Hong Kong Wetland Park is a world-class ecotourism facility aimed at promoting green tourism, and education about environmental protection and wetland conservation.

The park includes a 10,000-square-metre visitor's centre — Wetland Interactive World — and a 60-hectare Wetland Reserve.

Mission and Objective

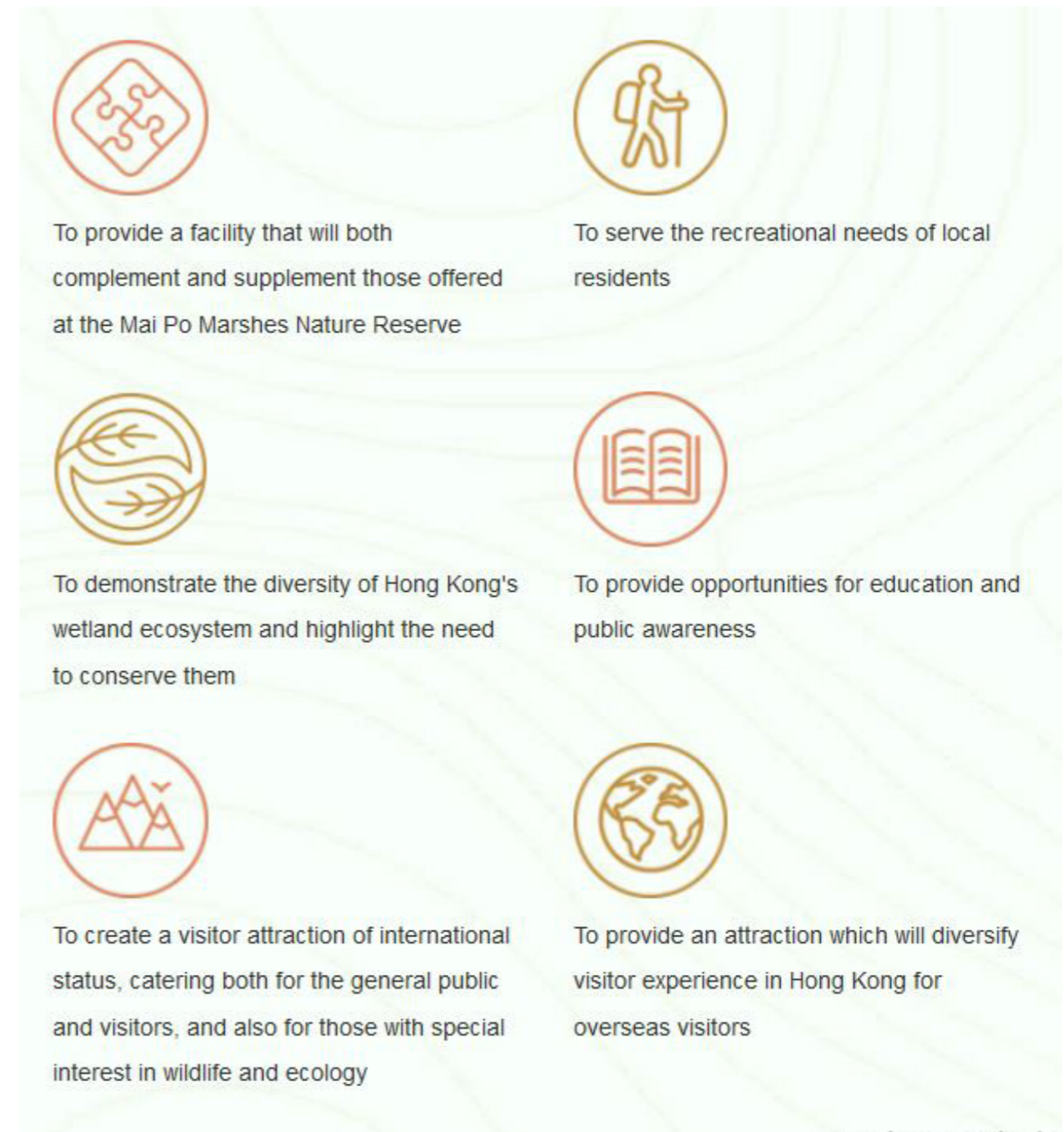
The mission of the Hong Kong Wetland Park is to foster public awareness, knowledge and understanding of the inherent values of wetlands using Communication, Education, Participation and Awareness Raising.



Purpose

Environmental awareness is to understand the fragility of our environment and the importance of its protection. Promoting environmental awareness is an easy way to become an environmental steward and participate in creating a brighter future for our children.

The global environmental crisis affects every one of us. Nobody can escape the global consequences. Their impacts will continue to be felt by every human being and by every species with which we share this planet. We as caretakers should address these global environmental threats.



IBUKU - Bamboo Construction

Structure/ Material



CASE STUDIES

MOON HOUSE

The Moon house is an addition to Bamboo Indah, an eco-resort in Sayan, Bali.

This crescent-shaped house has a direct view of the Ayung river and fresh nature.

Bundled up bamboo splits form the main arches running between both ends, and criss-crossing bamboo weaves form the support for the roof.

Visitors approach the structure through a serpentine path sitting in lush tropical gardens.

The striking curve of the roof, a unique visual element, offers a little spark of delight while descending the pathway.



RIVERWARUNG

This café is tucked into the riverside landscape of warung. The shell-like structure feels like an intimate and comfortable abode in the wild.

The structure was created with bamboo splits, bundled into one, for the main arches and other split weaves crossing each other for the solid roof support.

The bamboo matting lining the roof and terracotta on the floor bounce sunlight off each other and glow warm in the afternoon.

These materials are reminiscent of a traditional Balinese kitchen with earthy tones.



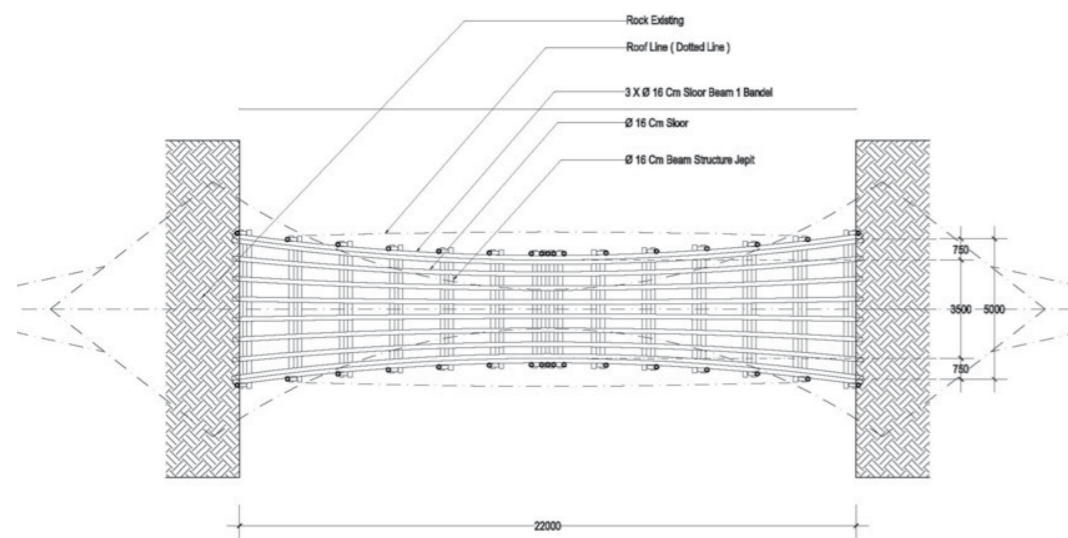
The Millenium Bridge

Structure

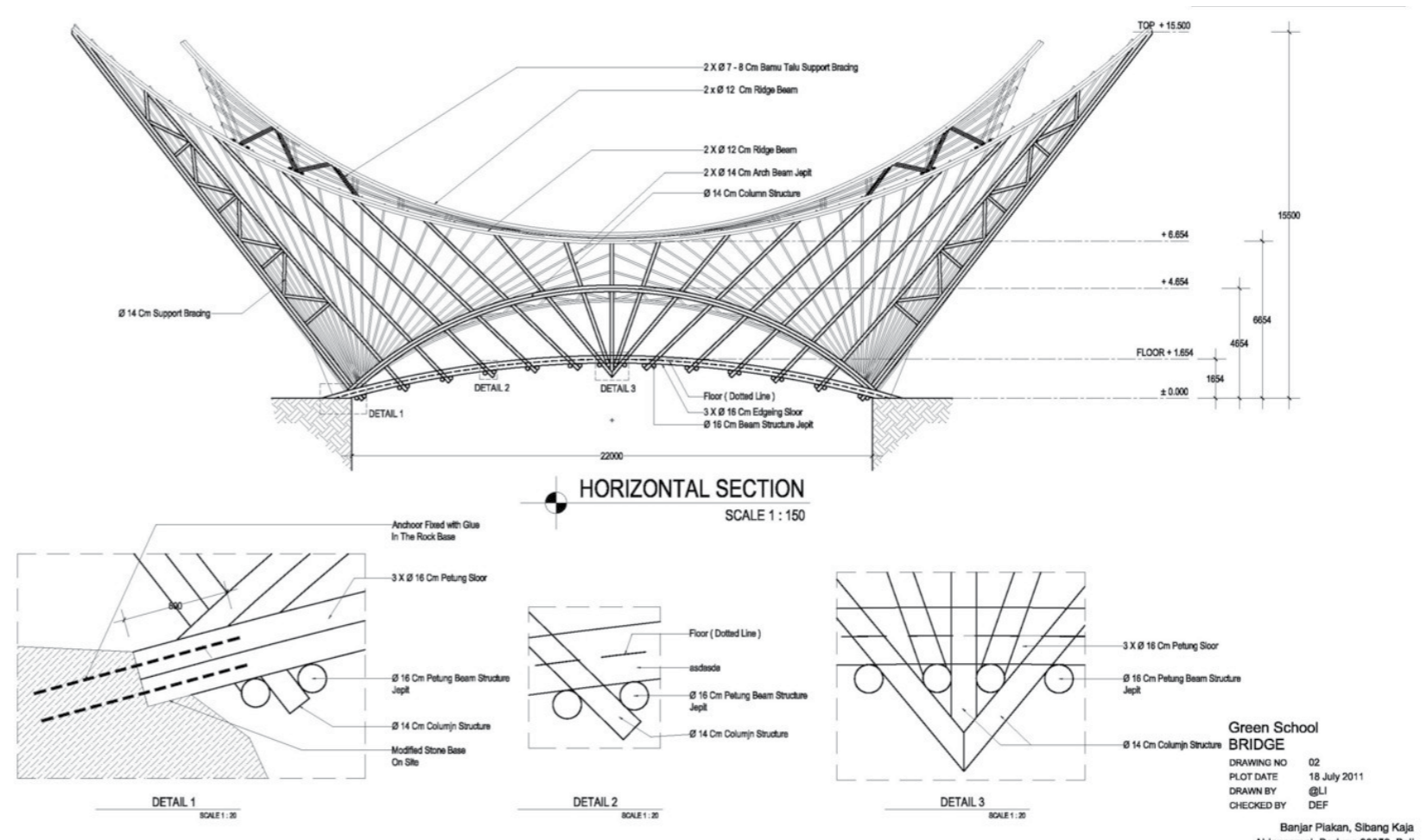
“

'It's very rare to get the chance to build a bridge from bamboo, and it is a proof that you can build anything with it. This bridge is a way to promote construction with bamboo around the world. It's a constructed testimony of its strength', says Defit Wijaya, Senior Architect at IBUKU.

”



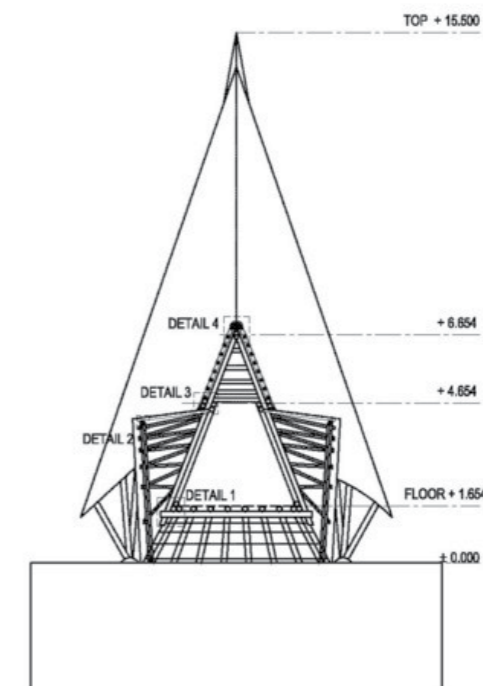
BRIDGE PLAN
SCALE 1 : 150



"Millenium Bridge" is one of the longest bamboo bridge in Asia, with a length of 23 meters.

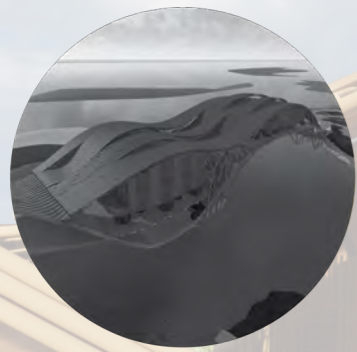
It has an impressive roof inspired by the shape of a buffalo horn.

It is built in a mix of blond and black bamboo species.



Green School
BRIDGE
DRAWING NO 02
PLOT DATE 18 July 2011
DRAWN BY @LI
CHECKED BY DEF
Banjar Plakan, Sibang Kaja

CASE STUDIES



LIT REVIEW

CONTEXT

BAMBOO PROCESSING

SYNTHETIC BAMBOO

TROPICAL ARCHITECTURE

WILDLIFE AWARENESS CENTER

PRESERVATION OF MANGROVES

Bamboo Processing

Material

HARVEST

Bamboo is carefully selected and harvested from clumps that, once established, grow a new generation of shoots each year.

It takes just a few months for a new bamboo shoot to reach its full height, and in three years it becomes timber ready for harvest.

Only the mature poles are harvested, creating an incentive for the bamboo farmers to allow the younger shoots to grow to maturity.



TREATMENT

In the past bamboo buildings were susceptible to termites and Powder Post Beetle infestations that would eat the bamboo to dust.

To avoid that bamboo is treated with a boron solution, a naturally occurring salt solution that renders the bamboo indigestible to insects.

The solution is re-used in a closed-loop system ensuring minimal impact on the immediate ecosystem.



DESIGN

The spaces rest on their foundation, carefully set in the earth's natural contour.

Firstly, To-scale structural models are created made of hand-whittled bamboo sticks. These models are replicated in 3D line in computer programs for engineers to study and confirm that the building adheres to codes.

Architects and engineers then follow the project in depth through completion.



CONSTRUCTION

For construction, collaboration is done with teams of skilled bamboo craftsmen.

Onsite, these craftsmen measure and replicate the bamboo model, building these structures almost entirely by hand.



Synthetic Bamboo & Bamboo Fabric

Material

PROCESS

They are generally synthetic rayon made from cellulose extracted from bamboo. Bamboo is used whole and in strips; these strips may be considered stiff fibers.

Synthetic Bamboo Poles are created using molds taken from natural bamboo directly. This unique manufacturing method allows us to offer a natural-looking and long-lasting alternative to natural bamboo poles. They are suitable for decorative purposes and can also be reinforced with metal for structural applications. They do not rot in water and are UV resistant.



The term "**bamboo fabric**" widely refers to a number of different textiles that are made from the bamboo plant. Fabrics have been made from bamboo for thousands of years, but it is only in contemporary times that the process of making this hardy and fast-growing wood into fabric has been perfected.



01. Colors

Available in two standard tones: "sundried" and "brown". Custom color available for the full container order.



02. Textures

Weathered finishes can be added to deliver a perfect reproduction of aged bamboo sticks.



03. Diameter

Available in six standard diameters: 1" (25mm), 1.5" (40mm), 2" (50mm), 2.5" (65mm), 3" (75mm), 4" (100mm).



01. Fire Retardant



02. Weather Resistant



03. Mold Resistant



04. Non-Toxic

Fabric also known as	Bamboo rayon, bamboo yarn, retting, bamboo linen
Fabric composition	Semi-synthetic viscose cellulose extracted from bamboo or yarn made from bamboo fibers
Fabric possible thread count variations	300-600
Fabric breathability	Very breathable
Moisture-wicking abilities	High
Heat retention abilities	Medium
Stretchability (give)	High
Prone to pilling/bubbling	High
Country where fabric was first produced	Countries in East Asia
Biggest exporting/producing country today	China

Tropical Architecture

Strategy Samples

Stress of a Tropical Climate

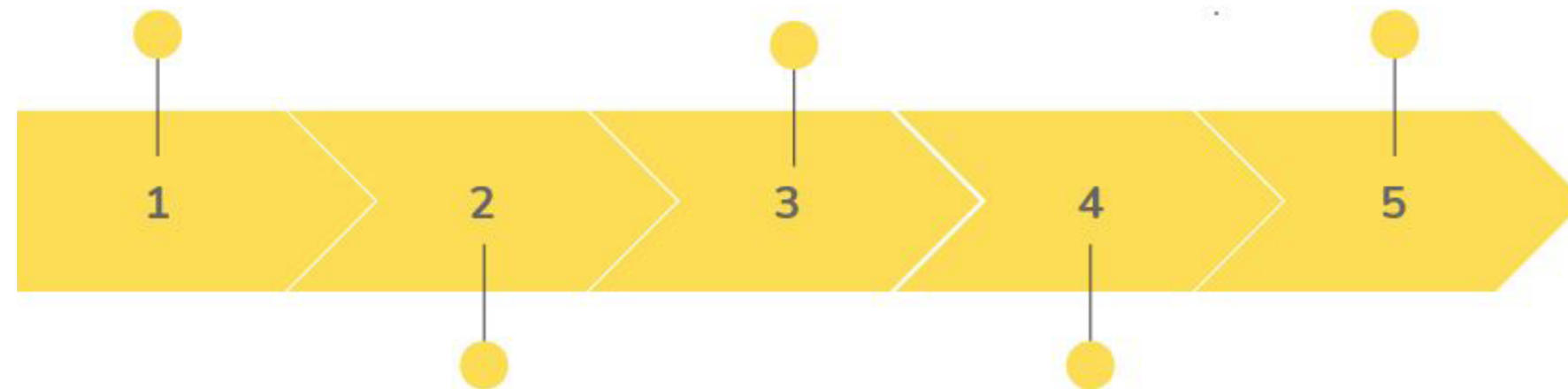


Factors to consider for Tropical Design

Sun path changes throughout the year in changing season of summer and winter. Reduce amount of radiation and improve light distribution.

Lack of breezes during hottest days can be a problem in achieving natural ventilation. In this situation, it is important to design in a way to encourage convection flow.

Building orientation for maximum intake of prevailing wind.



Passive ventilation

Effective natural ventilation reduces energy intensive air conditioning. Air movement creates a feeling of cool by evaporating the moisture from the skin. The two principals are cross ventilation and stack ventilation.

Removing Hot air

Design in a way that convection air flow can remove hot air from the building - hot air rises and exits from the highest point and draws in cool air in the building.

From a broader perspective, it is obvious that architects must make efforts to reduce the ecological footprint of humanity. The response begins by proposing a change of attitude, providing the resource of knowledge in this process and involving science and technology where appropriate.

This attitude aims to incorporate the least amount of equipment to achieve solutions without sacrificing architecture. It combines wisdom with innovation. It is our conviction that an architecture with more design than technology is a valid way to calibrate our attitude and tune architecture to nature.

To achieve this, the building project as a whole must be optimized, rather than concentrating on solving isolated parts and seeking partial benefits, such as lighting, energy consumption, or recycling of materials and water.

This is equivalent to considering it as a totality that perfects its relationship and balance between resources and consumption in the immediate environment.

LET REVIEW

Sea Synergy Marine Awareness and Activity Center

Environmental Strategy

Mission

Seacology's mission is to protect threatened island ecosystems all over the world. They do that by working directly with communities, helping them to preserve their cultures and improve their lives while saving precious island habitats.

At Seacology, environmental issues are human issues. When an island community wants to protect a forest or marine area, a grant is offered that will benefit the whole community—for example, a school, ecotourism center, or water system. In return the community strives to save their ecology.



Approach

Seacology, in collaboration with Sri Lanka-based NGO Sudeesa, is working to make Sri Lanka the world's first nation to protect all of its mangrove forests. The Sri Lanka Mangrove Conservation Project will protect all 21,782 acres (8,815 hectares) of Sri Lanka's existing mangrove forests by providing alternative job training and microloans to approximately 12,000 impoverished women.

The project will also replant 9,600 acres of mangrove forests, using seedlings raised in three Seacology-funded mangrove nurseries. In exchange for receiving microloans to start small businesses, all 1,500 communities will be responsible for protecting mangrove forest.

Activities

Sea Synergy is a Marine Awareness and Activity Center that offers interactive marine wildlife and heritage exhibition, as well as a variety of meaningful activities, workshops, and adventures that empower all ages.

Guided tours and adventures are provided by marine biologists to facilitate a greater connection to nature. Mission is to create meaningful experiences in nature for individuals or groups which are tailored to their needs and enable them to discover the rich diversity of Ireland's environment.



<https://www.seasynergy.org/tours/>

Preservation of Mangroves

Environmental Strategy

Characteristics

Mangroves are higher plant that grow along shallow water coastal areas. Salt tolerant; evolved means to live in saltwater their seeds disperse by seawater.

Importance of Mangroves

1

Mangroves provide hiding places for the young animals.
Aquaculture and fisheries are dependent on mangrove forests.
A hectare of mangrove can produce one ton of fish per year.

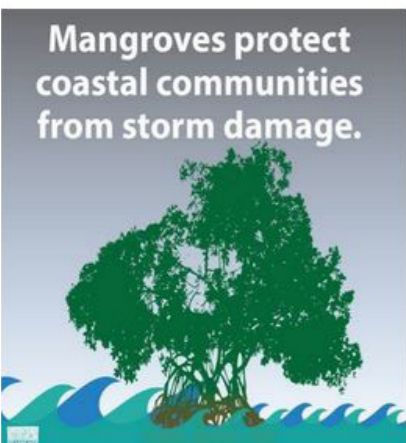
2

Source of timber, dyes, and medicine.
Produce leaf litter and decayed matter as food for animals in the mangrove
Mangroves produce about 3.5 tons of litter per hectare, per year

3

Provide protection from waves, tidal currents.
Crown and stem of mangroves serve as physical barriers
Roots trap and hold sediments and siltation from uplands

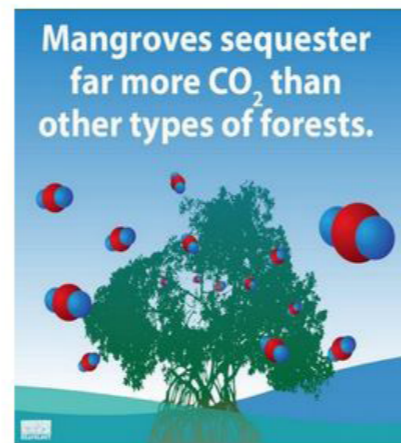
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5



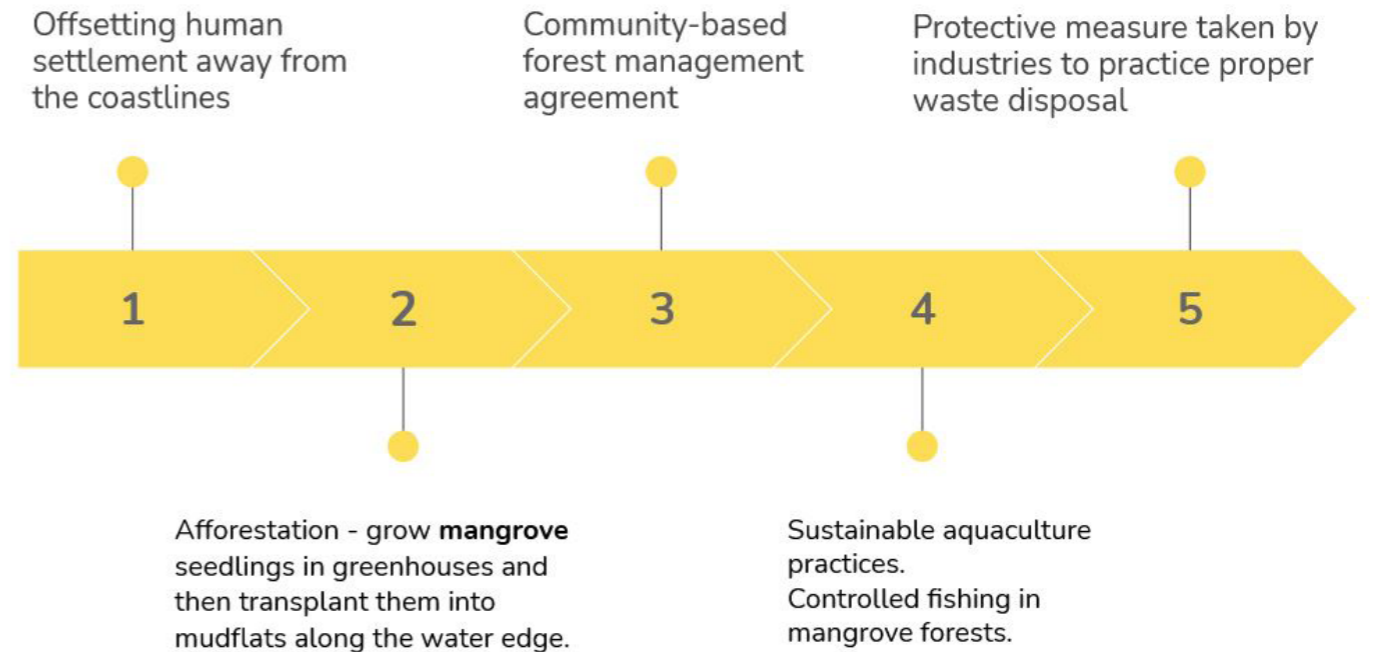
6



The Threat

Construction	Untreated waste	Human Activities
<p>Construction of structures to obstruct waterways</p> <p>Urbanization</p> <p>Reclamation - Sometimes marshy land is drained and filled, so people can build houses or hotels</p>	<p>Dumping of waste material</p> <p>Pollution, effluent release and siltation</p>	<p>Mangroves' ability to flourish along tropical coastlines makes them vulnerable, because many coastal areas are popular places for agriculture, homes, or tourism. In the past 100 years, it's estimated that the global mangrove population has been cut in half.</p>

Solutions

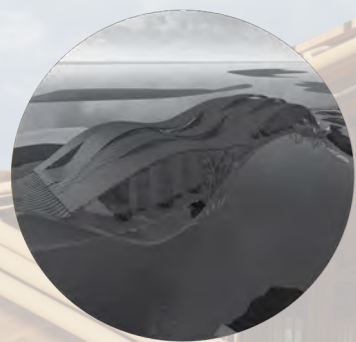


Rahman, M.M., Jiang, Y. & Irvine, K. Assessing wetland services for improved development decision-making: a case study of mangroves in coastal Bangladesh. Wetlands Ecol Manage 26, 563–580 (2018). <https://mangroveactionproject.org/>

LIT REVIEW

SLICING THROUGH

CLOSER LOOK



OVERVIEW

EXTERIOR LOOK

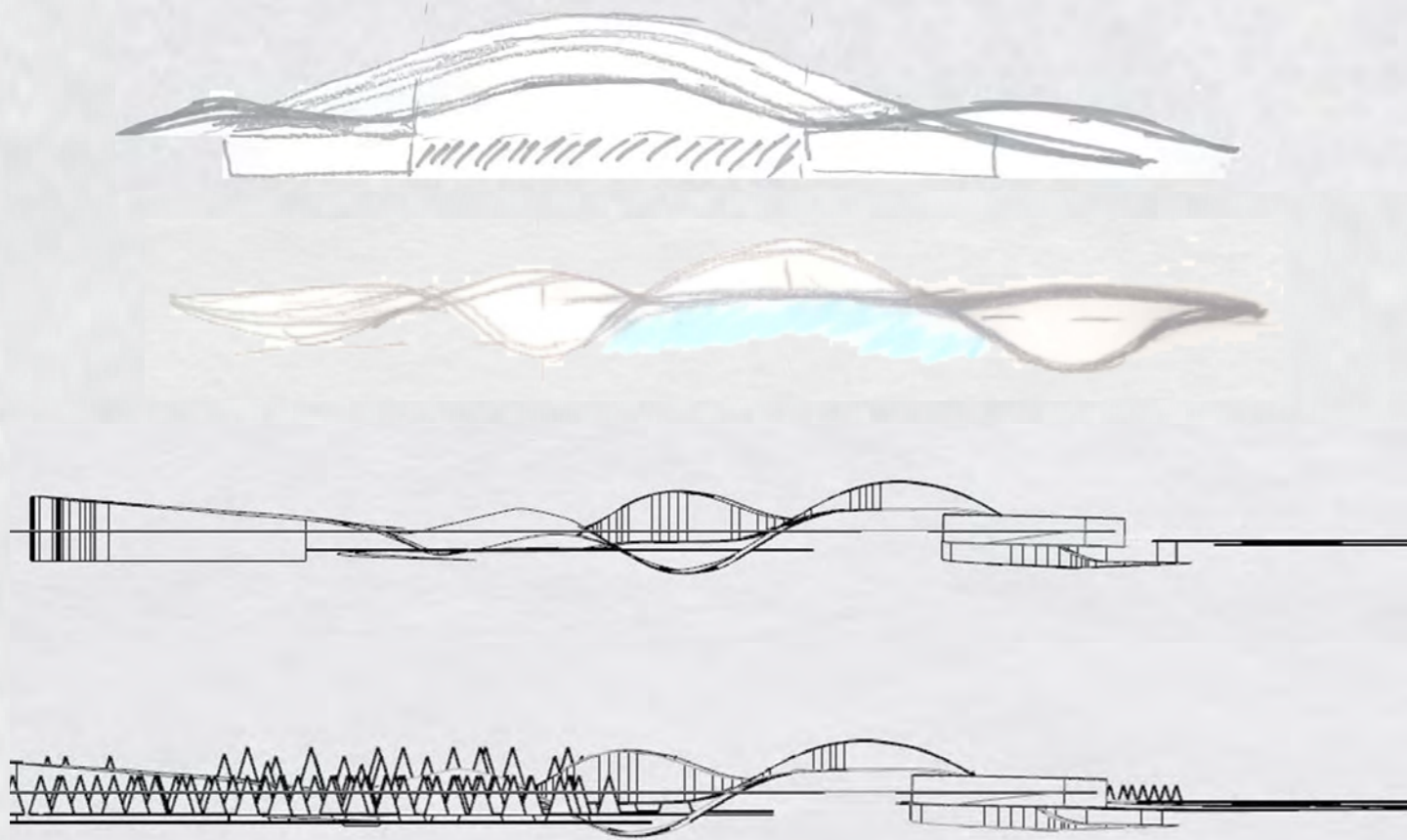
GET INSIDE

CONCEPTUAL

ENVIRONMENTAL



CONCEPTUAL



Reference .

- topography
- hydrology
- wetland + existing wildlife
- sun / wind .
- views .

→ Environmental

- waste water management
- bioswales
- use sustainable material
- less intensive construction .
- save wildlife .

→ Socio-culturally

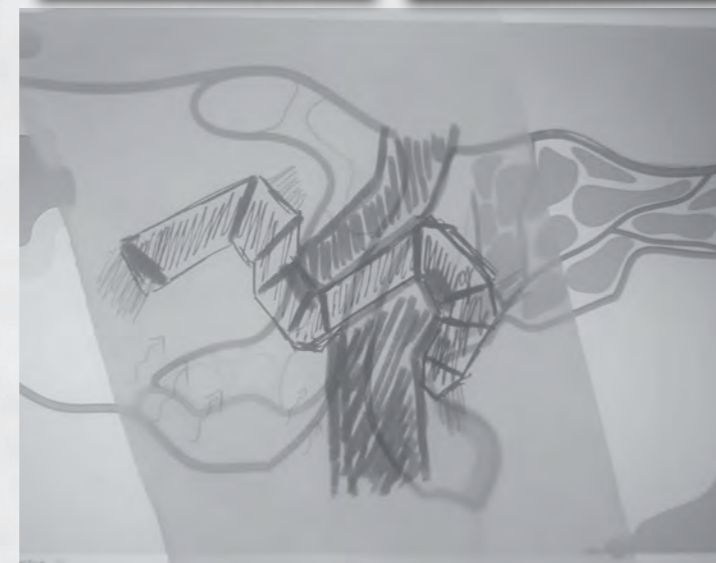
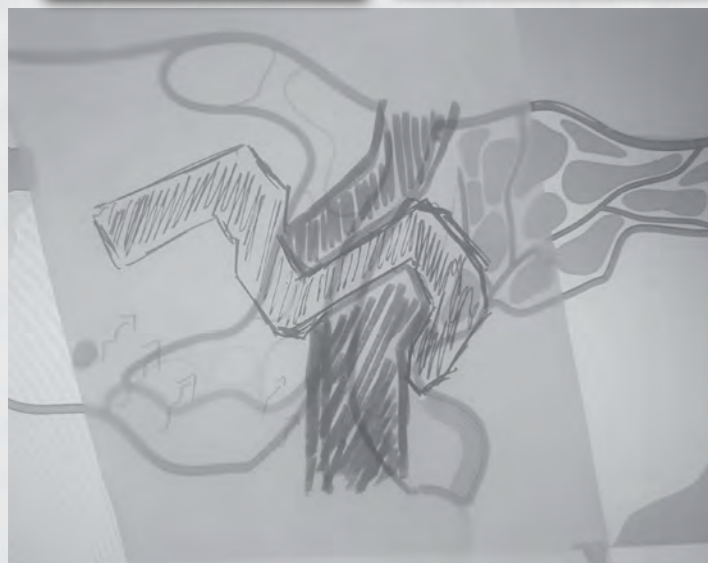
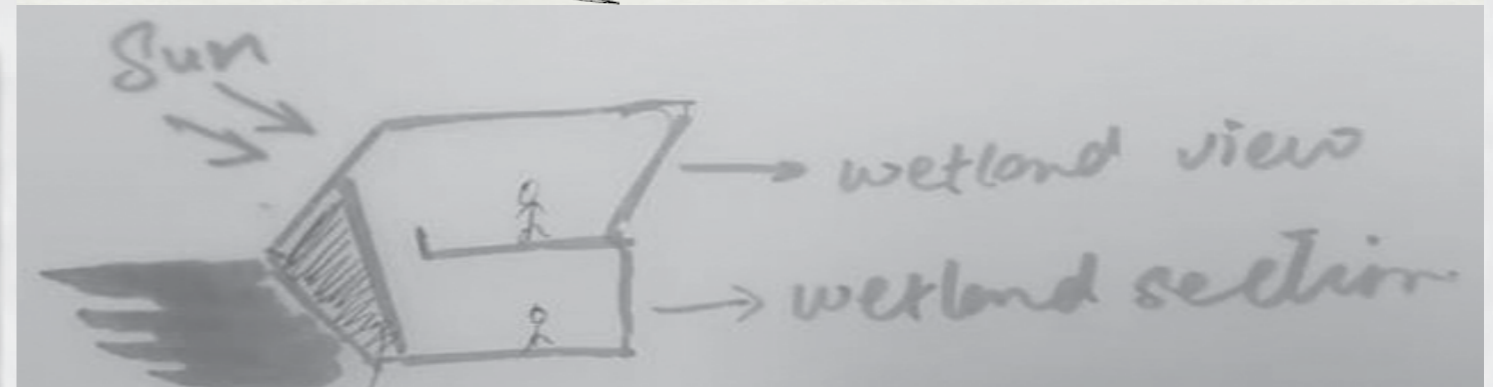
- nature escape
- clean env
- awareness center .

→ economically

- tourism

→ aesthetically

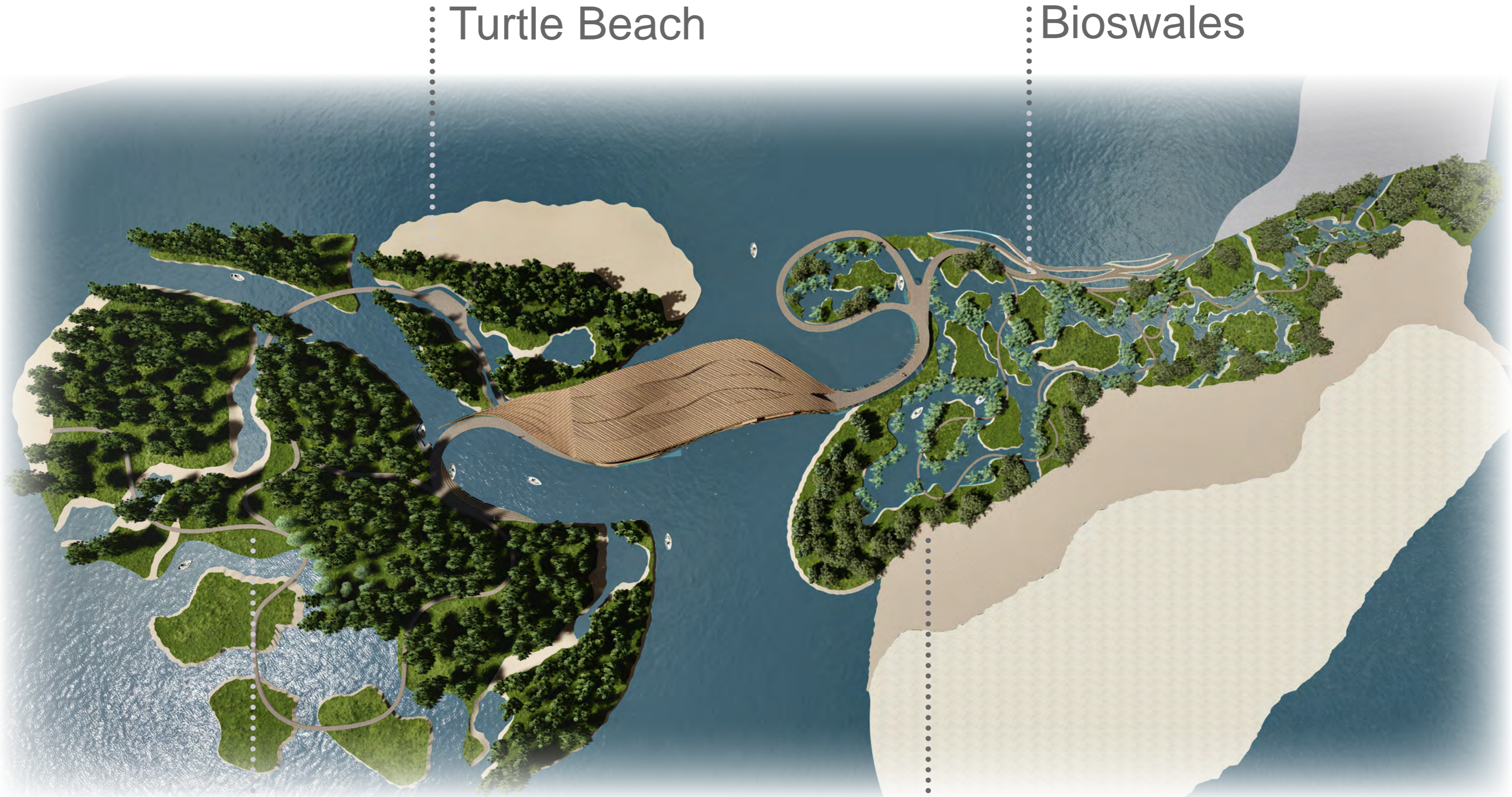
- merged in nature .



ENVIRONMENTAL

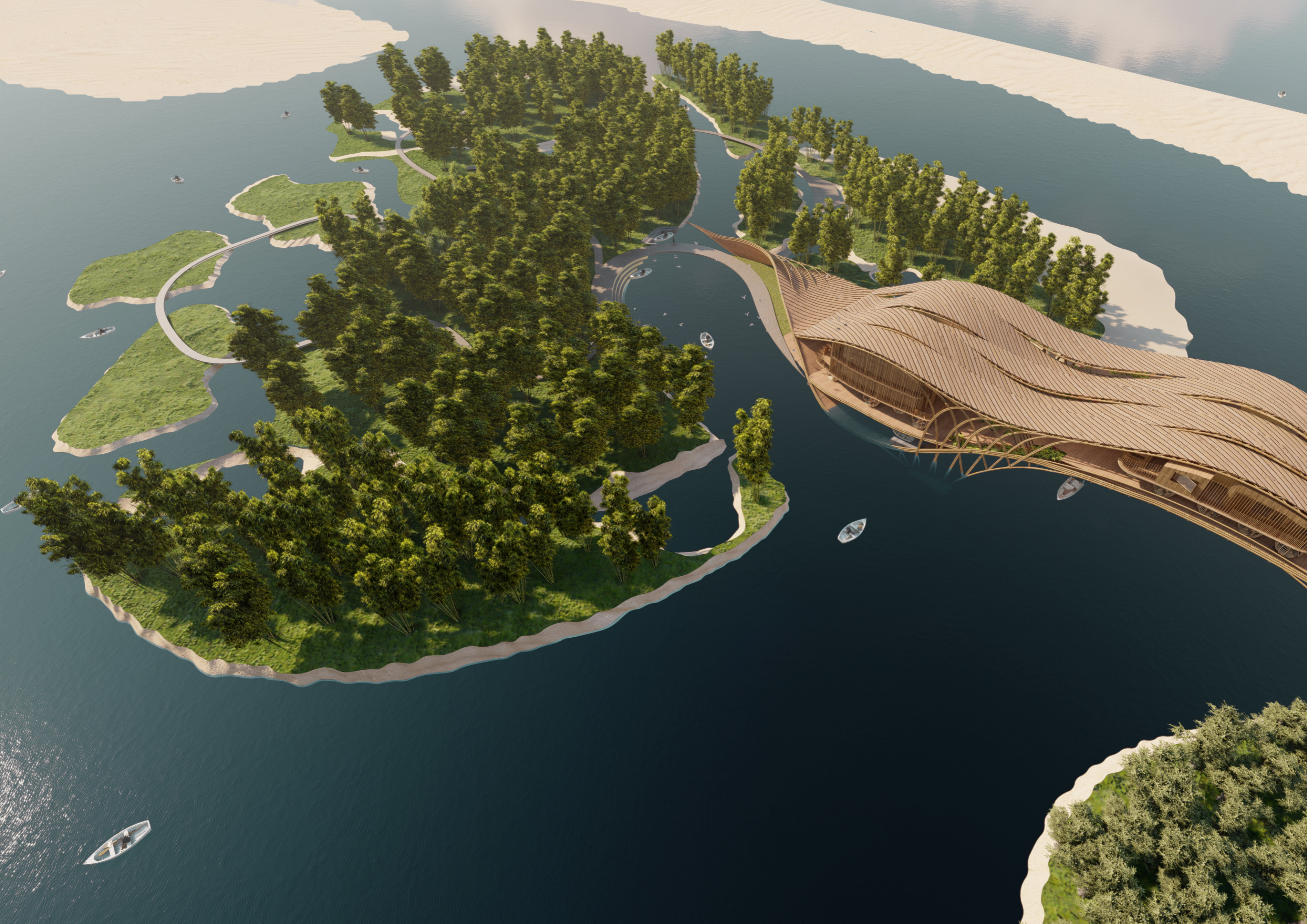
⋮ Turtle Beach

⋮ Bioswales



⋮ Bamboo Forest

⋮ Wetlands







CLOSER LOOK

OVERVIEW



EXTERIOR LOOK

GET INSIDE

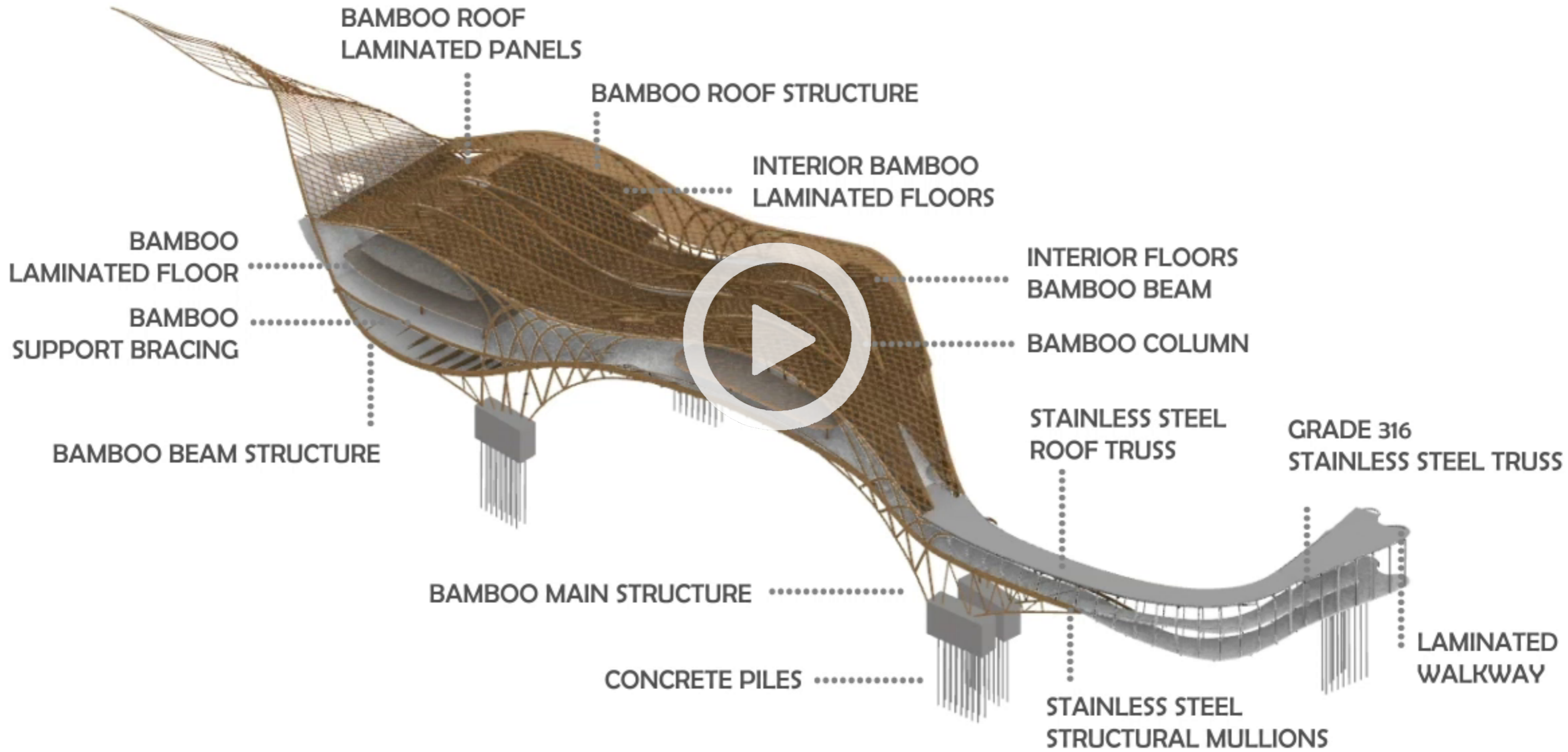
SLICING THROUGH

STRUCTURAL ANIMATION

PERSPECTIVES



STRUCTURAL





OVERVIEW

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GET INSIDE

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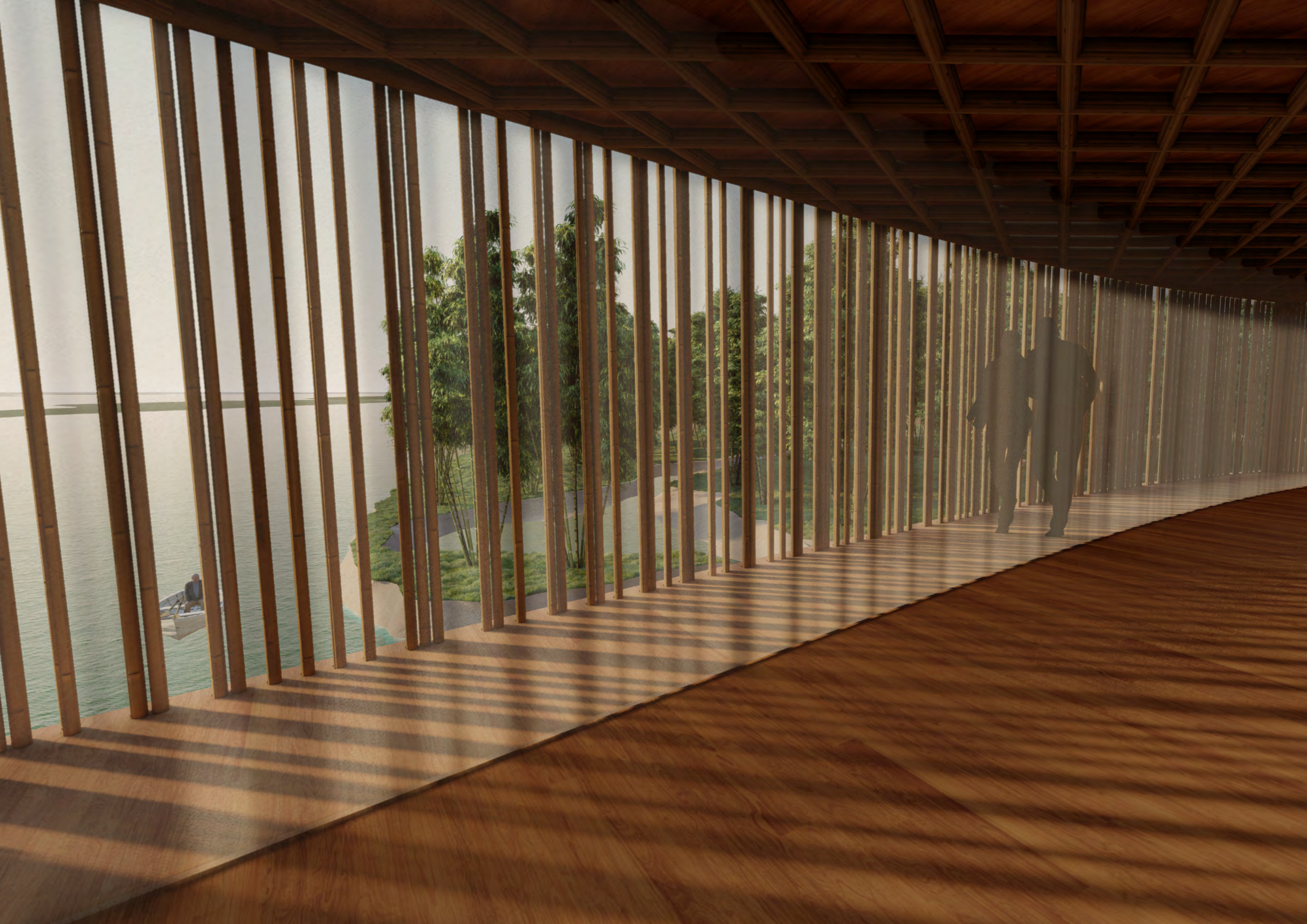
PERSPECTIVES

ANIMATION

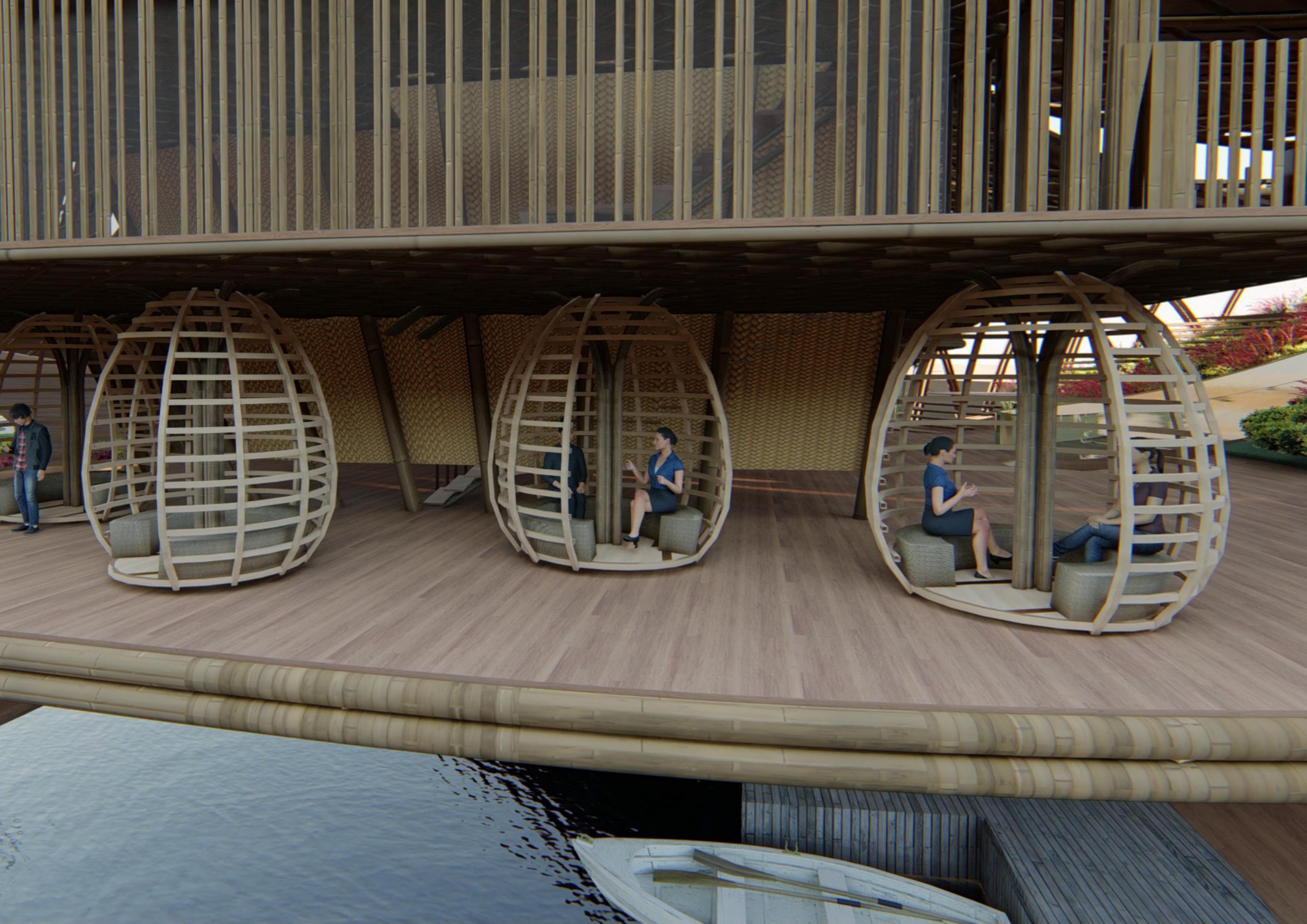


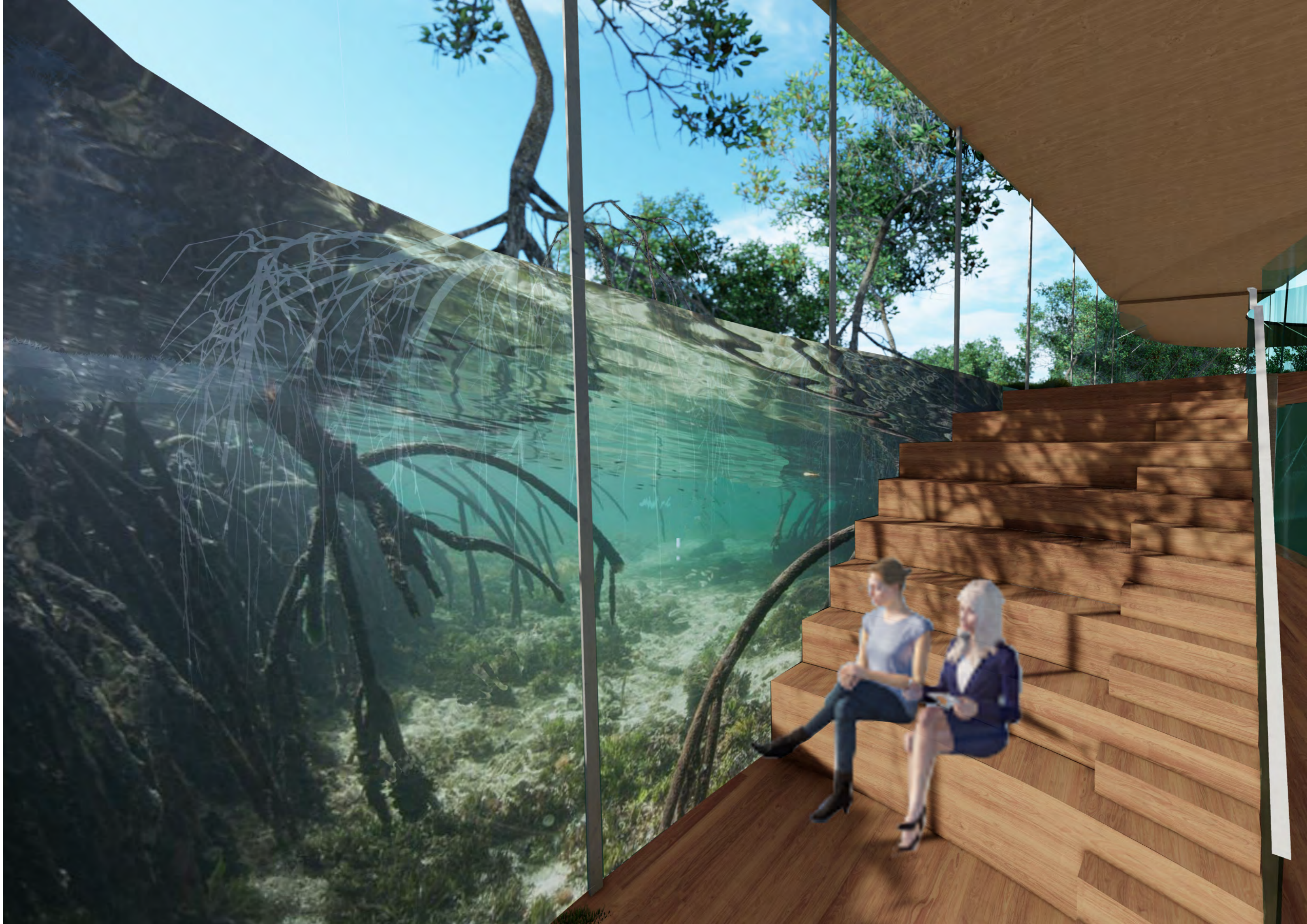


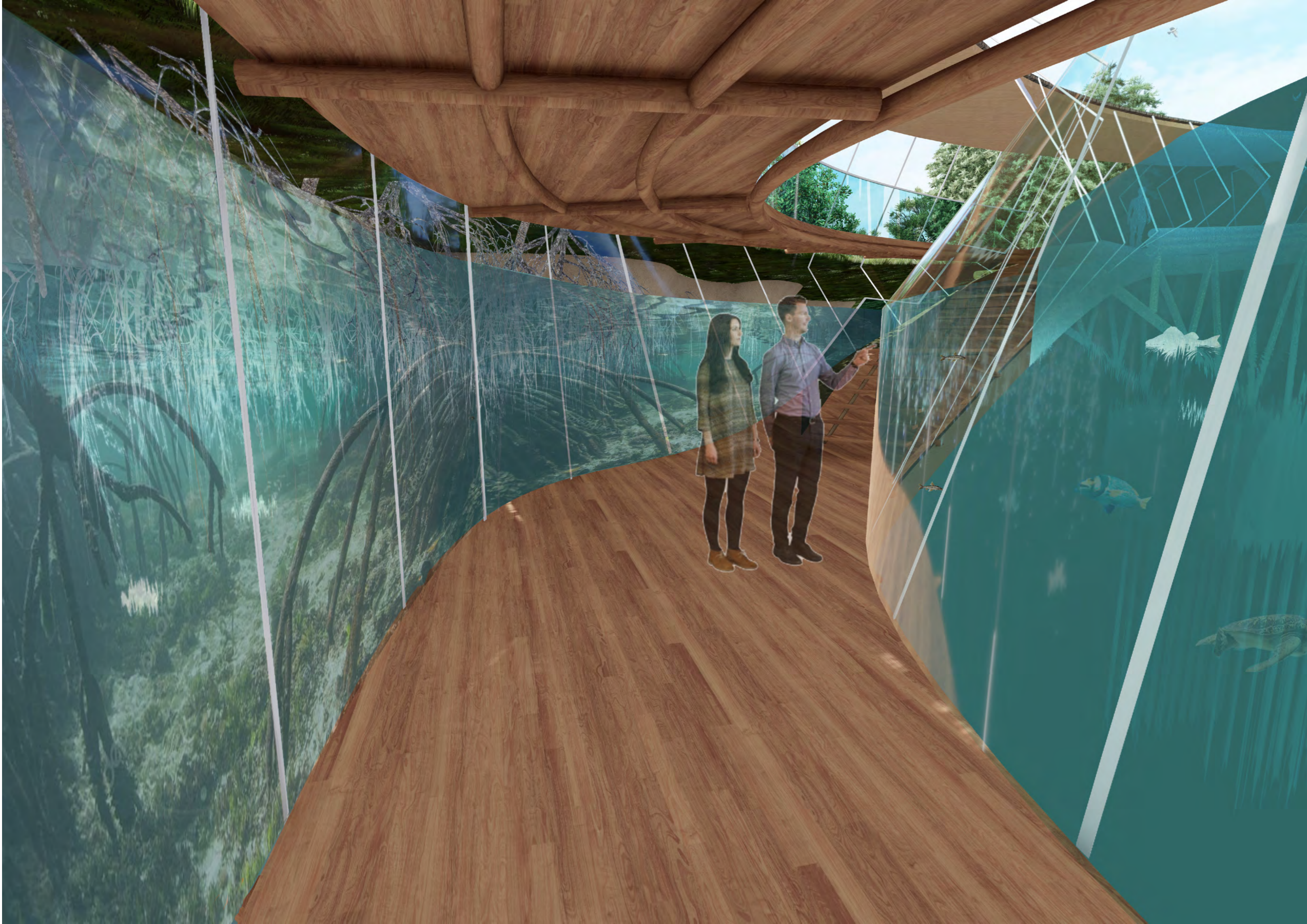














EXTERIOR LOOK

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OVERVIEW

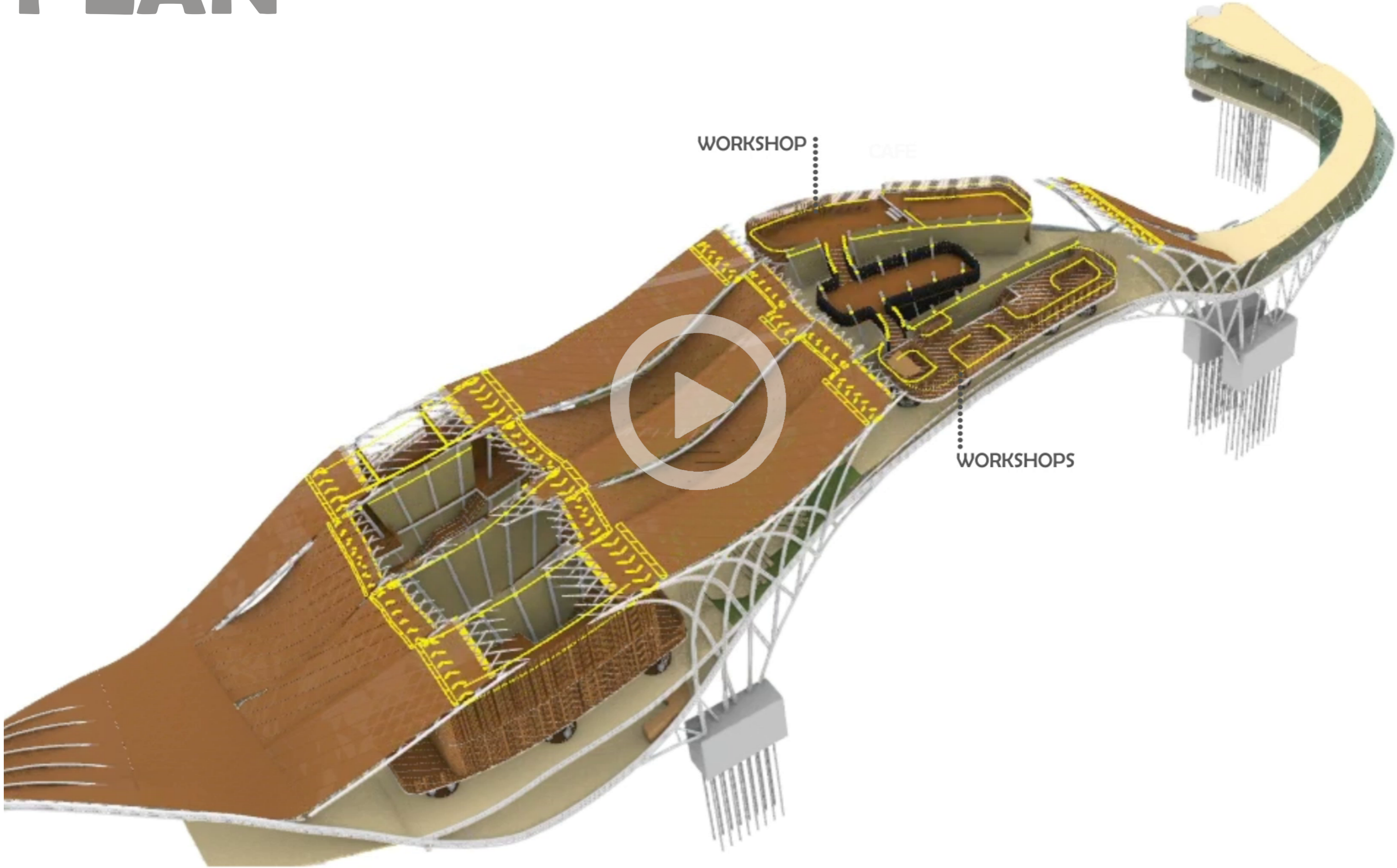
PLAN ANIMATION

SECTION ANIMATION

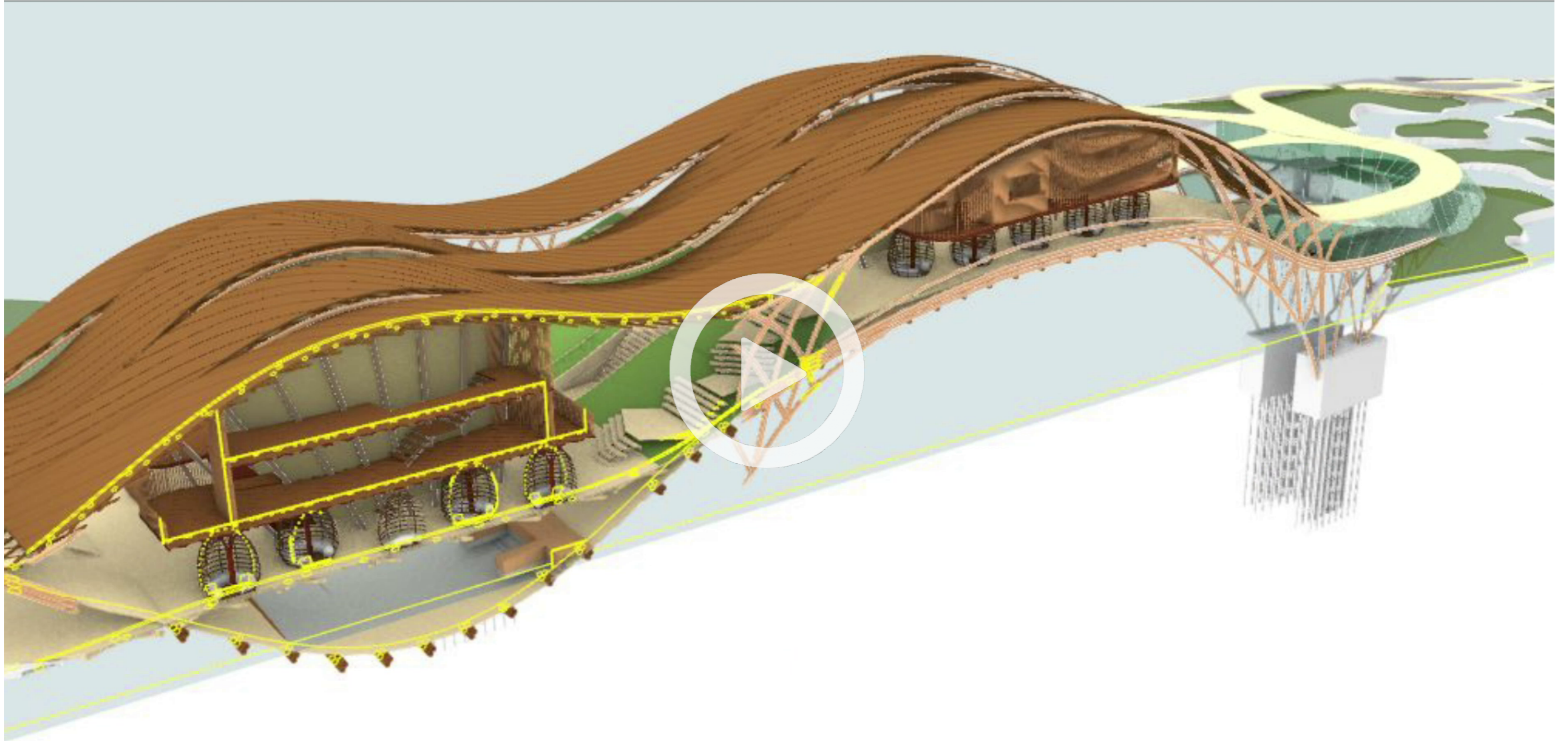
SECTION ANIMATION 2



PLAN

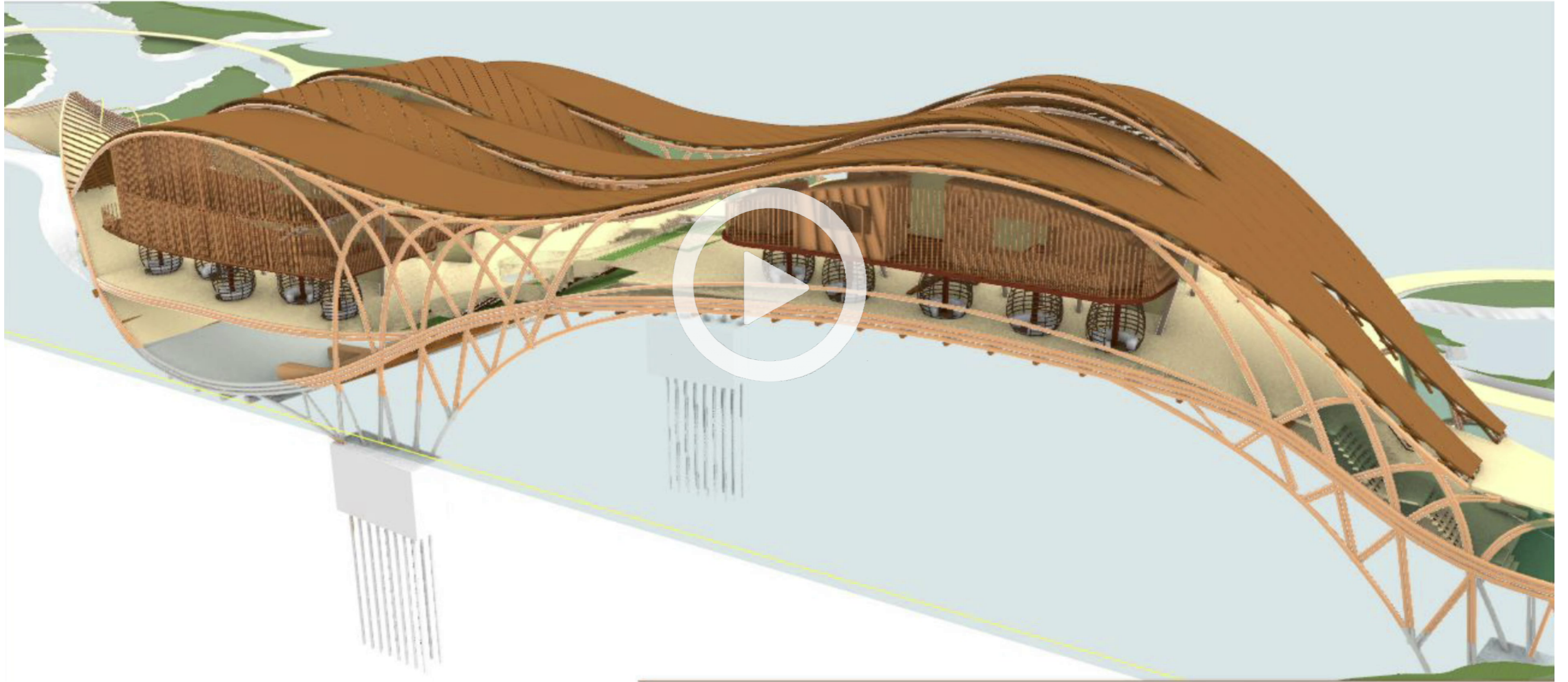


SECTION



..... SECTION 1

SECTION



GET INSIDE

SLICING THROUGH

CLOSER LOOK

WASTE WATER SYSTEM

OVERVIEW

EXTERIOR LOOK

WASTE WATER

