DEPTH

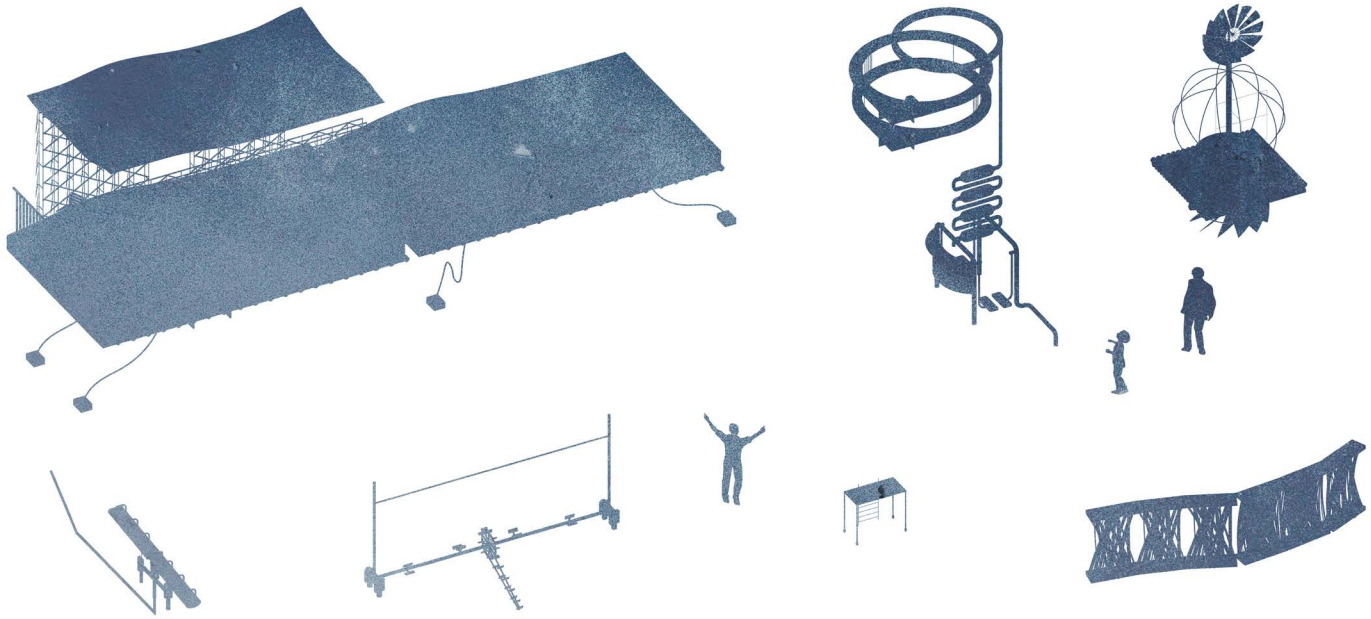
WEIYU XU
Columbia GSAPP MSAAD
Graduation Portfolio

CONTENT

01

(UN)SPONTANEOUS WATERSCAPE

GIS+Blender+Grasshopper Research



Instructed by Marco Ferrari and Elise Hunchunk
In Collaboration with Jiyoon Hwang, Linda Deng

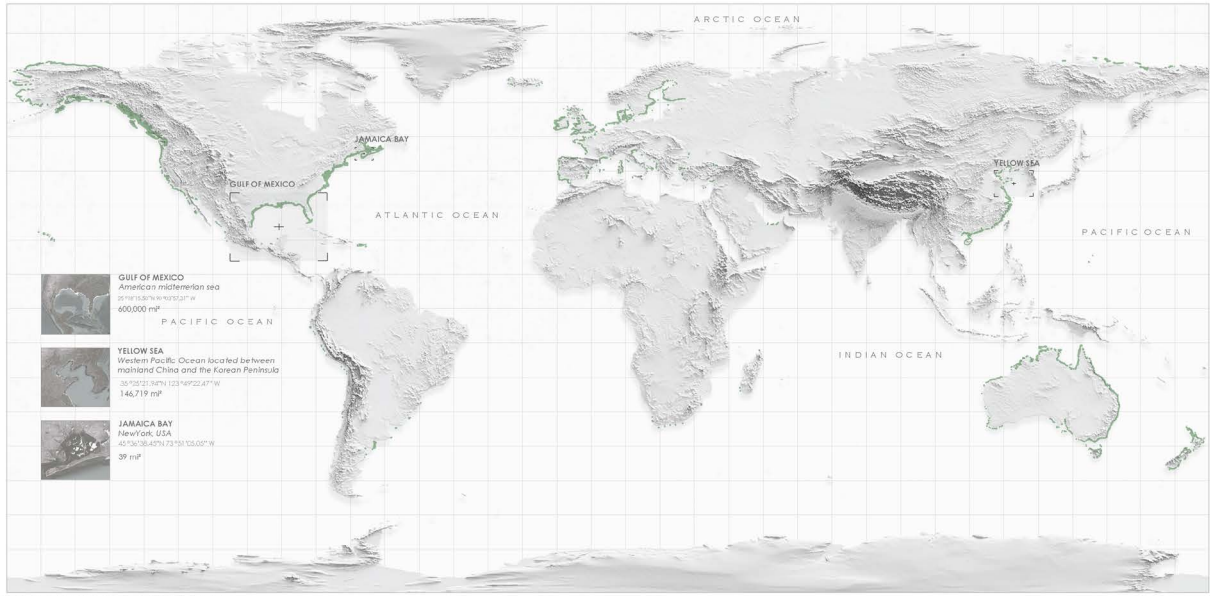
COLUMBIA GSAPP 2022 SUMMER
ADVANCED ARCH DESIGN STUDIO

WATER AS PROXY

Water is everywhere. It is shapeless, but when it runs through different media, it takes the shape of the media and becomes the proxy for it.

As long as the shape of the terrain forms a three-sided surrounding by barrier islands or peninsula, water will generate salt mash in the bay. This phenomenon also occurs in the Yellow Ocean between China and the Korean Peninsula, and the mexico bay. Highly populated, the urbanization process and industrialization in these area is threatening the salt marsh.

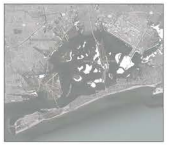
Our site, Jamaica bay in the southern coast of New York City, is a beautiful estuary in the long island, covered mostly by salt marshes. The ever-going process of degradation is caused by erosion, sea level rise and pollution, which are highly related to human activities. To understand the degradation, we have to understand human's impact on the flow of water first.



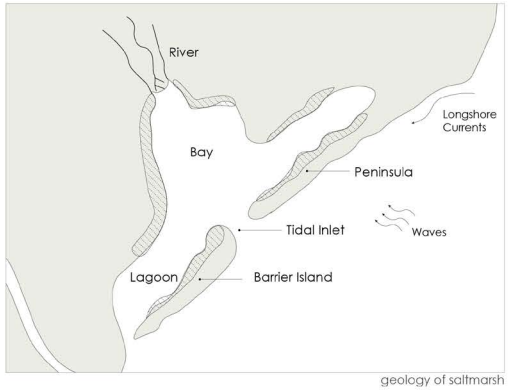
SALT MARSH IN THE WORLD ■

GULF OF MEXICO
American midterrerian sea
25 °18'15.50"N 90 °03'57.31" W
600,000 mi²

YELLOW SEA
Western Pacific Ocean located between mainland China and the Korean Peninsula
35 °25'21.94"N 123 °49'22.47" W
146,719 mi²



JAMAICA BAY
NewYork, USA
45 °36'38.45"N 73 °51'05.05" W
39 mi²

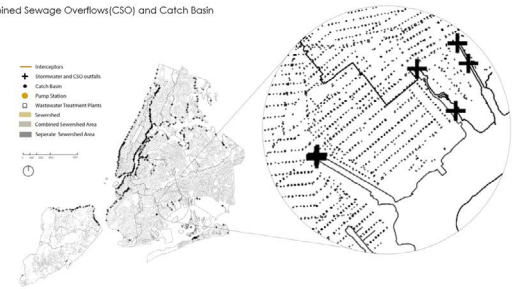


geology of saltmarsh

NYC WATERSHED

NYC SEWAGE SYSTEM

Combined Sewage Overflows(CSO) and Catch Basin

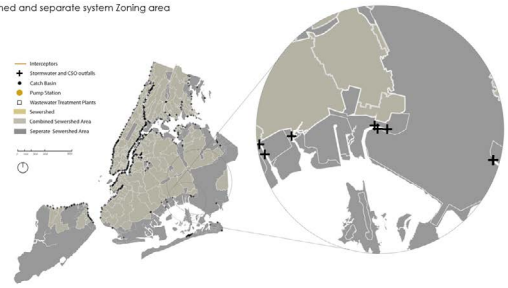


NYC SEWAGE SYSTEM

Sewer shed

NYC SEWAGE SYSTEM

Combined and separate system Zoning area



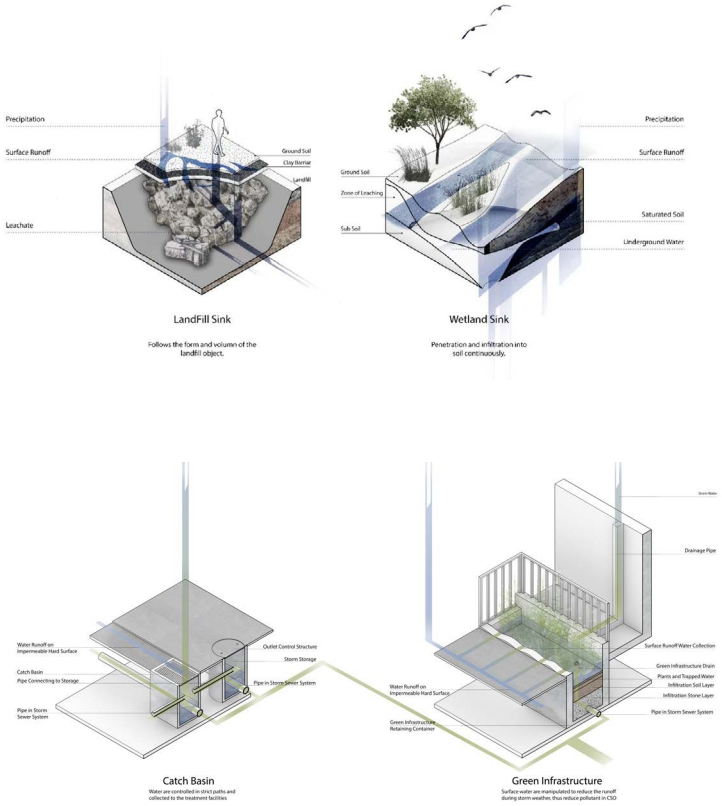
NYC WATERSHED & SALT MARSH

Water in salt marsh acts as a proxy for the blurring boundaries between urban and the seemingly 'wilderness'.

Water Shed

Elevation Data

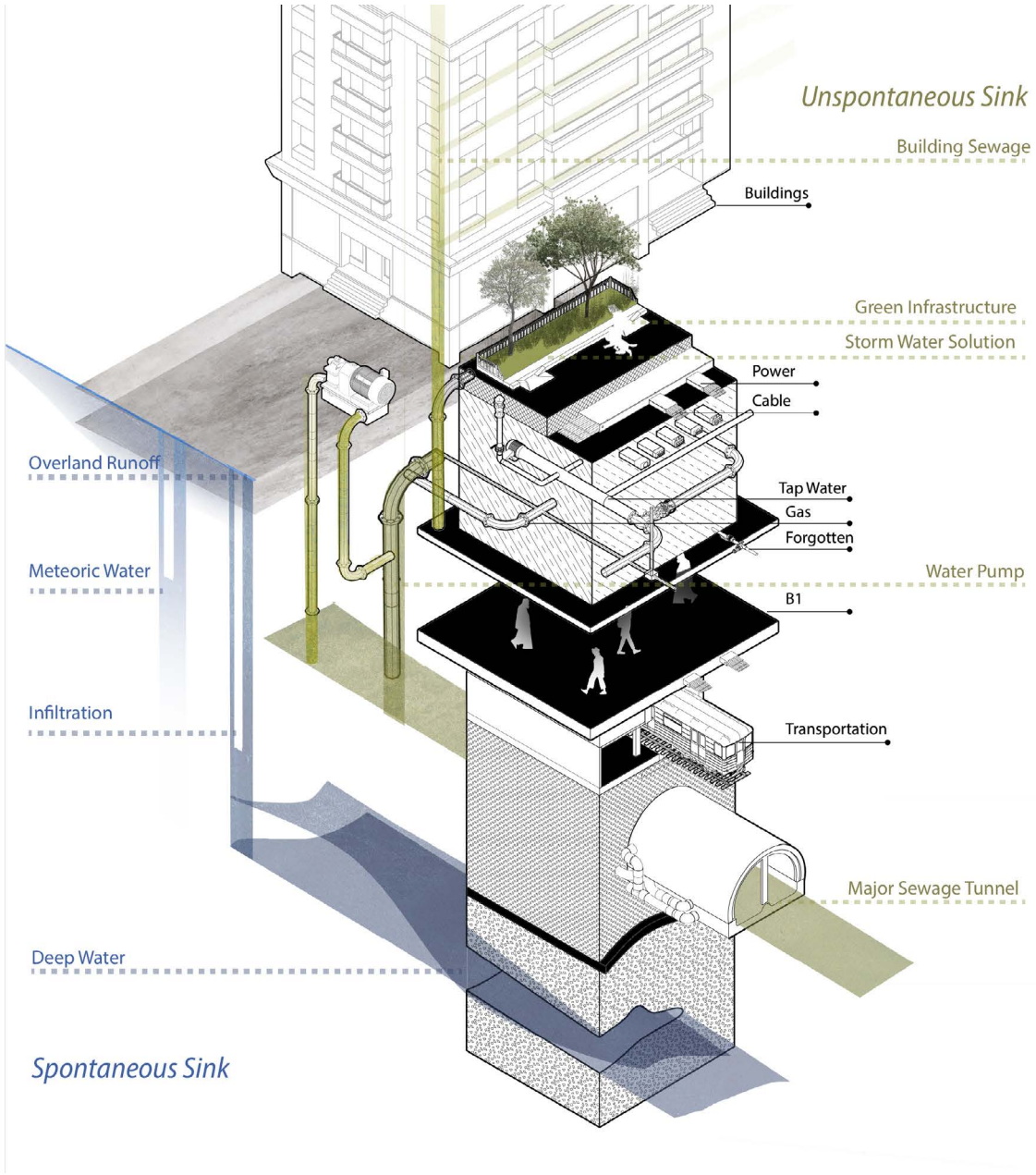
Salt Marsh Area



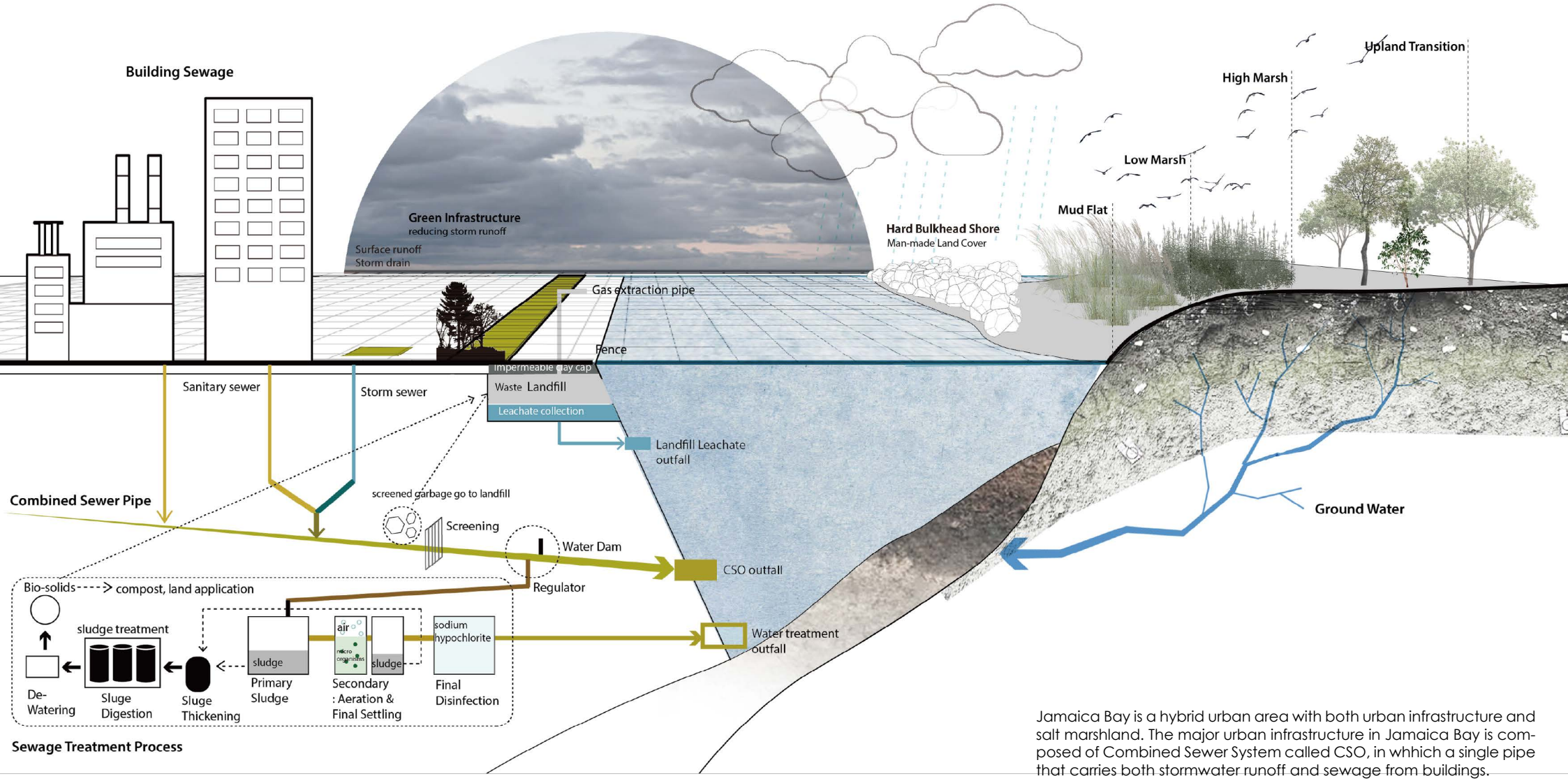
SPONTANEOUS VS UNSPONTANEOUS

The categorization of spontaneous and unspontaneous is distinguished by the power source of water flow.

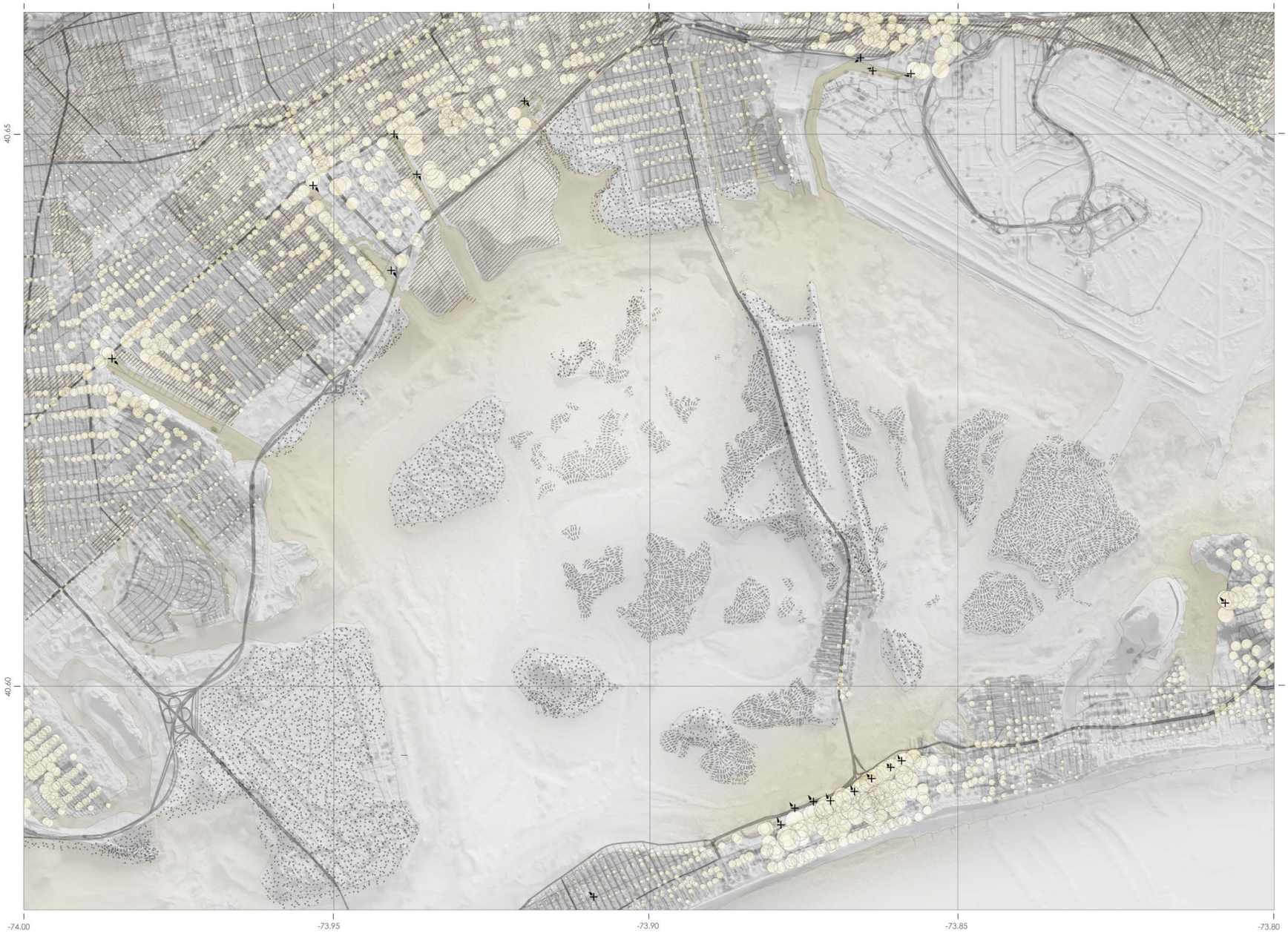
If the water is only moving because of gravity, it is a spontaneous water. On the other hand, if the water is moving because of an external force, such as pumping, collecting and blocking, then it becomes unspontaneous water. This outer force includes sewage catch basins, water treatment pumping and water dam. Different human infrastructure change the flow of water by aggregating, accelerating and stopping the flow of water.



SITE: JAMAICA BAY



Jamaica Bay is a hybrid urban area with both urban infrastructure and salt marshland. The major urban infrastructure in Jamaica Bay is composed of Combined Sewer System called CSO, in whhich a single pipe that carries both stormwater runoff and sewage from buildings.



Jamaica bay Unspontaneous Watershed

unspontaneous unspontaneous unspontaneous unspontaneous unspontaneous unspontaneous unspontaneous unspontaneous unspontaneous unspontaneous

Catch Basin

The Larger the circle, the higher the amount of water, closer to designated outfalls.

CSO Contamination

+

-

Soil

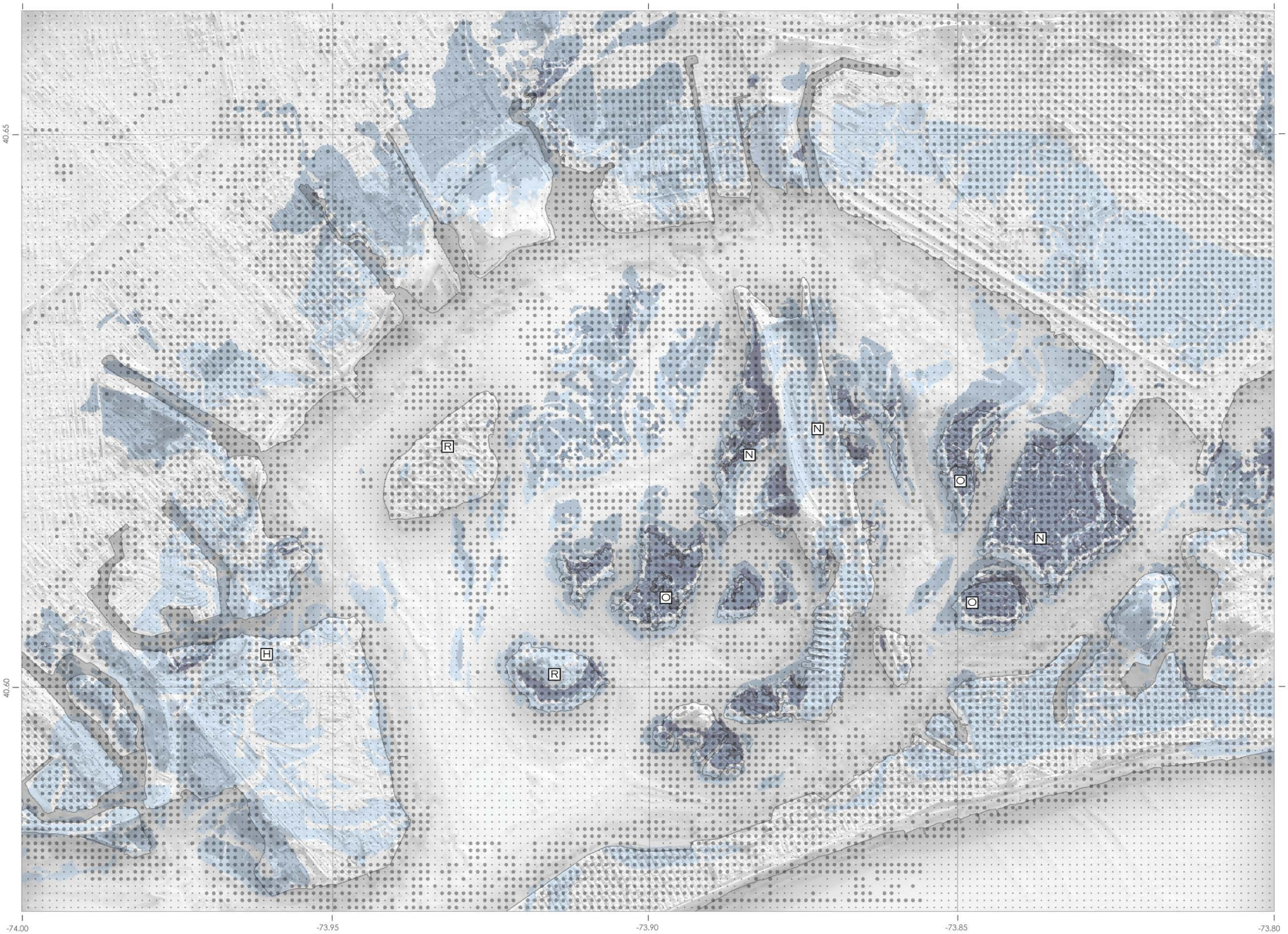
Salt Marsh

NYC Road

Polluted Area by Runoff

CSO Outfalls

Building



Jamaica bay Spontaneous Watershed

unspontaneous unspontaneous unspontaneous unspontaneous unspontaneous unspontaneous unspontaneous unspontaneous unspontaneous unspontaneous

Soil Depth

Saltmarsh 1879 1948 2011

Watershed boundaries

Bird Nesting and Migration site N

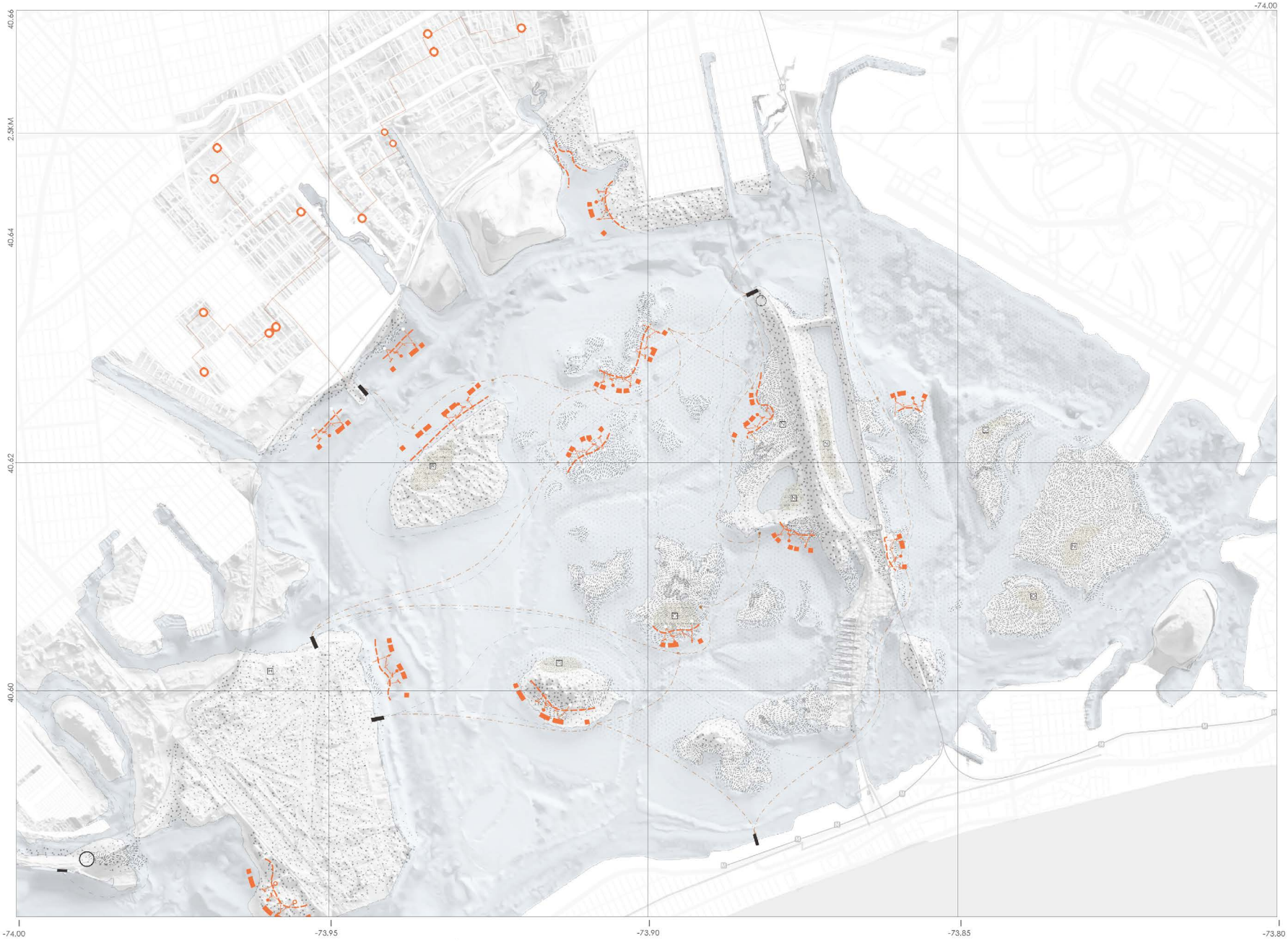
Rookery R

Osprey platform O

Herp reintroduction area H

PROXY AS PROJECTION

A total of 6 hybrid watershed machines as a way of emerge hybrid water action is projected on the site to deal with different problems in the salt marsh degradation - pollution, sea level rise and erosion. They filtrates, replace, mixing, splash and capture the water in a theatrical ways of interacting water.

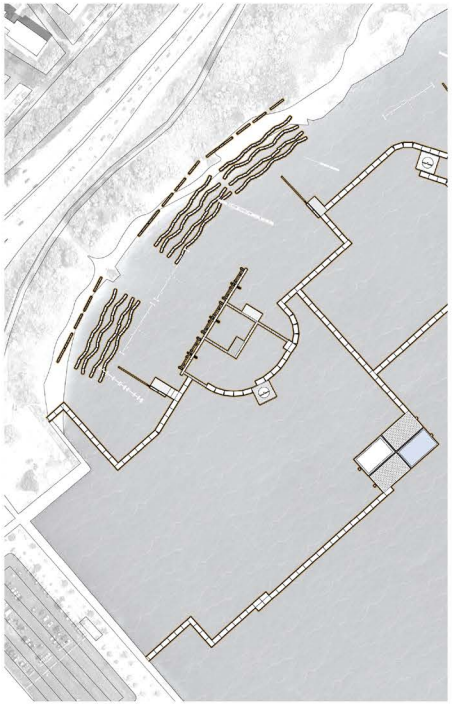


POSITIONING MACHINE ■

Machines are architecture objects as well as technical objects which actively interact with landscape.

SITE MAP

ZOOMED-IN SITE MAP
LOCATION B



ZOOMED-IN SITE MAP
LOCATION B

LOREM IPSUM DOLOR SIT AMET, CONSEC-
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UTDO CONSEQUAT. DUIS AUTEM VEL EUM

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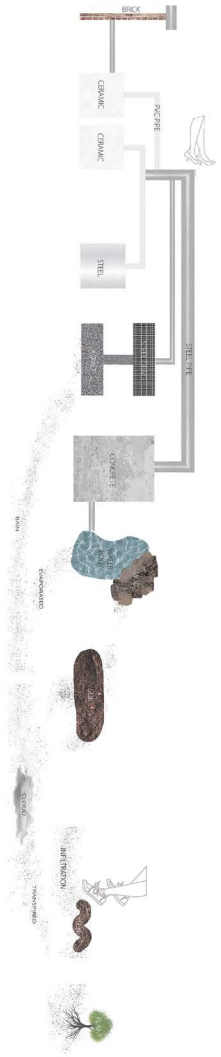
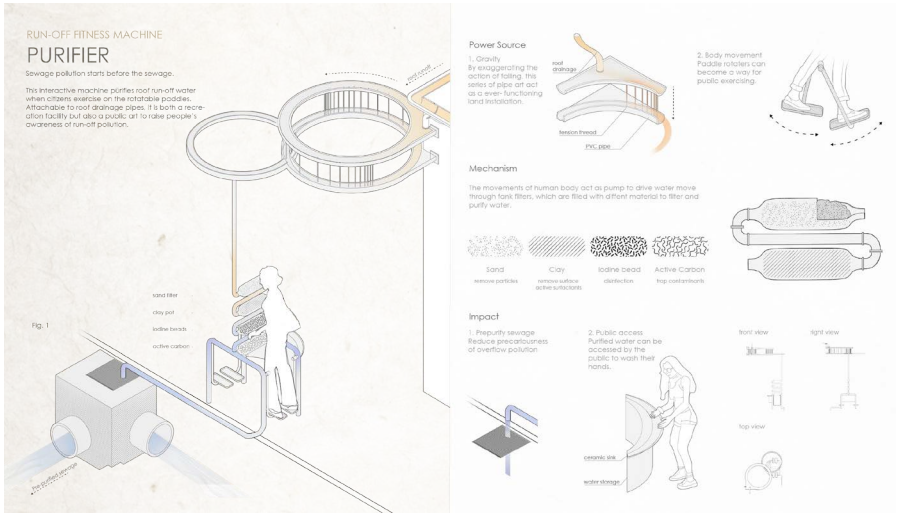
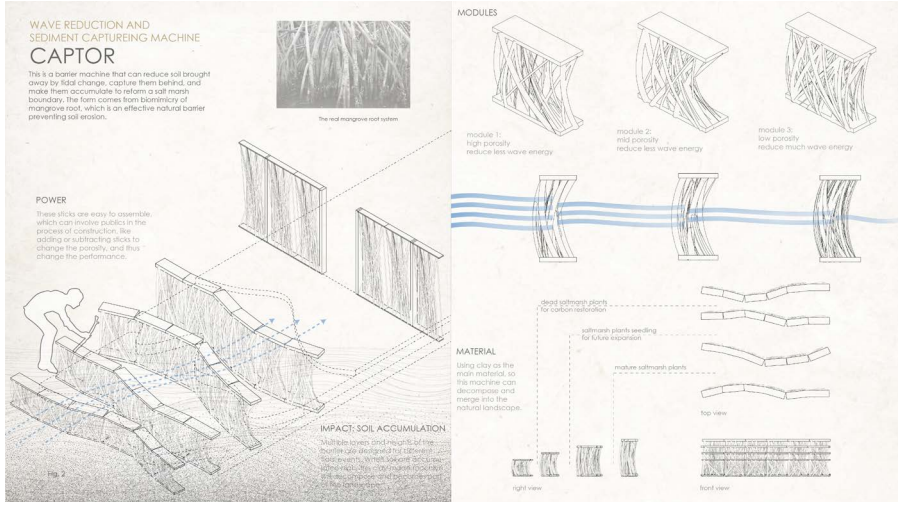




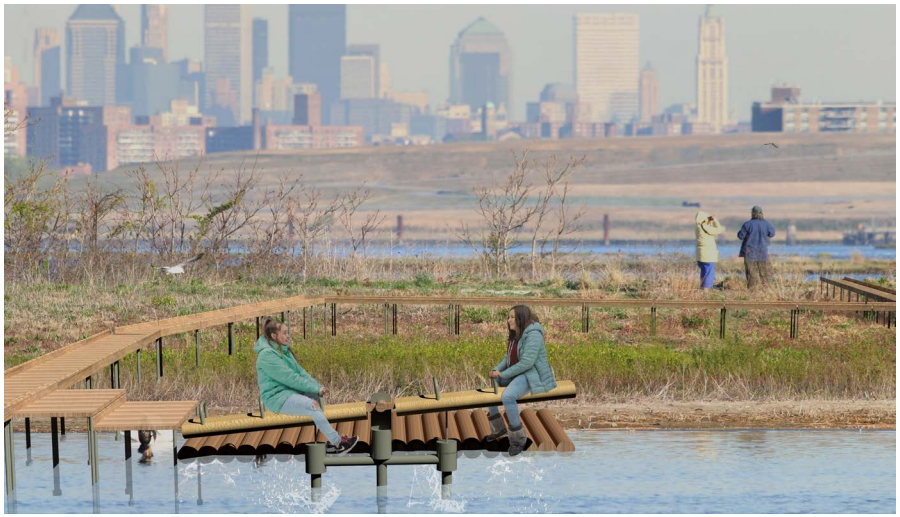
PURIFIER

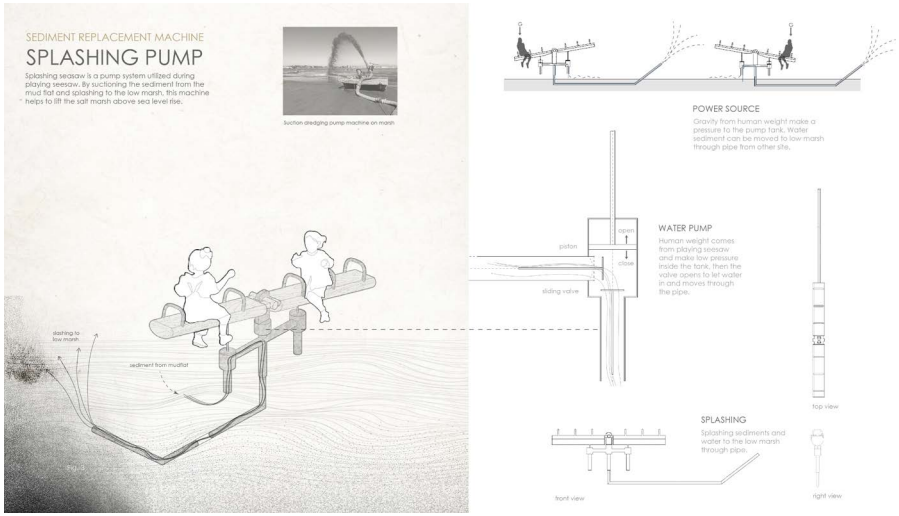
Attachable to roof
Awareness: Pollution before sewage.



BARRIER

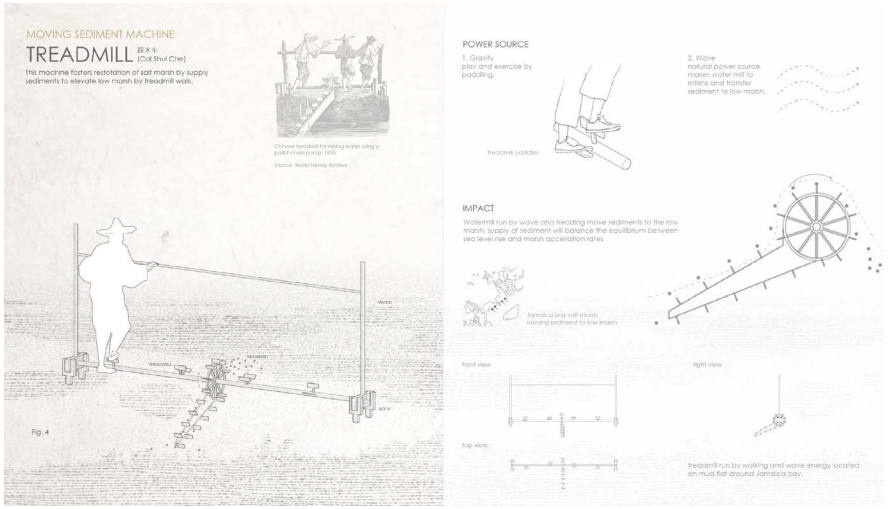
Reduce soil erosion
Accumulate salt marsh boundary





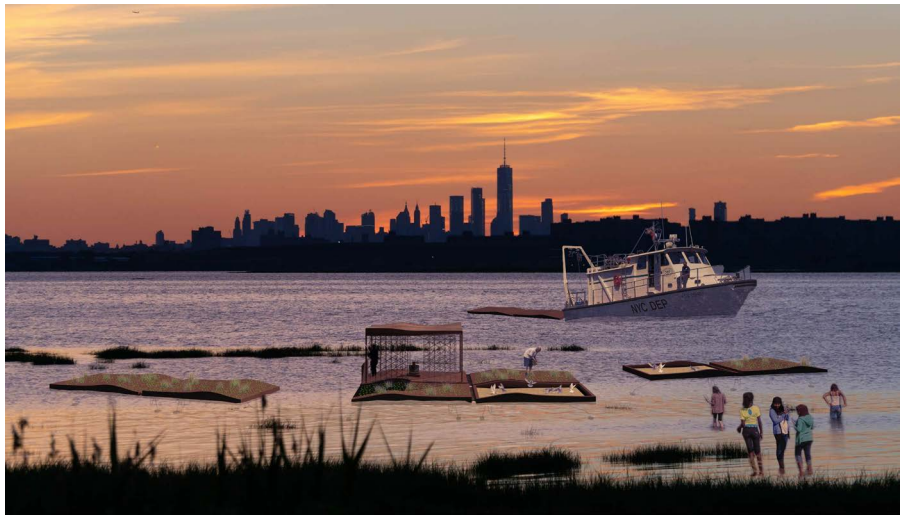
SPLASHING PUMP

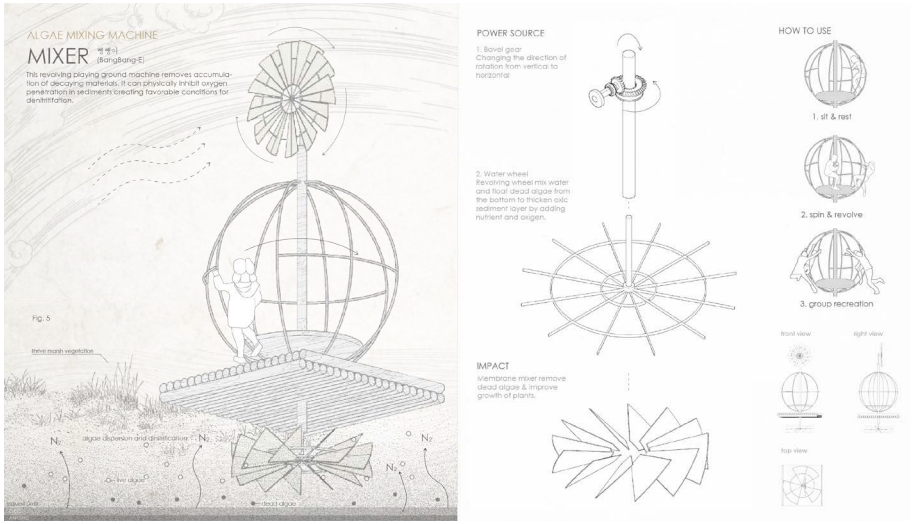
Sediment replacement
Lift the salt marsh

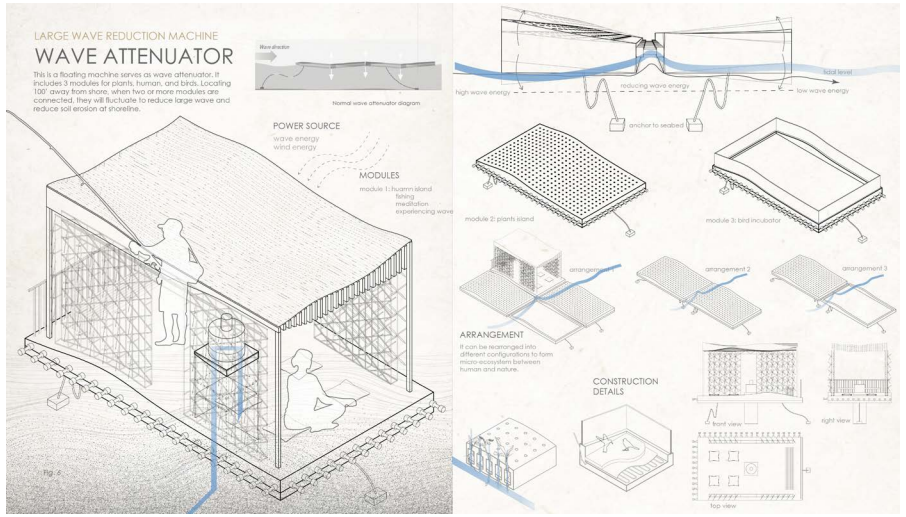


TREADMILL

Carries sediments to the low marsh.
Balance the equilibrium





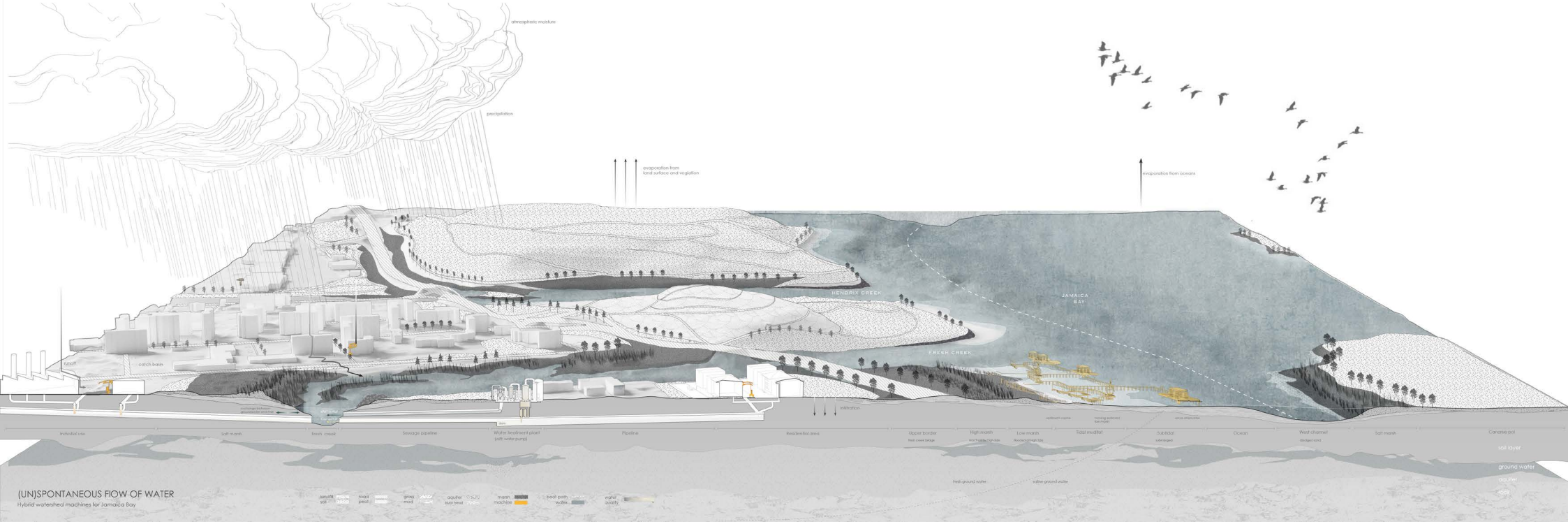


MIXER

Revolved by humans and wind.
Add nutrient and oxygen

WAVE ATTENUATOR

Reduce soil erosion at shoreline
Rearrangeable configurations



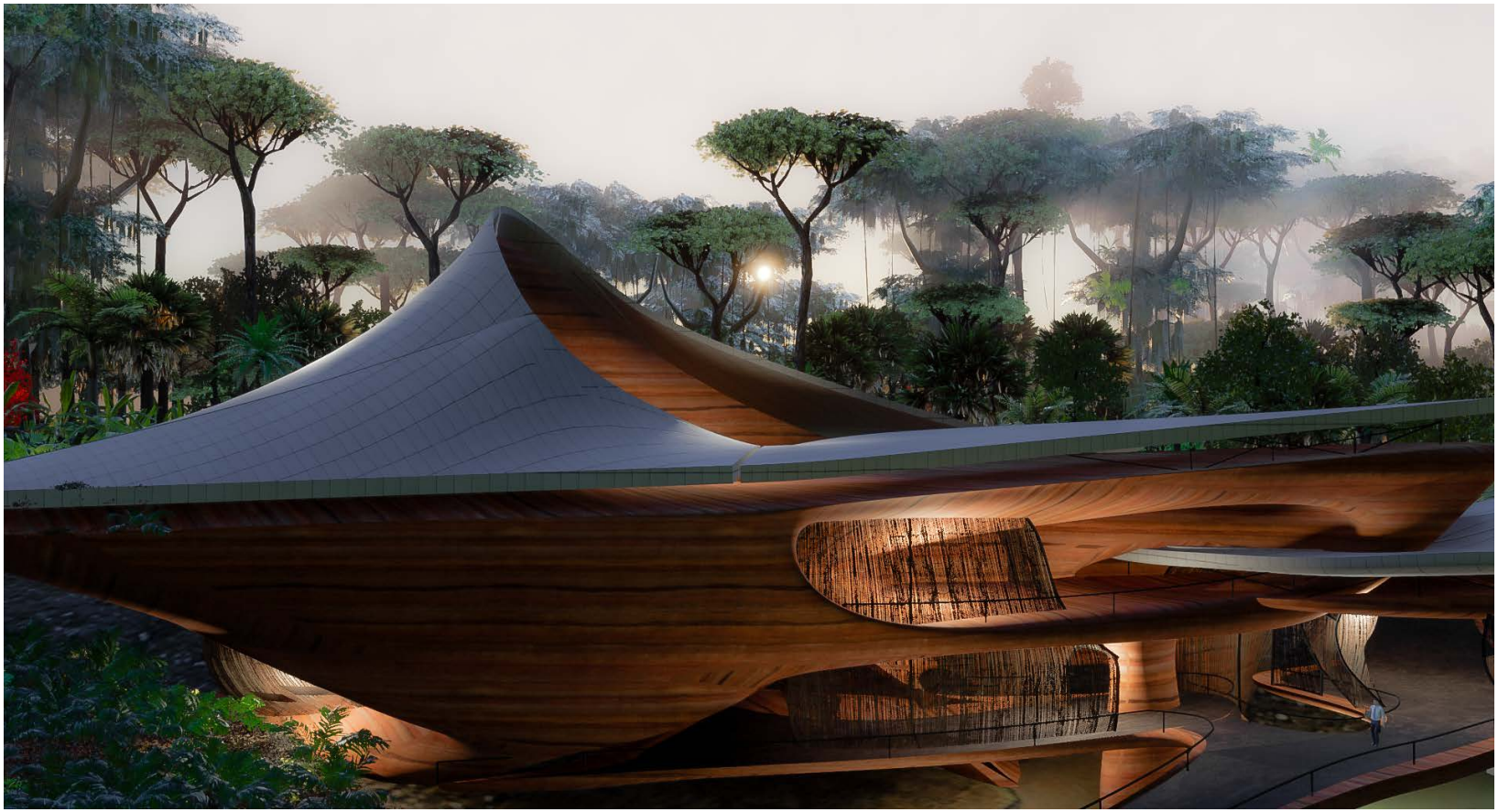
LANDSCAPE MACHINERY

Humans have been inventing machines to produce labour, profits and values. However, machines in our project are invented as imaginations for a different kind of labour on landscapes. Instead of exploiting the landscape, the 'labour' is actually a playful way for human and all species to experiment, interact with landscape.

02

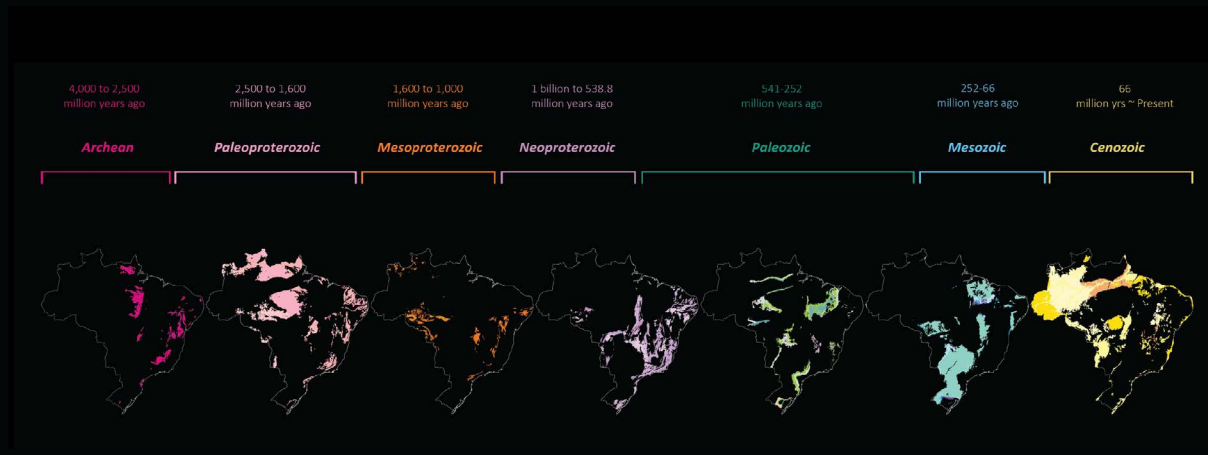
THE ABOVE AND BENEATH

Imagining 2180 Brazil



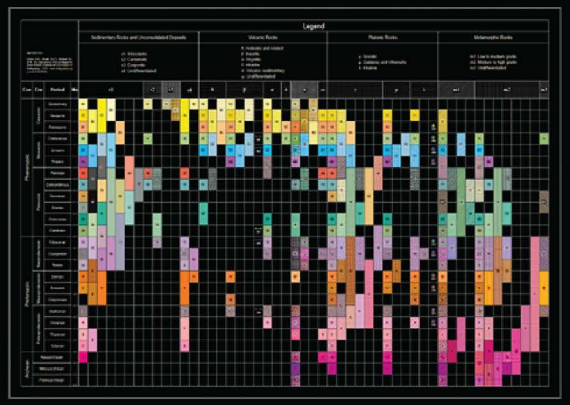
Instructed by Vanessa Keith & Andrew Homick
Collaboration with Annet Kennady

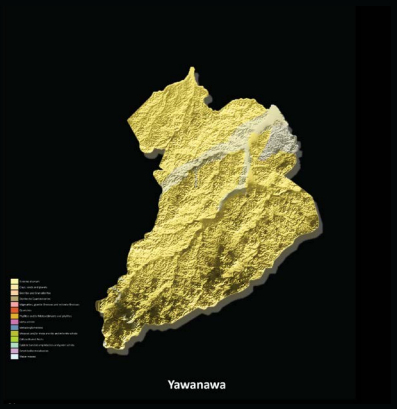
COLUMBIA GSAPP 2022 FALL
ADVANCED ARCH DESIGN STUDIO

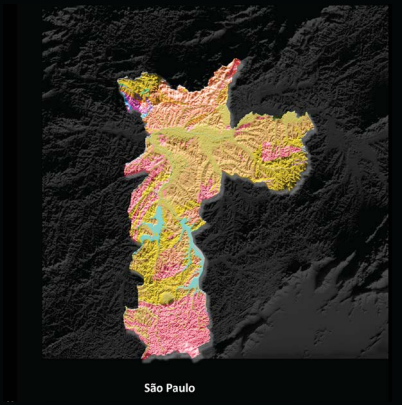


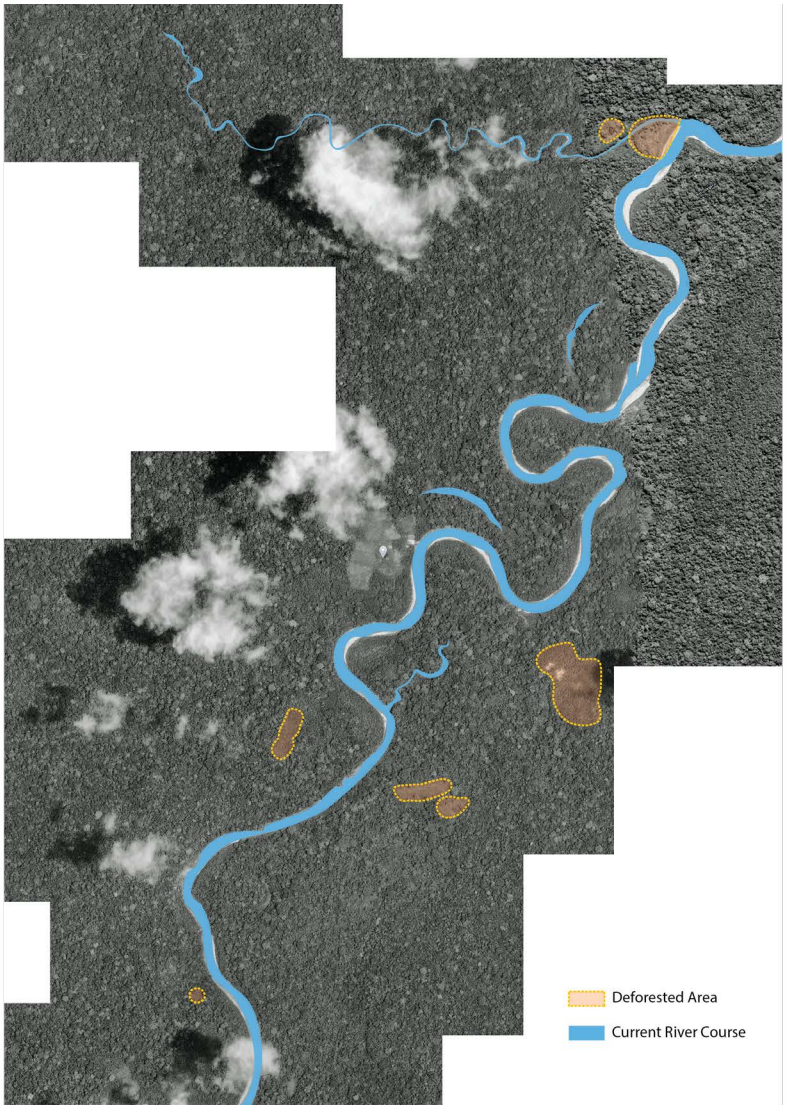
2180 GEOLOGY

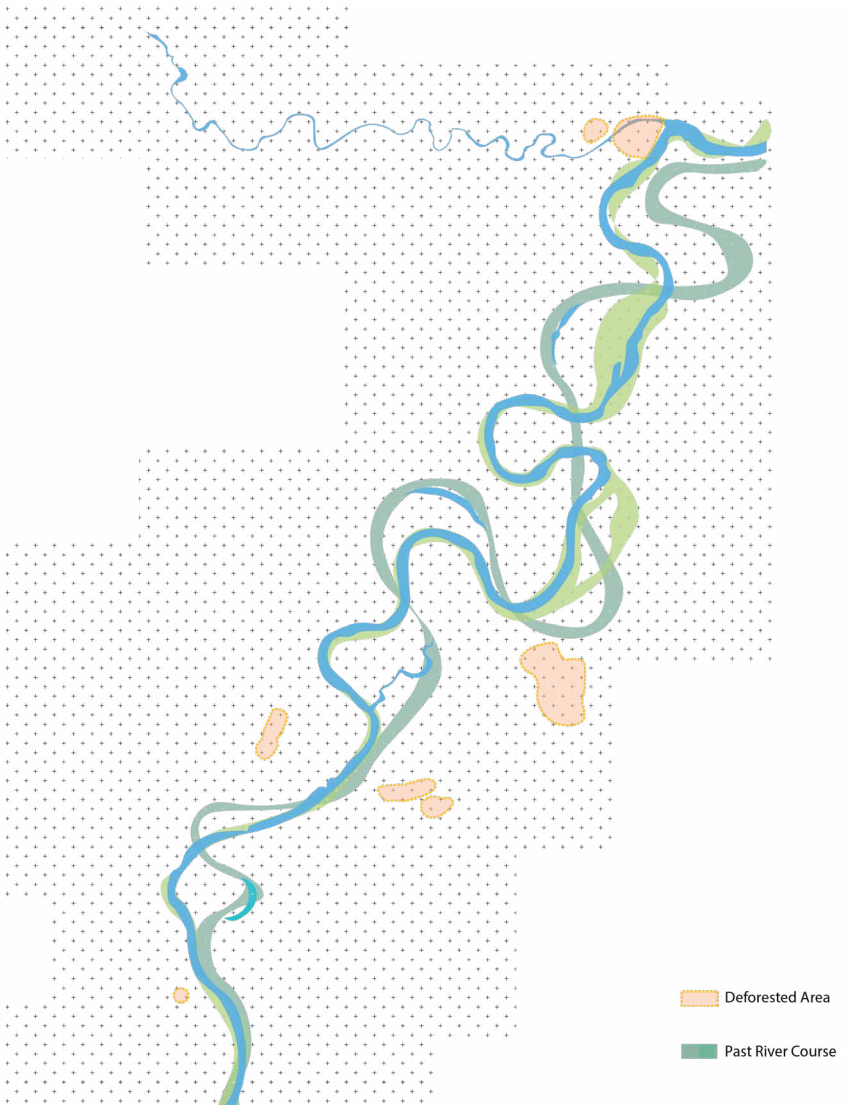
In the geology perspective, overmining and shortsighted-policy of industrialization in the amazon forest not only damaged the land as itself, but also went into the demarcated indigenous territories. As land cover of agriculture expands into the deep rainforest, severe deforestation impact has been left upon the virgin forest.

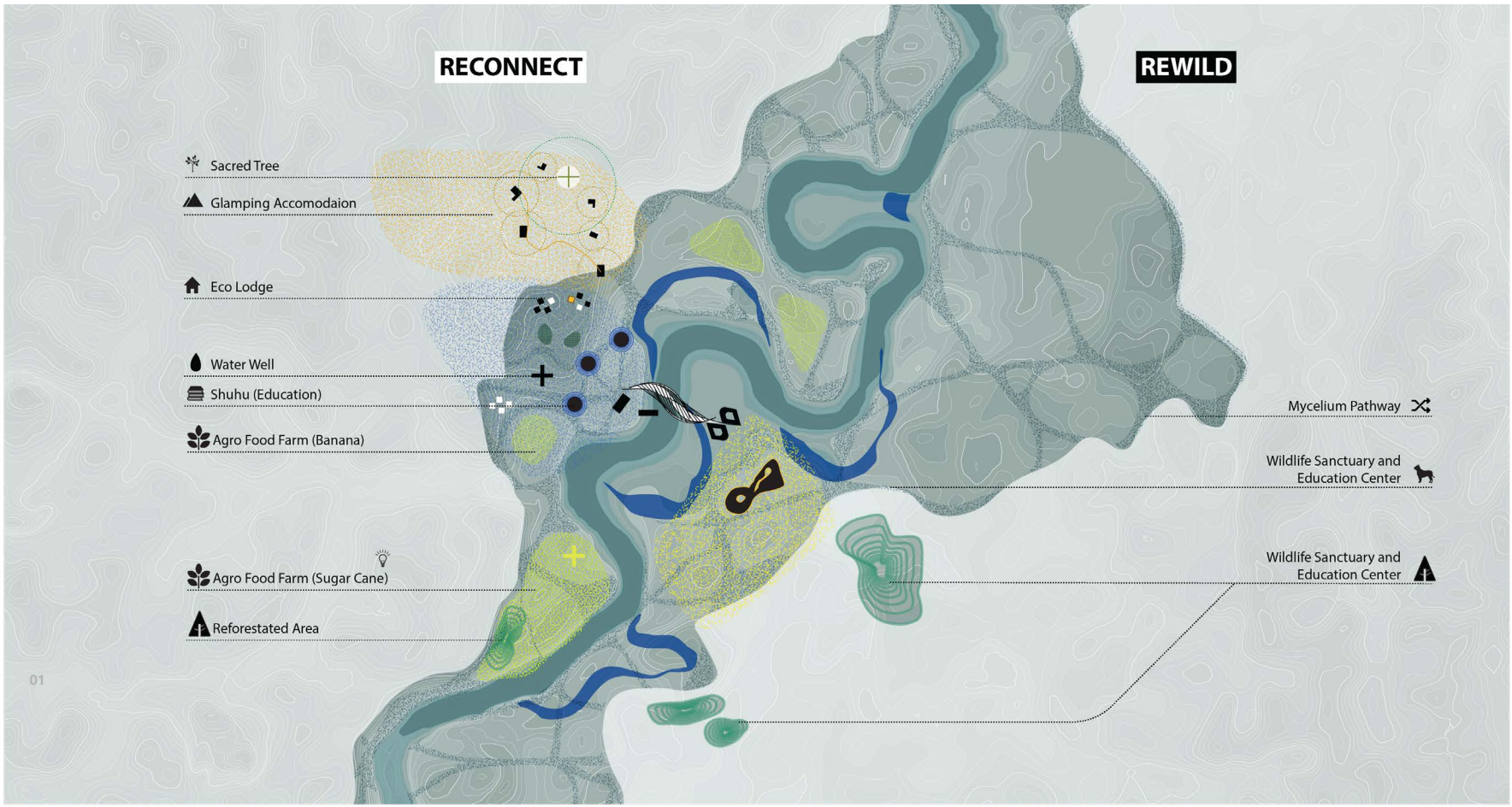


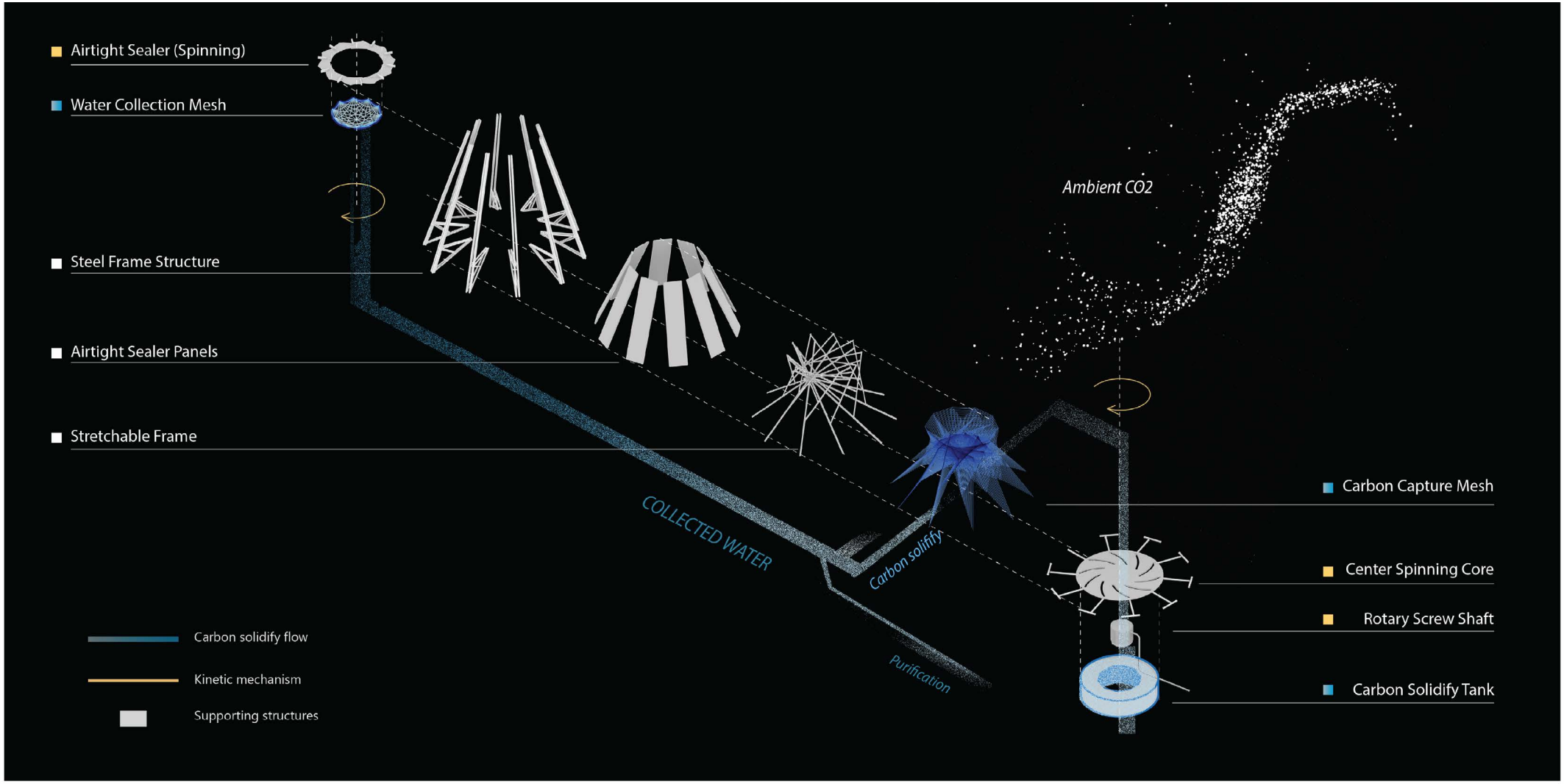

Yawanawa


São Paulo


Deforested Area
Current River Course

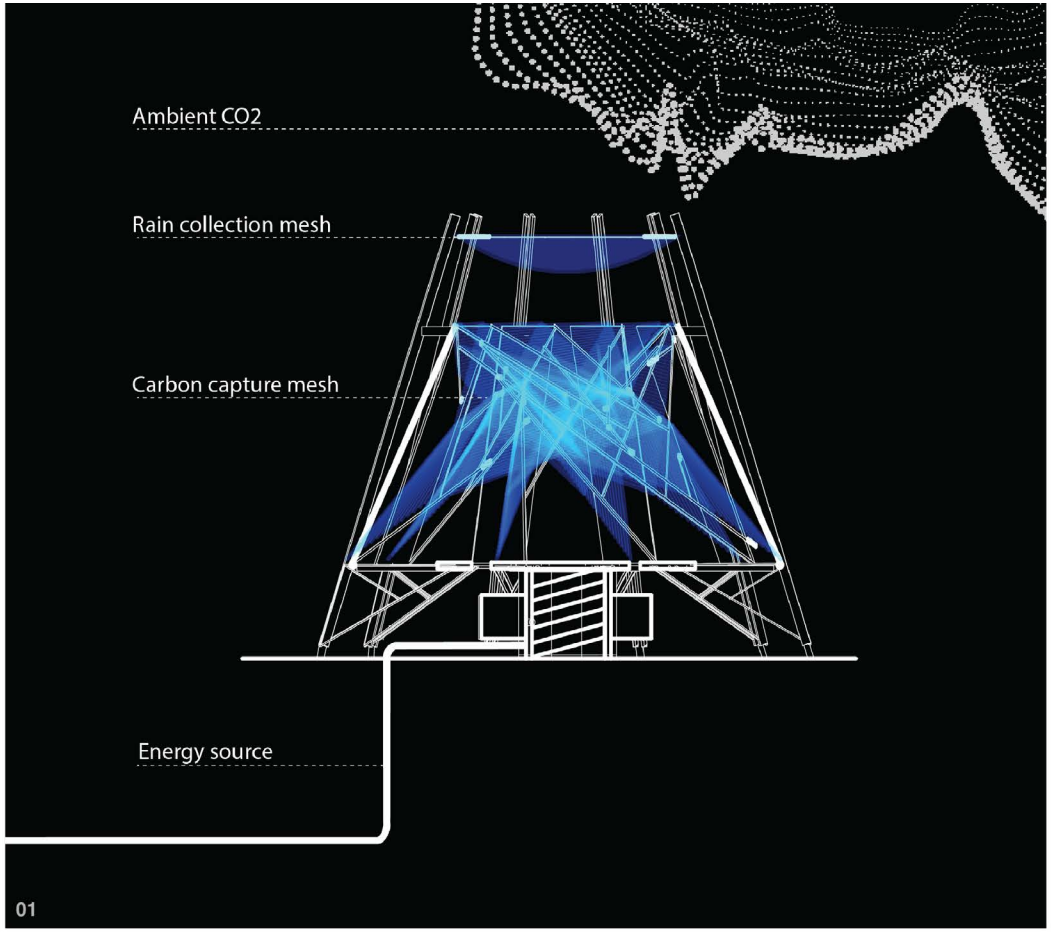

Deforested Area
Past River Course

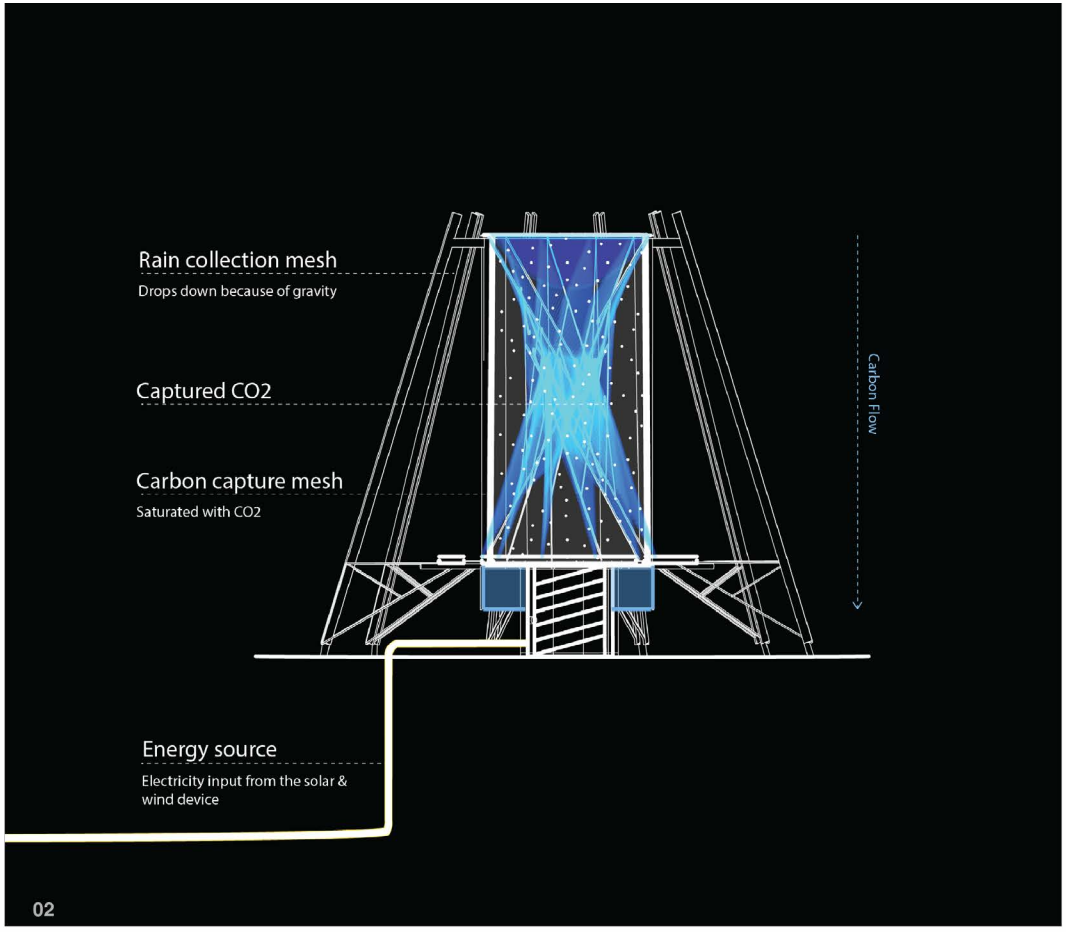

RECONNECT
REWILD
Sacred Tree
Glamping Accomodaion
Eco Lodge
Water Well
Shuhu (Education)
Agro Food Farm (Banana)
Agro Food Farm (Sugar Cane)
Reforestated Area
Mycelium Pathway
Wildlife Sanctuary and Education Center
Wildlife Sanctuary and Education Center
01



Carbon Captor - the axon

The carbon capturing device, Carbon Captor, works in the way which both incorporate water and air. It is using a material with two characteristics under certain humidity. In the case of ambient air, the material absorbs CO2 from ambient air, whereas in the case of the material is infiltrated with water after one hour, it starts to emit carbon dioxide. Utilizing this trait, this device is using kinetic and airtight techniques to sesure the dymnamic flow of how the material functions. Wataer collected from the top of the device will be used for securing and solidifiying the carbon that the material has captured. After the the tank is sealed airtight, captured CO2 will be injected to a solidify tank, which is filled with silcate rocks, which are sensitive to CO2 and will have chemical reactions between them.





Capturing status

[01]
The devide expands the mesh maximize its contact area with ambient air. In this process, ambient CO2 will be drawn to and attached to the carbon capture network. As the device expands, rain fall is also collected throughout the process, and will be processed for both drinking and carbon collection purpose.
The structure touches the ground with light nodes, which allow the device to be deployable at almost all circumstances.

Solidify status

[02]
In order for the device to be sustainably reusable, the device will have to solidify the carbon it captured after a certain period of time. Every 5 days, the device draws electricity from the energy device. This power will be used for powering rotation of the central core.
After the device is sealed airtightly, water will infiltrate the carbon-satuated mesh, changing the material's characteristic to acarbon-dissolvable. Carbon thus is let out to the airtight tank, and then injected by vaccum to the silicate rocks attached to the bottom of the device.

Details / Zoom Ins

[01]
Detail - ground part
[02]
Water collection net
[03]
Overview- zoomed in

Scene 06 - Description / Title

The device blends with the environment with its unique aesthetics.
The structure will be light and portable. We encourage the villagers from Yawanawa to actively incorporate with deploying the device to facilitate the carbon capture process.

The carbon capturing device, Carbon Captor, works in the way which both incorporate water and air. It is using a material with two characteristics under certain humidity. In the case of ambient air, the material absorbs CO2 from ambient air, whereas in the case of the material is infiltrated with water after one hour, it starts to emit carbon dioxide.

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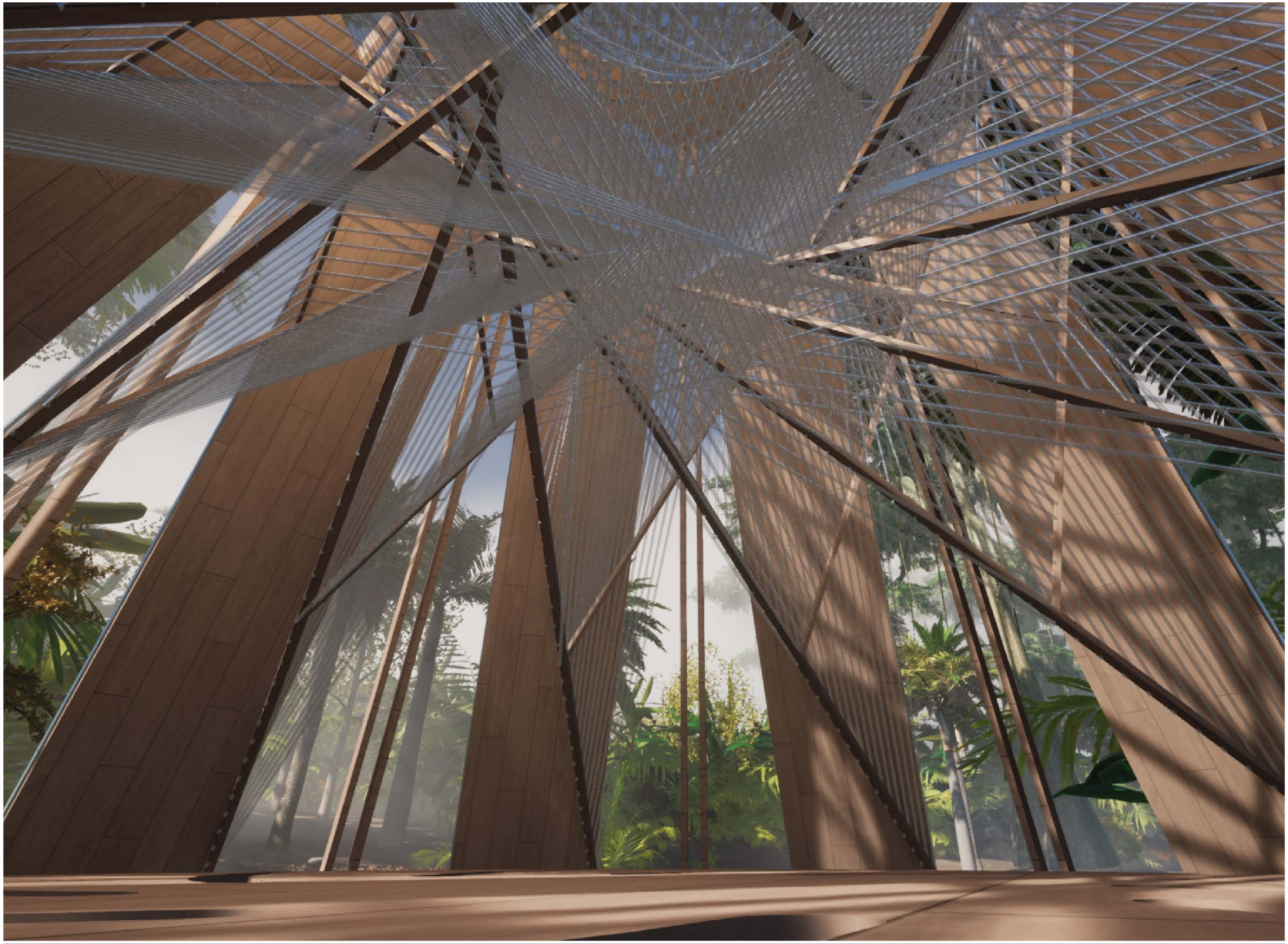
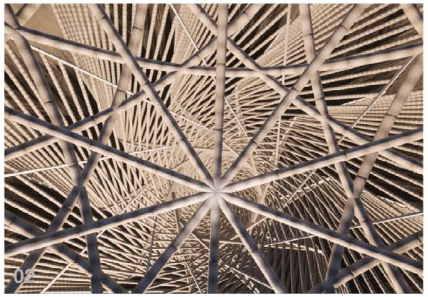
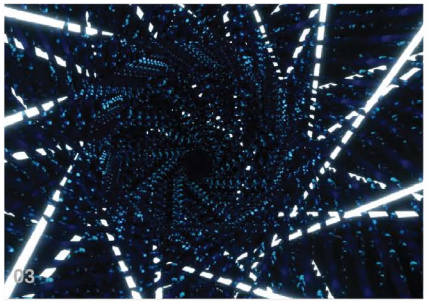


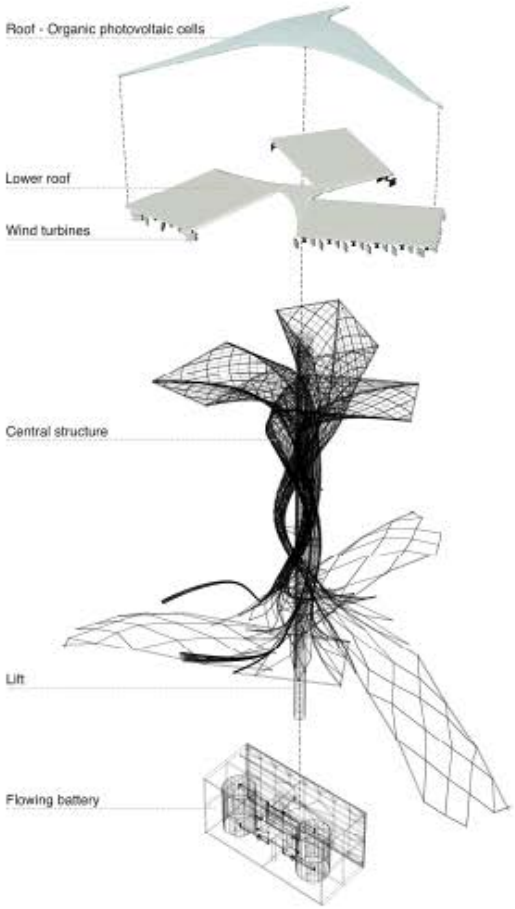
Scene 05 - Description / Title



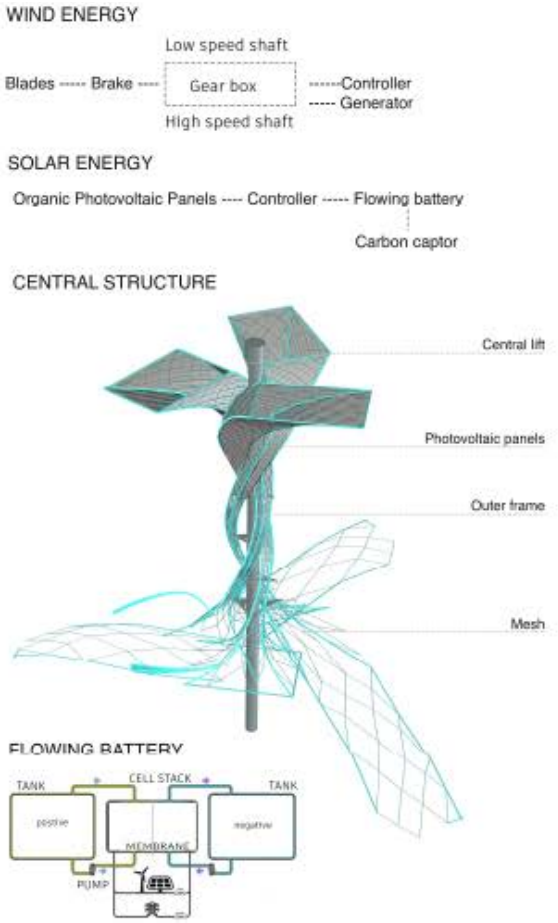


Details / Zoom Ins

[01]
The spinning panels will close when the tank has to be airtight and emit the carbon.
[02]
Carbon Capture net in the daytime
[01]
Carbon capture net in the microscope aspect. Carbon dioxide is captured and temporarily stored in the mesh.



01



02

Climate device axon

[01]
The device consists of two renewable energy systems.

1. Solar energy system : The solar energy system consists of Organic photovoltaic foil panels with absorb the sunlight and the charged particles move to the controller. From the controller the particles are then trans+ ported to the floe battery where they are stored ars electrolyte solutions of positive and negative charges. The charges are thhenn transfered to the cell stack from which the energy is distributed further to the carbon capture device

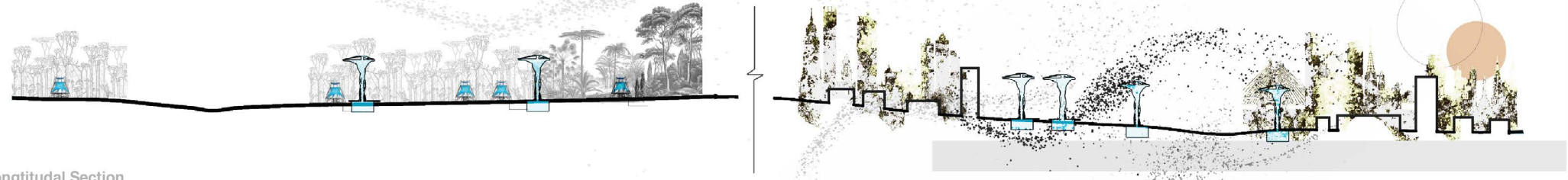
Climate device axon

[02]
2. Wind Energy system: The blades capture energy through the wind force in which the blades are conected to the gear box. The gear box is connected to the loow speed shaft and high speed shaft which regulated the speed of the blades according to the wind. The charged parted are then transfered to the controller from which it is then transfereed to the flowing battery

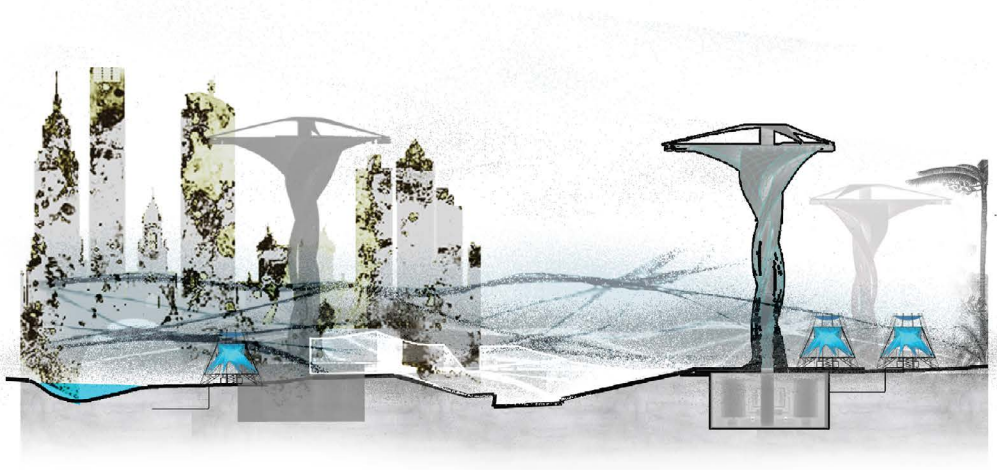

0


02

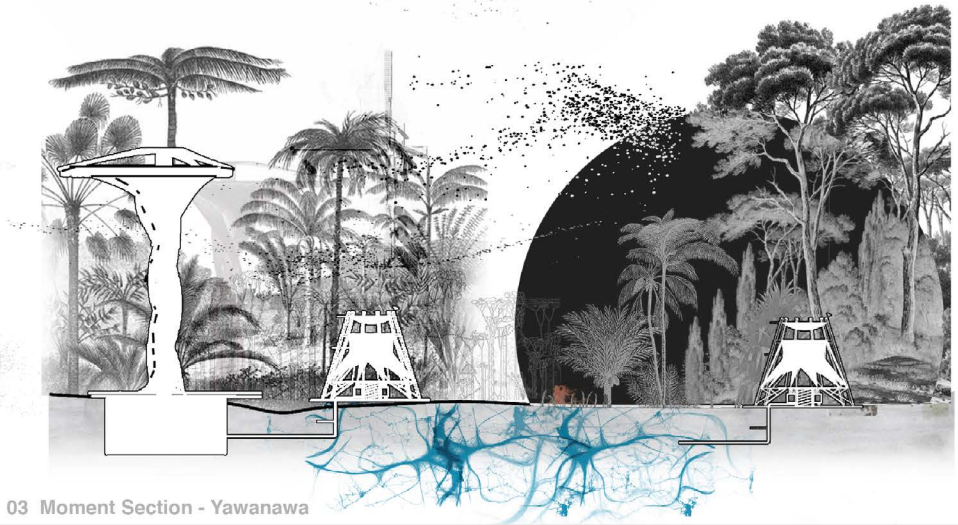

03



01 Longtitudal Section



02 Moment Section - Sao Paulo



03 Moment Section - Yawanawa

Site Strategy - Section

Our site section strategy includes a network containing both device, and a projected underground growth of mycelium. The mycelium network will ultimately bridge the gap between the deforested area.

Both device collaborate with each other in terms of reciprocal energy use and the loop of carbon.

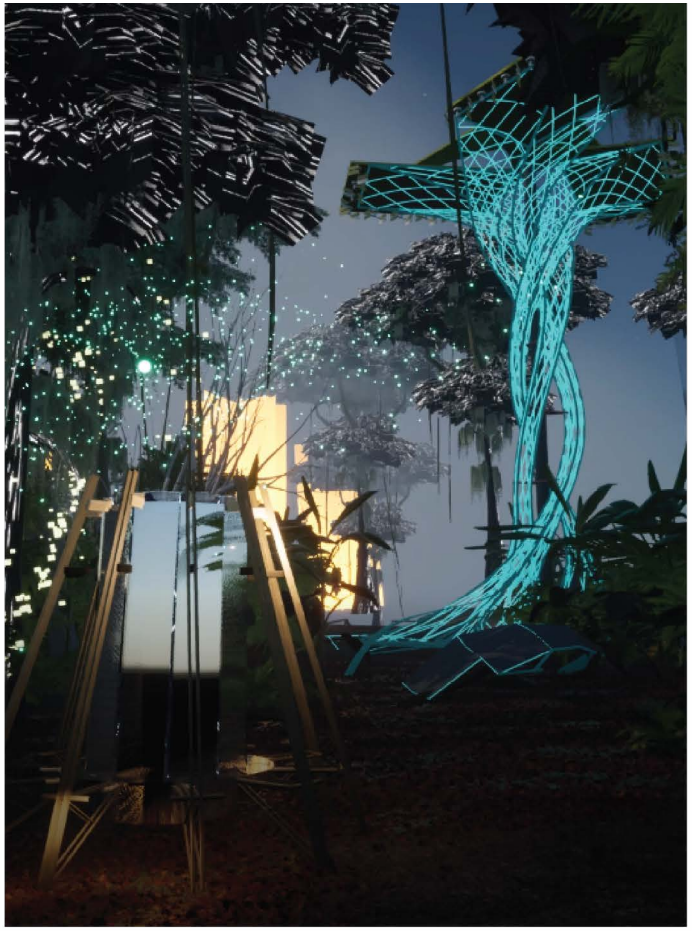
[01] Longtitudal Section Drawing
Carbon dioxide is emitted by the city, it will be captured by the carbon capture device and solidify.

[02] Moment Section, Sao Paulo
Energy device is deployed in the city. Organic cable and energy network will be generated to transmit the electricity to the rest part of city and the carbon devide.

[03] Moment Section, Yawanawa
Carbon capture device secures the ambient carbon in the air and facilitate fungi growth.

Sao Paulo - Energy Device

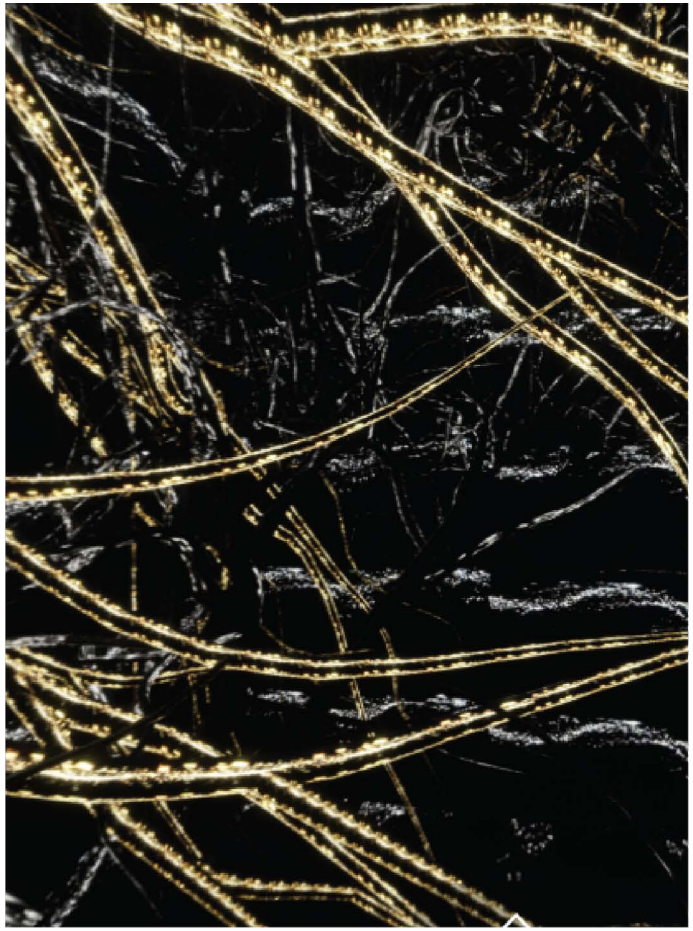
[01]
The device consists of two renewable energy systems. Solar energy system : The solar energy system consists of Organic photovoltaic foil panels with absorb the sunlight and the charged particles move to the controller.
Wind Energy system: The blades capture energy through the wind force in which the blades are conected to the gear box. The gear box is connected to the loow speed shaft and high speed shaft which regulated the speed of the blades according to the wind.



Yawanawa - Carbon Captor

[02]
During the nighttime in the forest, trees will stop absorbing carbon dioxide, and in reverse, emit CO2 instead. In this case, the carbon capture device will keep functioning to absorb carbon dioxide in the air. This panorama shows the carbon particles in the air and how the carbon capture device is functioning to cut down carbon dioxide.

https://panoraven.com/en/slider/M6lT3YMSoT



Yawanawa - Mycelium Network

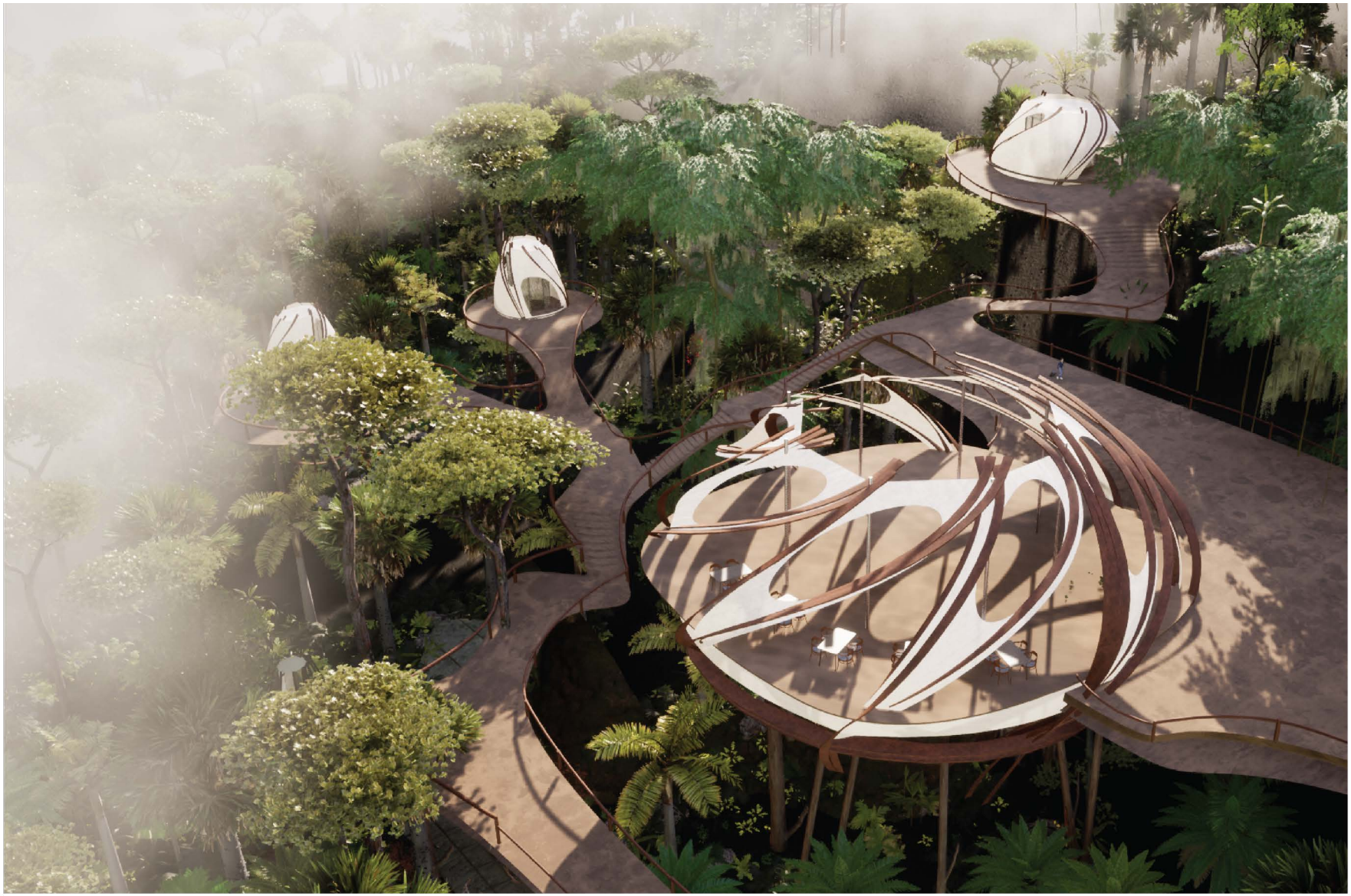
[03]
This panorama shows how nutrient is transmitted underground. Golden ones are the existing tree roots while the silver, smaller network represents the mycelium network.As mycelium farming and replanting proceed in the site, soil will be remineralized in both the forest and the deforestated areas.

https://panoraven.com/en/slider/M6lT3YMSoT

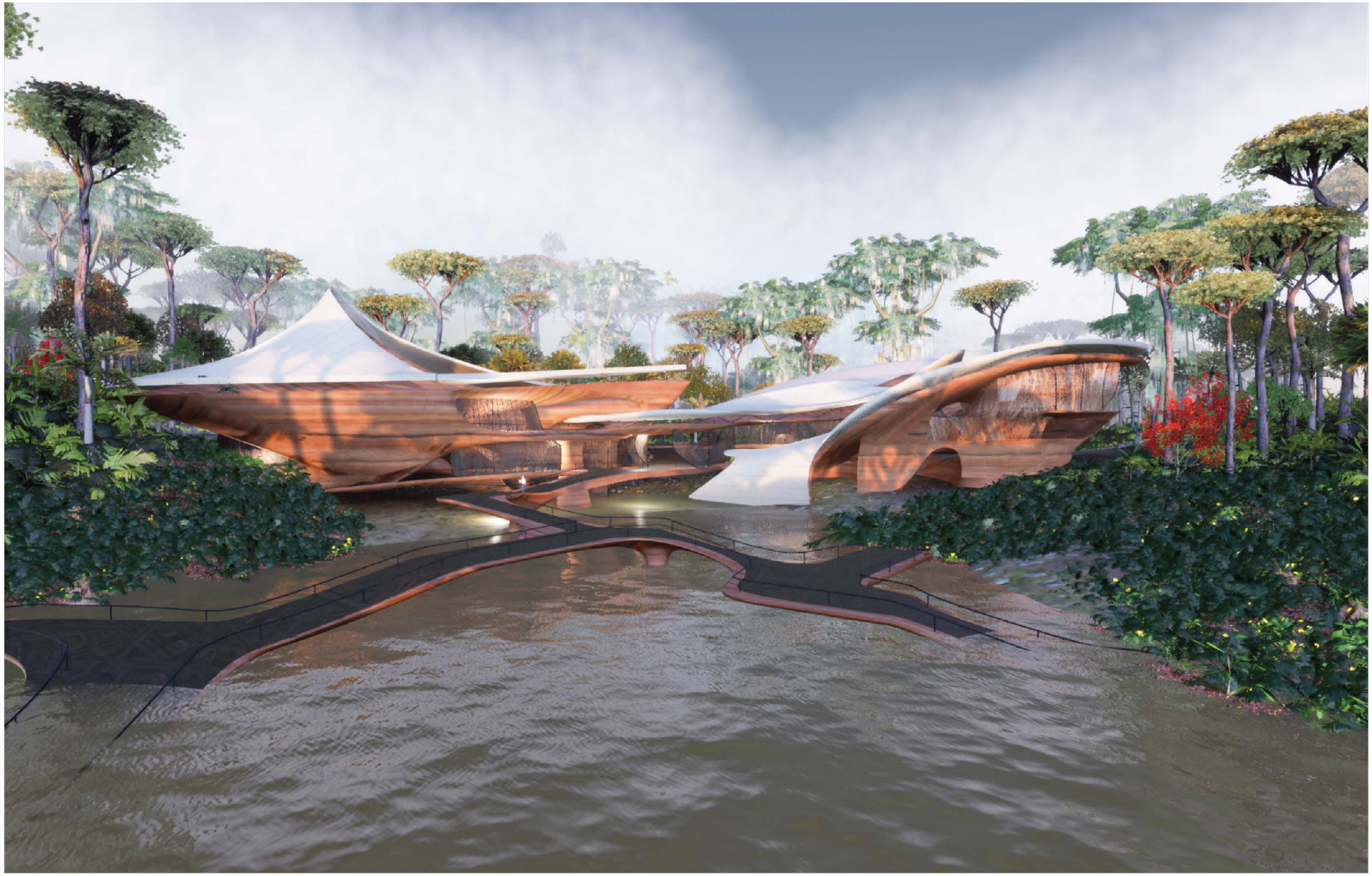
GLAMPING ACCOMODATION &ECO LODGE

Situated on the slope of Amazon rainforest, the glamping accommodation is a combination of indigenous lifestyle, ecological friendly construction and bird friendly sanctuary.

The design utilizes the sectional difference of the slope to accommodate programs of need and strategically implementation of the carbon capture device.



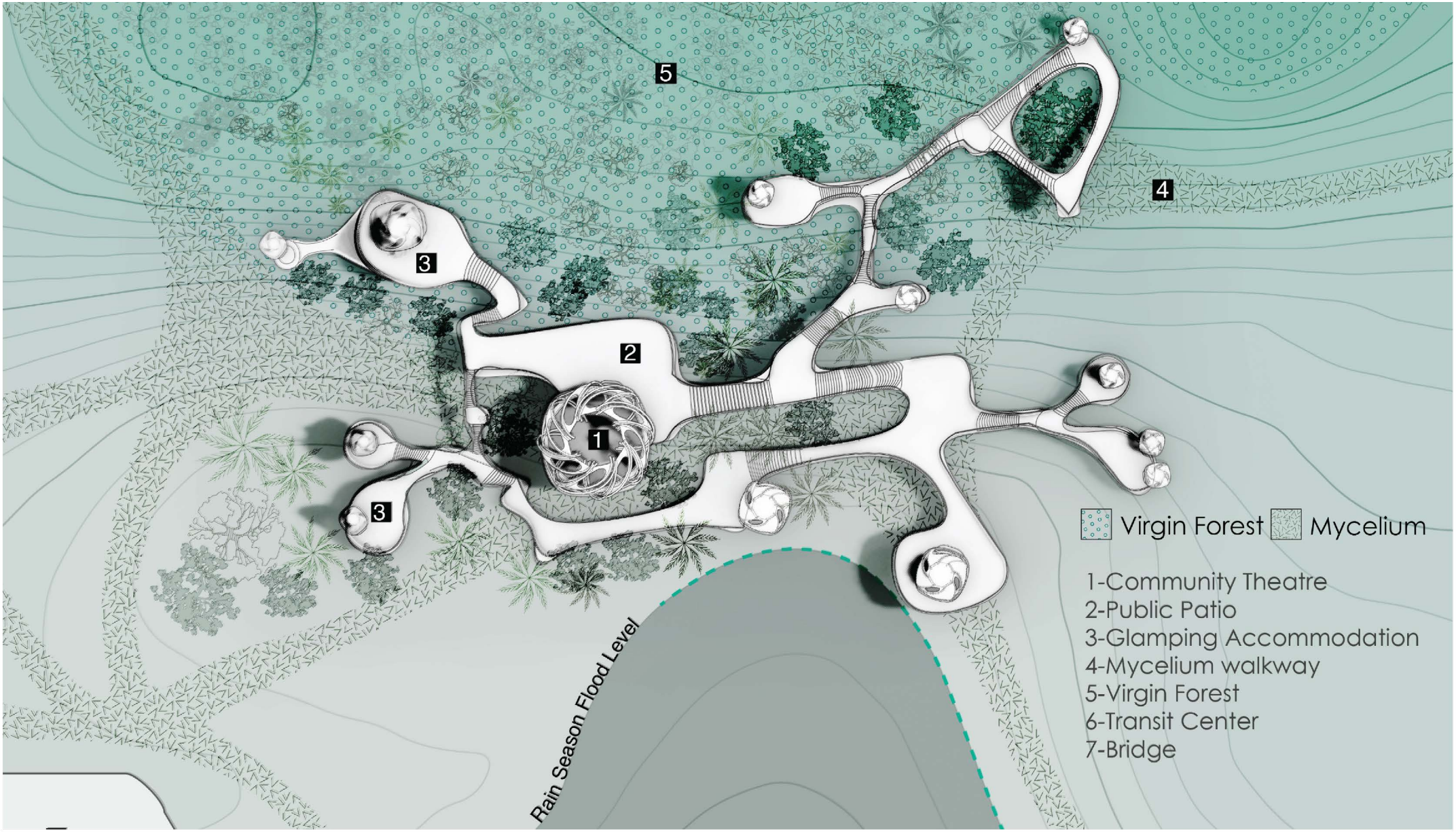
Aerial View



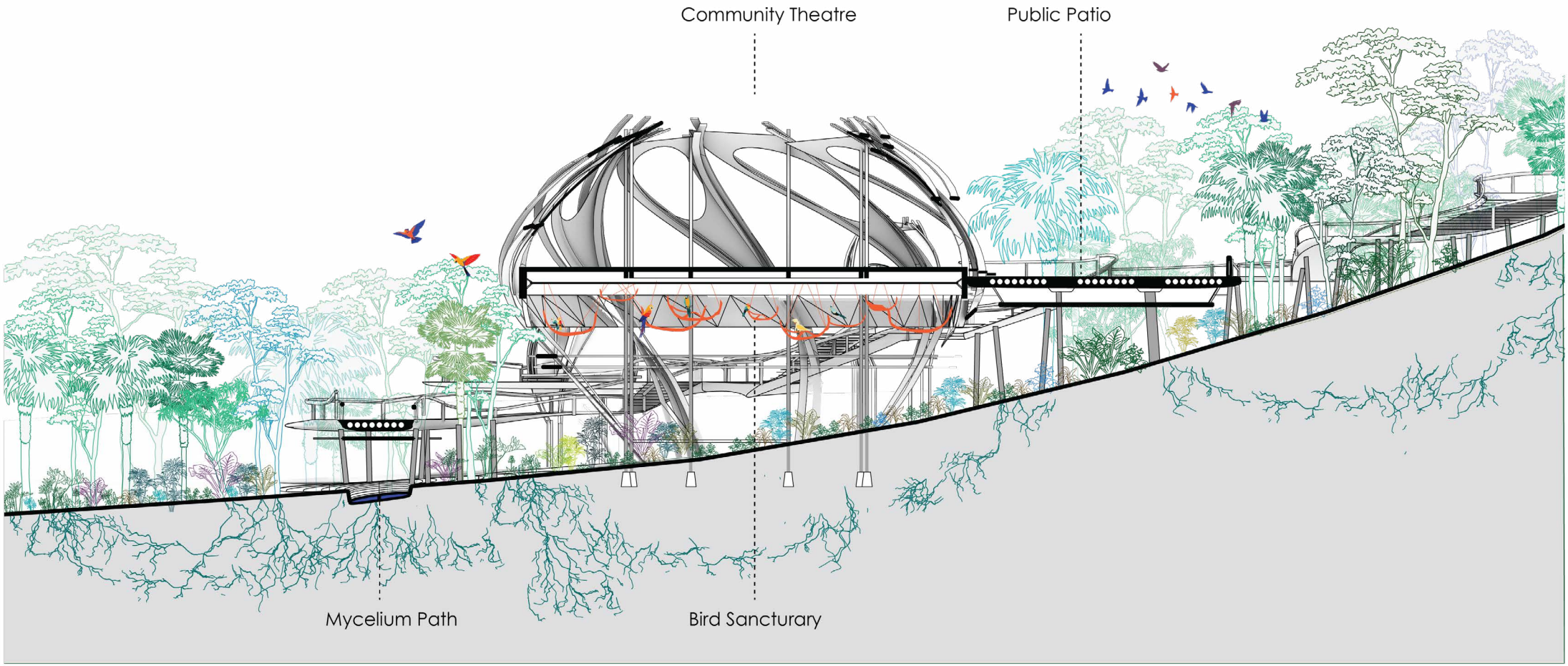
Wildlife Sanctuary and Education Center

Situated on the end of one tributary in the amazon forest, the wildlife sancutuary and eduation center is a place where the ecosystem meet with the human world.

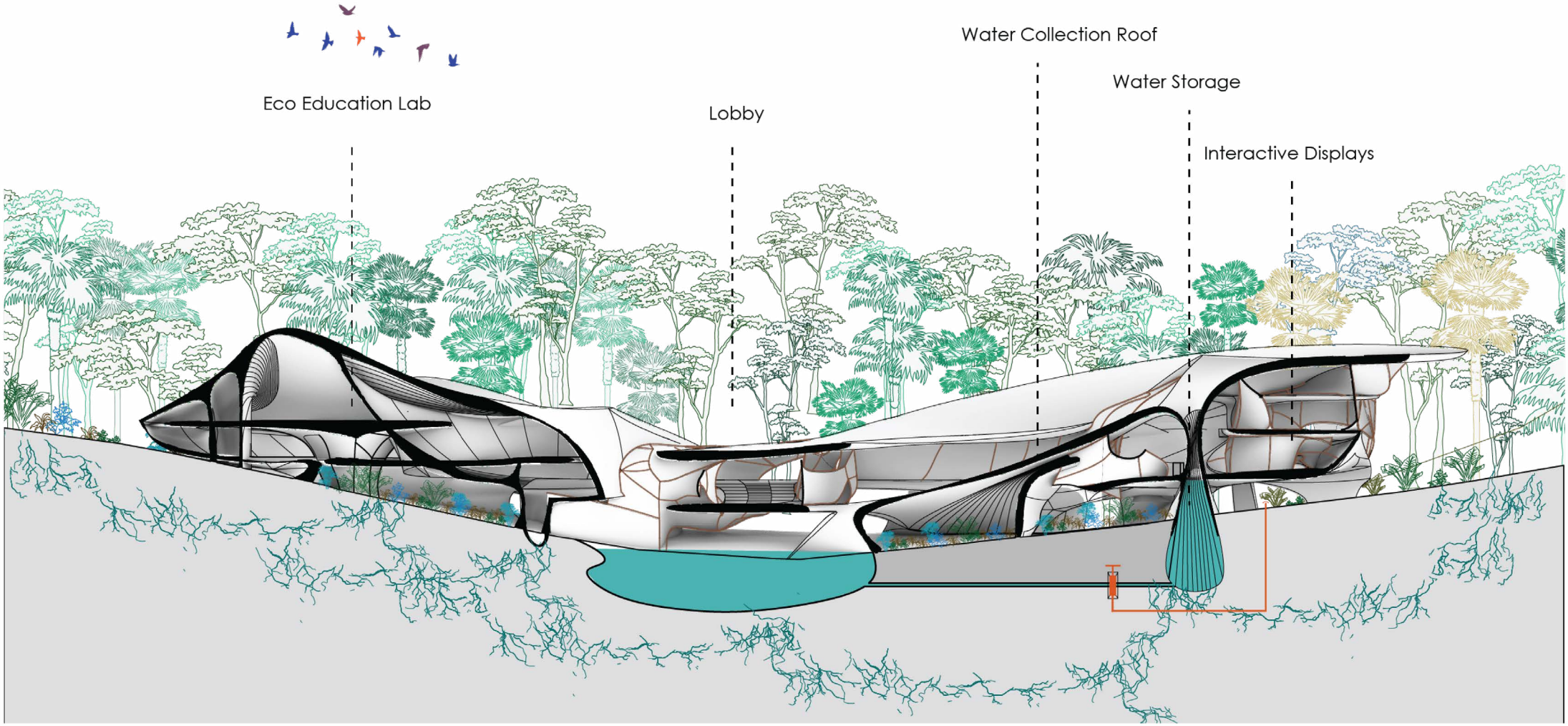
As the whole form unfolded through the site, it blends into the landscape. As the structure splits into two parts but connects in the center, the building manipulate water as a way of leveraging flood and drought in the amazon forest as well as providing a shelter for animals.



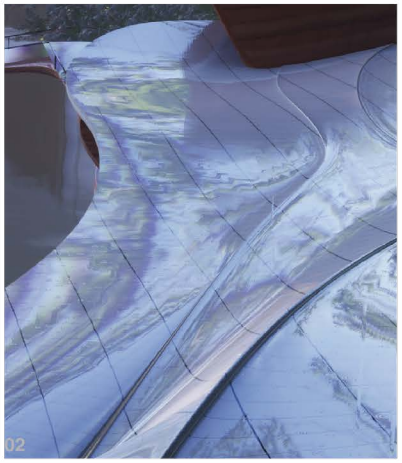
Zoomed-in Site Plan

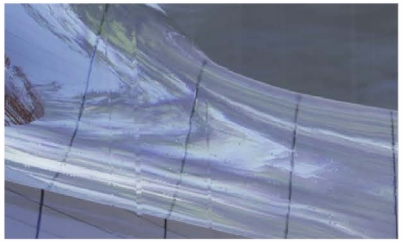

Community Theatre
Public Patio
Mycelium Path
Bird Sancturary

Section


Eco Education Lab
Lobby
Water Collection Roof
Water Storage
Interactive Displays

Section





Details / Zoom Ins

[01]
The spinning panels will close when the tank has to be airtight and emit the carbon.
[02]
Carbon Capture net in the daytime
[01]
Carbon capture net in the microscope aspect. Carbon dioxide is captured and temporarily stored in the mesh.

03

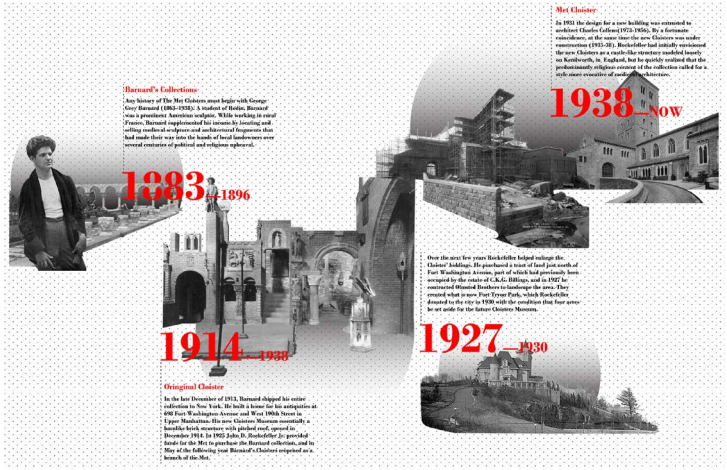
Archive of Time

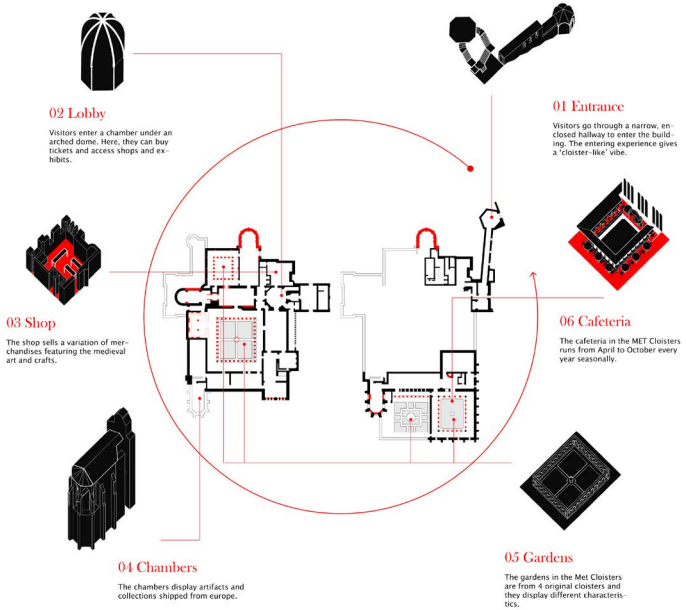
Transforming the MET Cloisters into
Instrument of Manipulation of Time

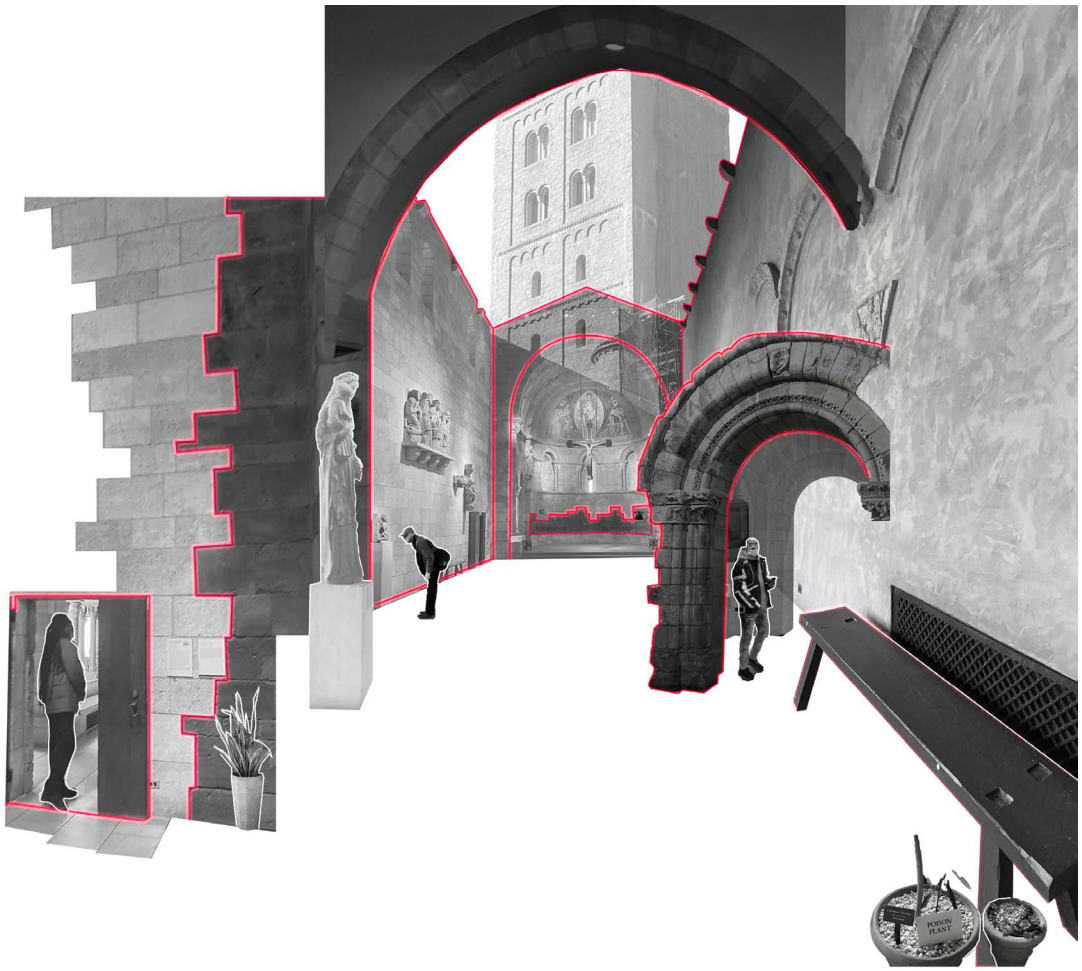
Instructed by Juan Herreros
In Collaboration with Valentina Jaramillo

COLUMBIA GSAPP 2023 SPRING
ADVANCED ARCH DESIGN STUDIO

History of homogenization

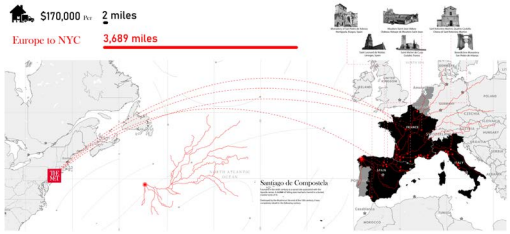






Homogenized Space

Marked red elements in the floor plan, the met cloister is exposing spaces rather than objects, which makes it unique and different from other museums. Fragments coming from different parts of europe are made into 4 gardens and 4 chambers. Which are articulated with new museum functionality.

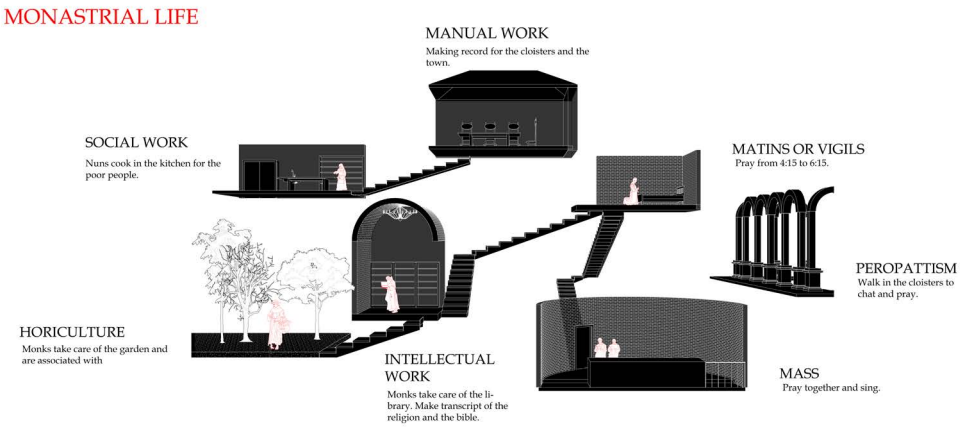


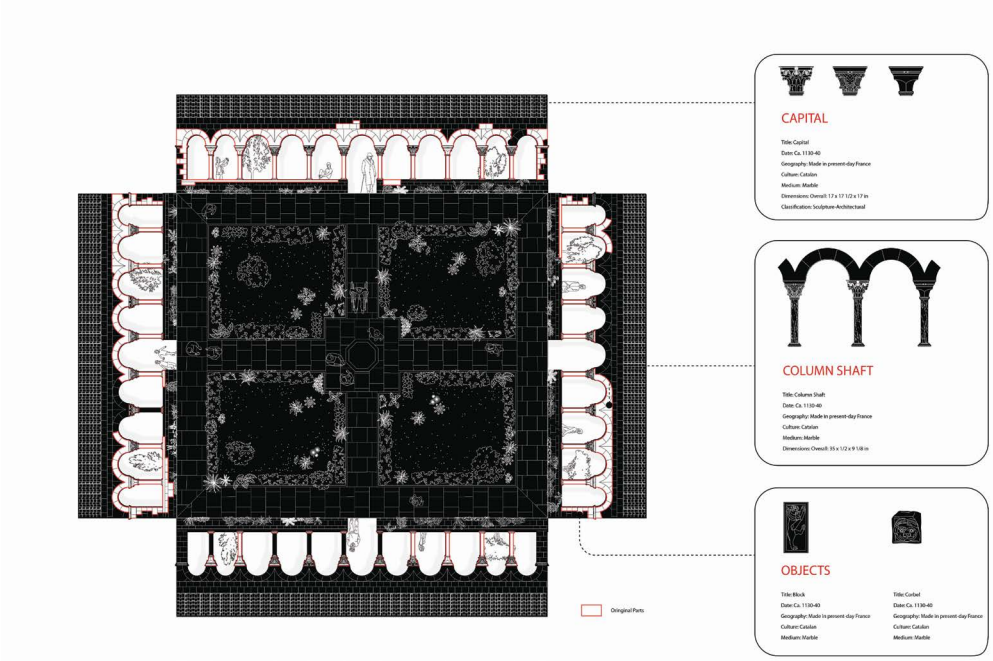
Cultural Heritage

It was very evident that the space of the Met cloister museum is a place dominated by the homogenization of all its elements.. The experience is a contradiction between fragments and homogenized space, which takes away the real value of the ruins, making it a frankenstein.

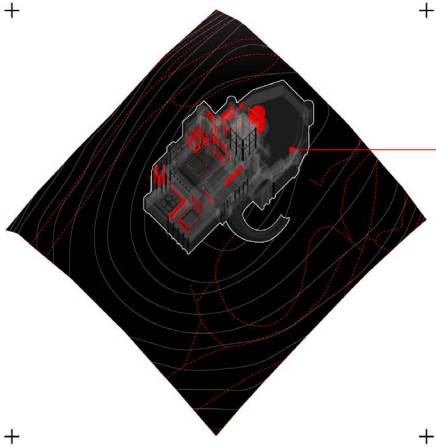
Behind the walls of a homogenized space, the current MET Cloisters has killed the diversity of a collections of architectural fragments that comes from different time. By manipulating an alphabet of architecture operation of contradiction, this project recoperates the power of the fragments and gives back the dignity of coming from otherwhere in time.

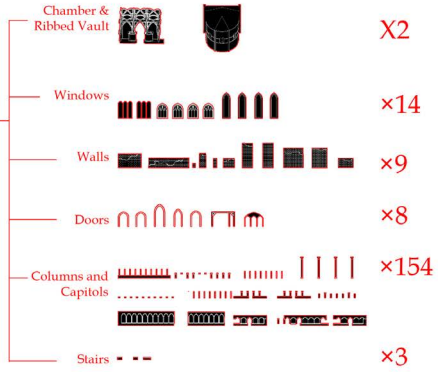
The monastery is a place with a very diverse program, a strong instrument of manipulation of time. Behind those walls of cloisters we have these hybrid or non-homogeneous programs. This kind of reading, teaching, cultivating and producing is what the cloister had killed. Through the articulation of architectural spaces, we would Bring back the spirit of slowness and introspection.



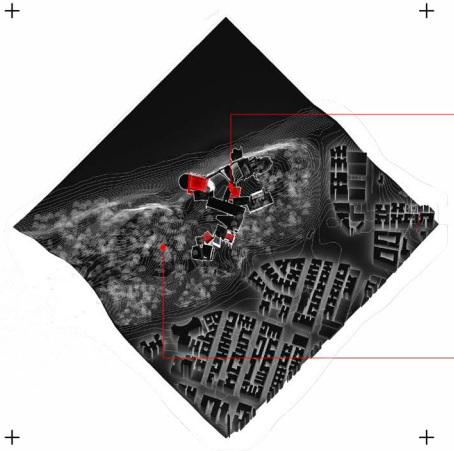


Building Fragments



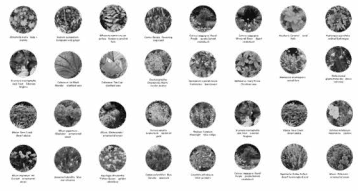


Bloom & Foliage



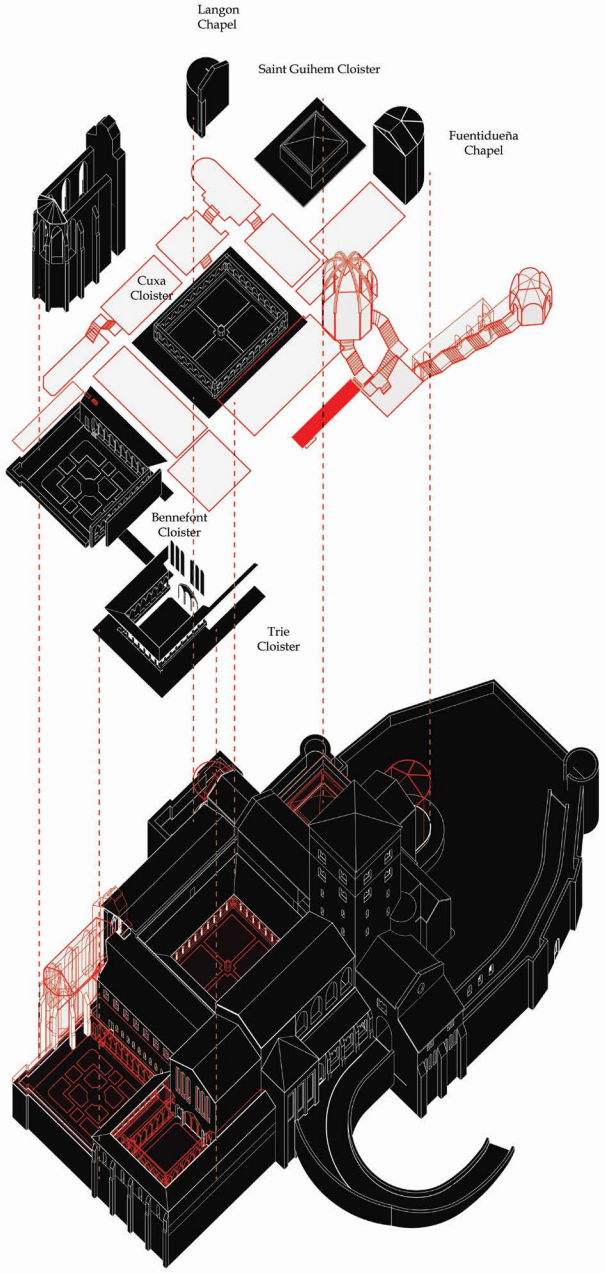
Cloister Garden

Fort Tryon Park



COMPILED FRAGMENTATION

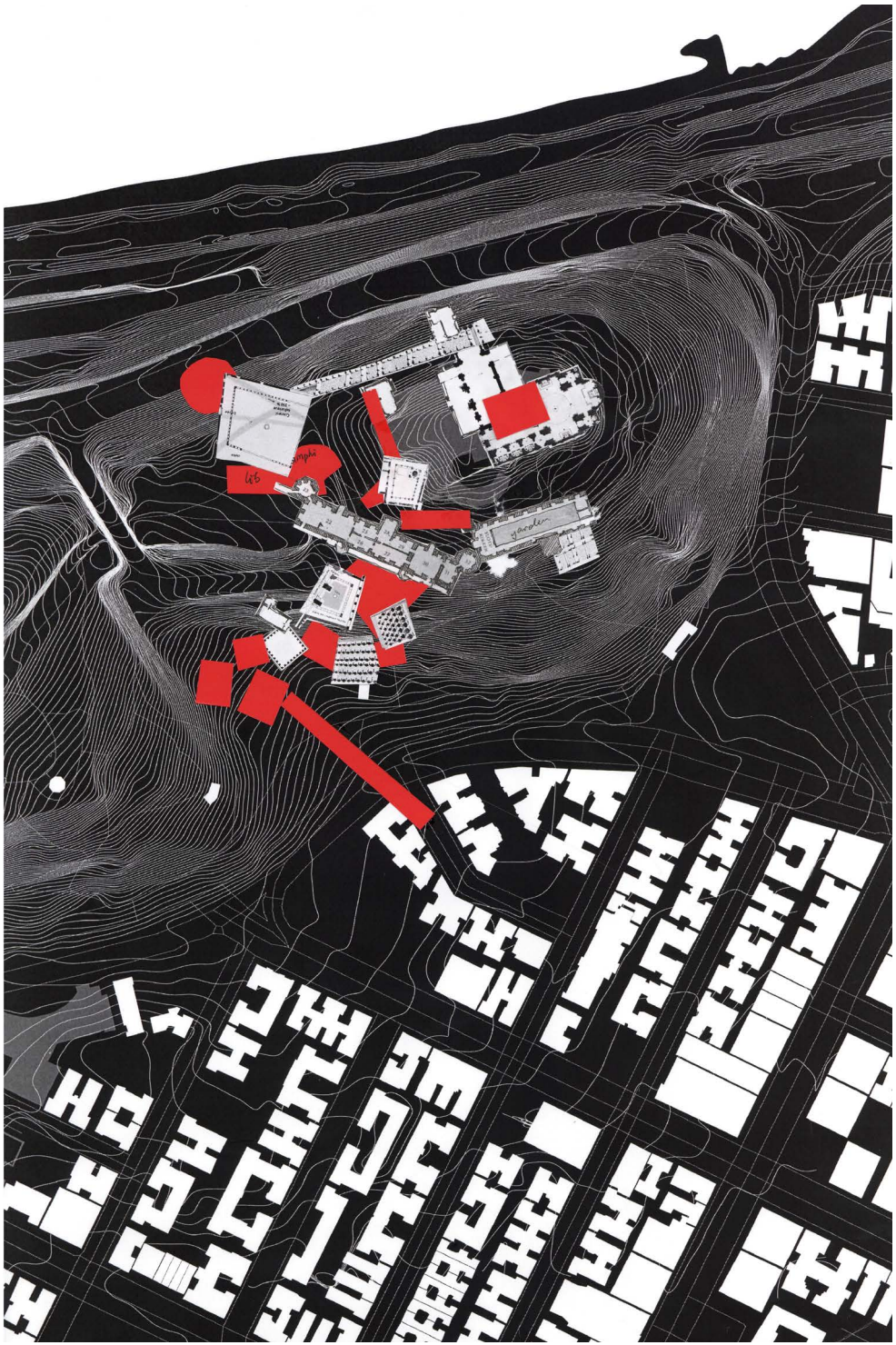
Fragments from different cloisters are displaced separately inside of the MET cloister. The museum is dedicated to create a homogenized environment for all the collection to 'fit in'.



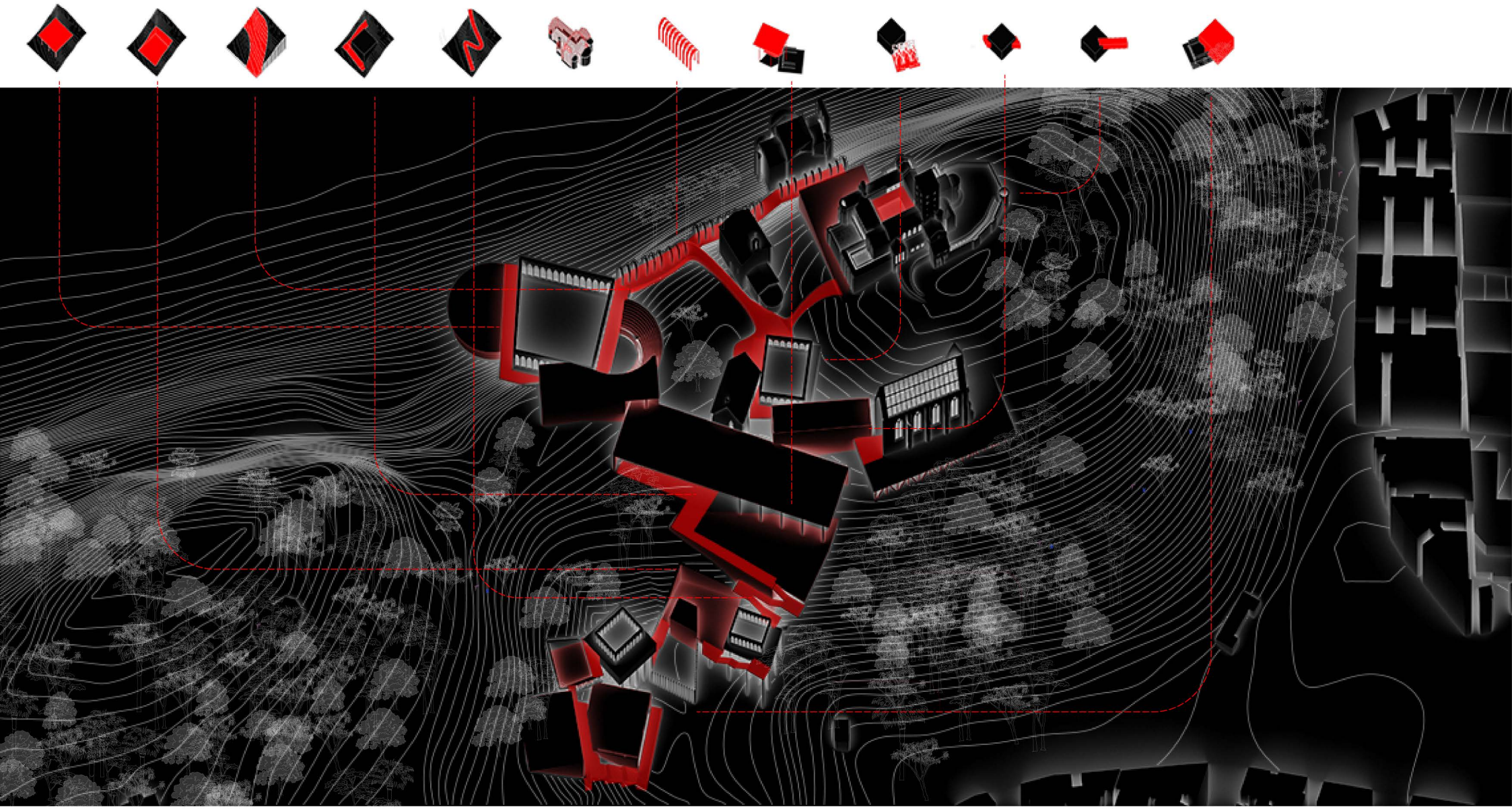
Peripateticism

To be slow means to dilute our focus, to be true, to be frank with history. This brings us to violet le duc, who bring the theory of preserving architecture using its historical form but contrasting the original material with a contemporary one. As back in time in monasteries, The slowness was understood as the practice of peripateticism. It means to go slowly, to practice introspection, to go from indoor to outdoor, to experience time, and to dialog with environments.

Our main strategy is taking out all the fragments from the cloisters museum, and reconstruct the European monasteries' historical typology, by articulating the spaces through a continuous circulation, giving an experience of slowness.



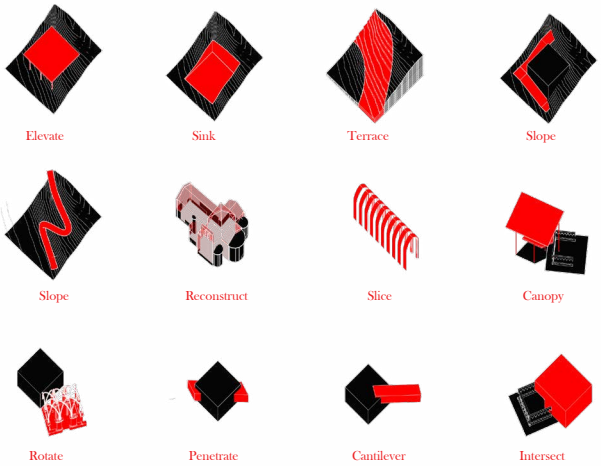
This project tries to share the experience of introspection and socializatoin. Through the transitions of indoor and outdoor, we want to exaggerate the difference between introspection and publicness.



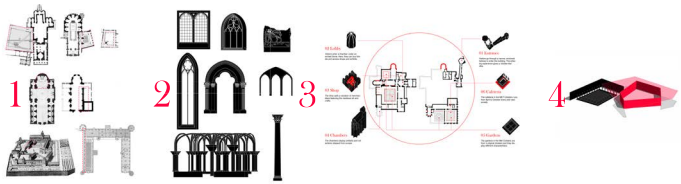
FRAGMENT PLACEMENT

Our main strategy is taking out all the fragments from the cloisters museum, and reconstruct the European monasteries' historical typology, by articulating the spaces through a continuous circulation, giving an experience of slowness.

Through this approach the design this project tries to share the experience of introspection and socializatoin. Through the transitions of indoor and outdoor, we want to exaggerate the difference between introspection and publicness.



Operation Alphabet

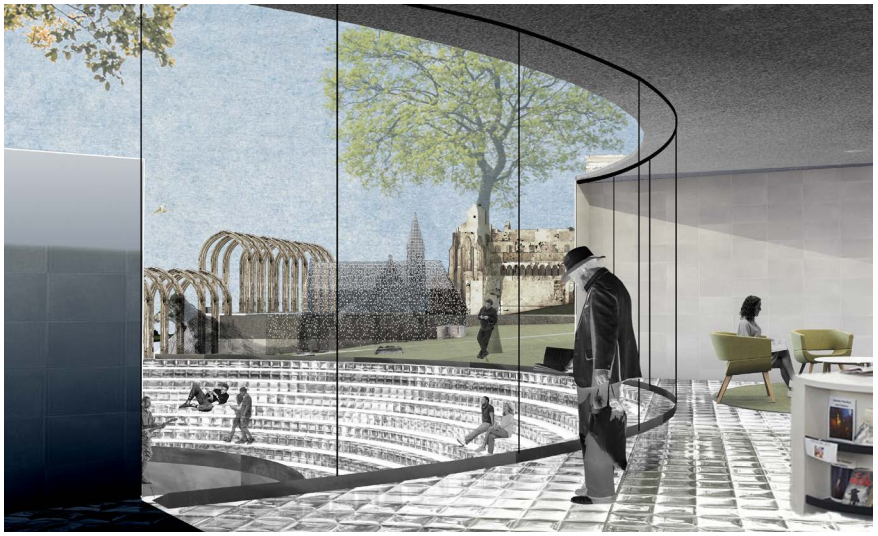


Operations and design

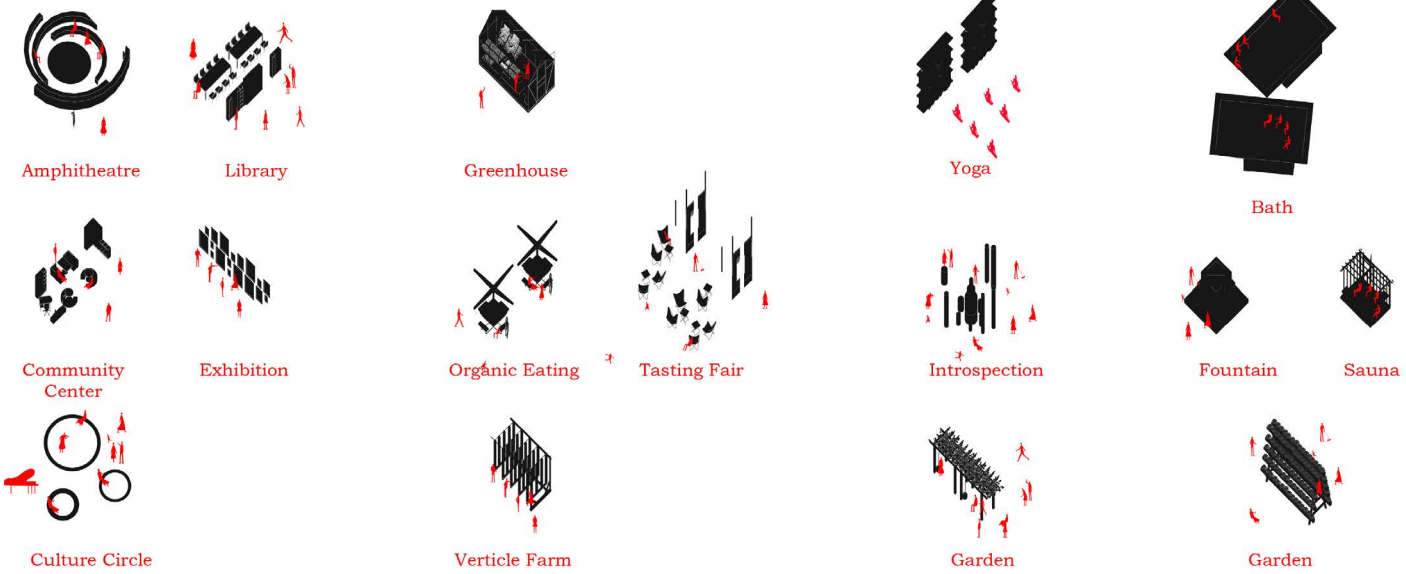
Insistancy in contrasting situation. Everything is red is contrasting with the black. They are not looking for homogeneity again, its seeking the significance of architecture operation of contradiction, and understanding the geographical conditions where the museum stands.

The manipulation of time is about being, the seasonal changes is about the connection between architectural spaces and the surroudnsing, whereas By connecting our project with the surrounding of Fort Tyron Park, it becomes a presence in a bigger context of the city.generate through the the green corridors and the relationship with the park. It's like the extension of the park through the city

Procastinarium



Archive of Knowledge



Program Alphabet

SPRING - Cuxa Cloister

SUMMER - Bennefont Cloister

Autumn - San Guilham Cloister

Winter - Trie Cloister

Environmental Corridor