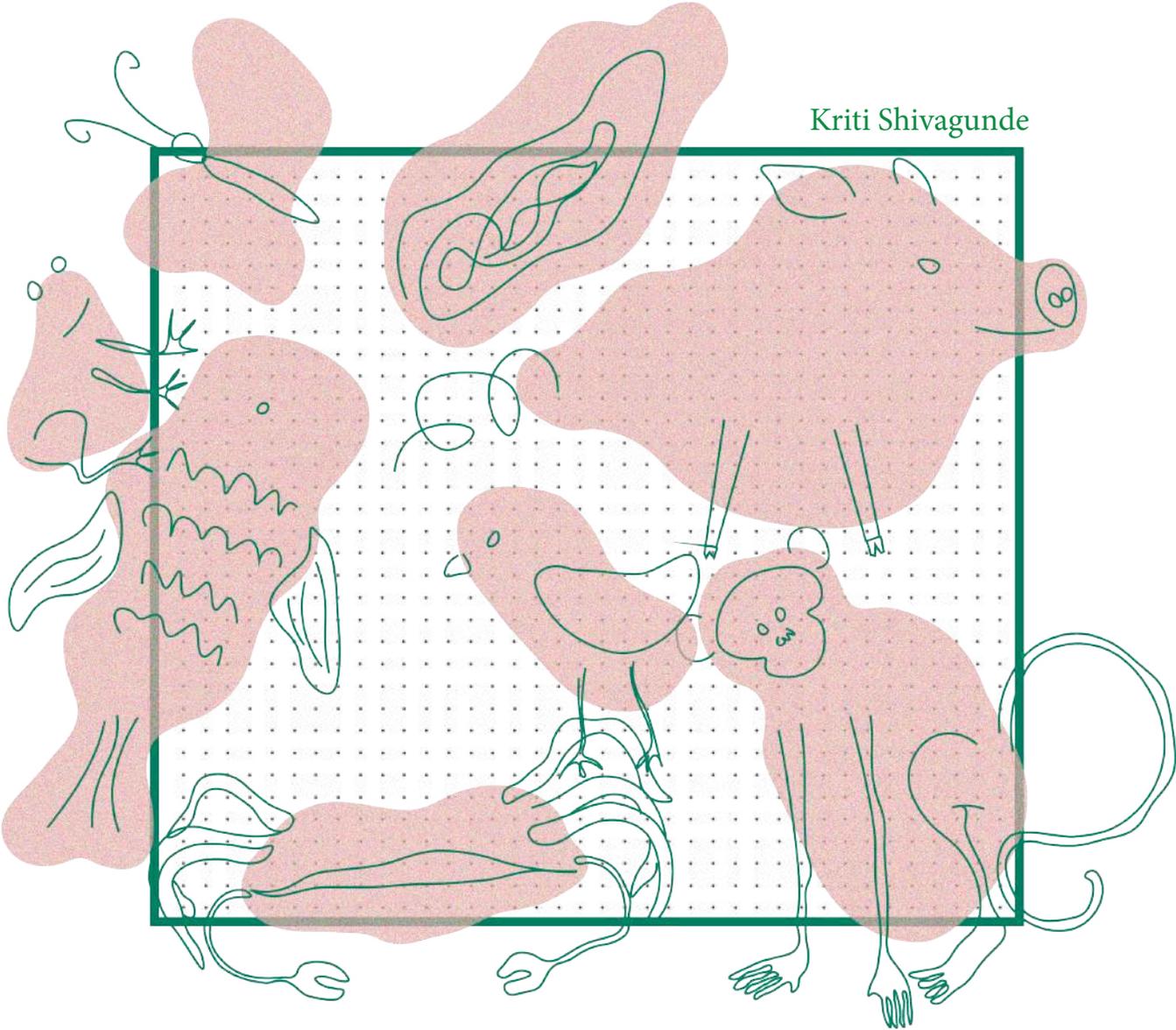


Kriti Shivagunde



# Menagerie

Advanced Architecture Design



“Sometimes since I’ve been in the garden I’ve looked up through the trees at the sky and I have had a strange feeling of being happy as if something was pushing and drawing in my chest and making me breathe fast. Magic is always pushing and drawing and making things out of nothing. Everything is made out of magic, leaves and trees, flowers and birds, badgers and foxes and squirrels and people. So it must be all around us. In this garden - in all the places.”

- Frances Hodgson Burnett, *The Secret Garden*

## PREFACE

This Portfolio is a collection of humans and non-humans bound together by design, by conscious and careful thought given to each identity dealt with in the span of three semesters at GSAPP. Architecture exists beyond the human. I explore the boundaries and definitions of “safe spaces”. Who is a space safe for? Are humans the only ones that require such spaces? Where does the architect fit in and what is the morality of space we grapple with? Each extraction, and new addition takes away and interacts with the garden, that is the earth. So when the anthropocene pushes for overconsumption through capitalism, each decision made within this human society is in fact transspecies; affecting in a cascade of butterfly effects. Through my work, I try to assemble a celebration, of life, of the earth, of the human hand and the cosmogram of interconnected entities; all the while asking one simple question - Who gets to celebrate, and who gets kept out of it? Menagerie is its namesake, a collection of humans, flora, fauna and objects that are and are not architecture simultaneously..



## 1 Shucking the Shell

*Hudson River, New York City*  
Investigating the political ecologies of the Billion Oyster Project

## 2 Aliens in the Arctic

*Longyearbyen, Svalbard*  
Designing for aquatic invasives in anthropocene-ridden Arctic

## 3 Haunted Landscapes and the New Autochthonous

*Guri Lake, Venezuela*  
Defragmenting the islands of Guri Lake through temporal systems of habitat construction

## 4 Re-building Momonoura

*Momonoura Village, Miyagi, Japan*  
Studying the post-3/11 disaster rebuilding of the Momonoura village as a fishing school

## 5 Lamb to the Slaughter

*St. Louis, Illinois*  
De-carbonizing the meat manufacturing industry



## 6 Waltz with Bashir

Course: The Arab City in Film  
Political Urban Memoriscapes

## 7 Animorphs

Course: Environments, Animals, Tech  
Designing toys for non-human conscious learning

## 8 Under and Above the Columbia Expansion

Course: If Buildings Could Talk  
Designing The Shard: an installation of gentrification

## 9 GSAPP x GOO Cloud

Course: The Outside In Project  
Design-build inflatable charging station in Columbia University

## 10 Man Plus

Course: Transscalarities

6

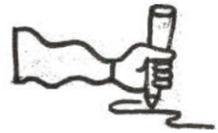
7

8

9

10

Writing



Fabrication



Writing



Designing



Research





# SHUCKING THE SHELL

Analyzing the material and immaterial factors that form the artificial oyster reefs landscape in Hudson river park, one can observe that marketing and funding are a central factor for the success of the initiatives. Through these observations, we question the connection and feasibility of this proxy landscape in other contexts where it is needed due to climate change and habitat loss. How can we define these landscapes, and what are the parameters in these landscapes?

STUDIO: Proxy Landscapes

SEMESTER: Summer 2022, Advanced Studio

CRITICS: Marco Ferrari and Elise Hunchuck

COLLABORATORS: *Kriti Shivagunde and Andy El Set*

GLOBAL WETLANDS

When Henry Hudson arrived on the lands of the Lenape people, what is now New York City, in 1609, there were approximately 350 square miles of oyster reefs in the harbor and its surrounding waters. These waters contained nearly half of the world's oyster population. By 1910, oyster bed populations were declining rapidly due to overfishing, overconsumption and water pollution (600 million gallons of untreated sewage were being dumped into New York City water every day). After the recent Hurricane sandy impact on New York City's coastline, New York City saw a series of initiatives and proposals to protect the coast, of which, initiatives such as the Billion Oyster project aimed to deploy millions of oysters in the estuarine waters of Hudson river to restore the lost Eastern Oyster reefs and potentially protect the land from future risk.

The success of Oyster Restoration initiatives depends on the ideal physical landscape as well as the political ecology that sustains it. Through these observations, we question the connection and feasibility of this proxy landscape in other contexts where it is needed due to climate change and habitat loss, and specially the ones that do not share the natural and political ecologies of New York City, however face the same environmental challenges.



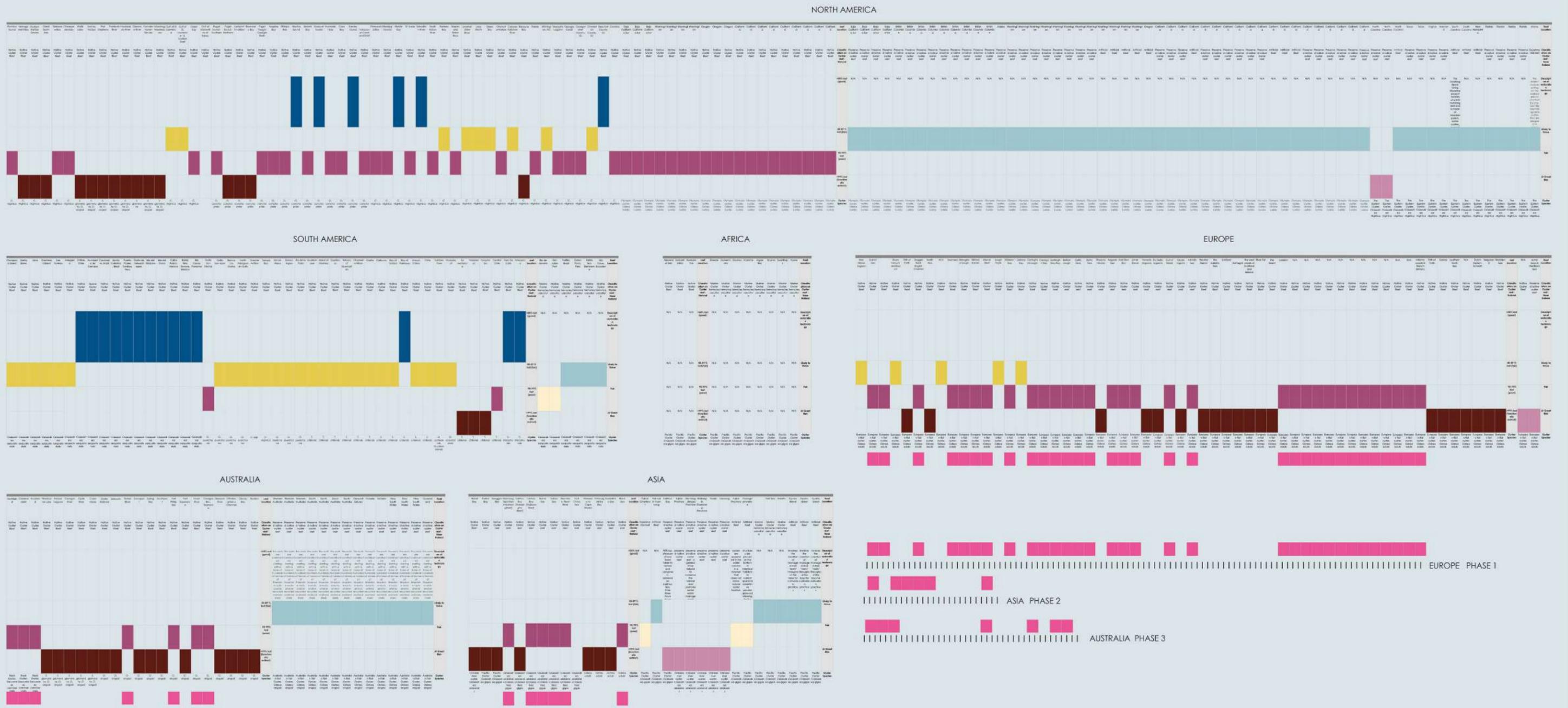
The Ramsar Convention on Wetlands is an international treaty for the conservation and sustainable use of recognized Ramsar sites. It acts as a global connecting body of wetlands in different conditions and ensures their preservation. Given the severity of oyster reef loss (85%) as compared to the 20-50% loss of other types of wetlands

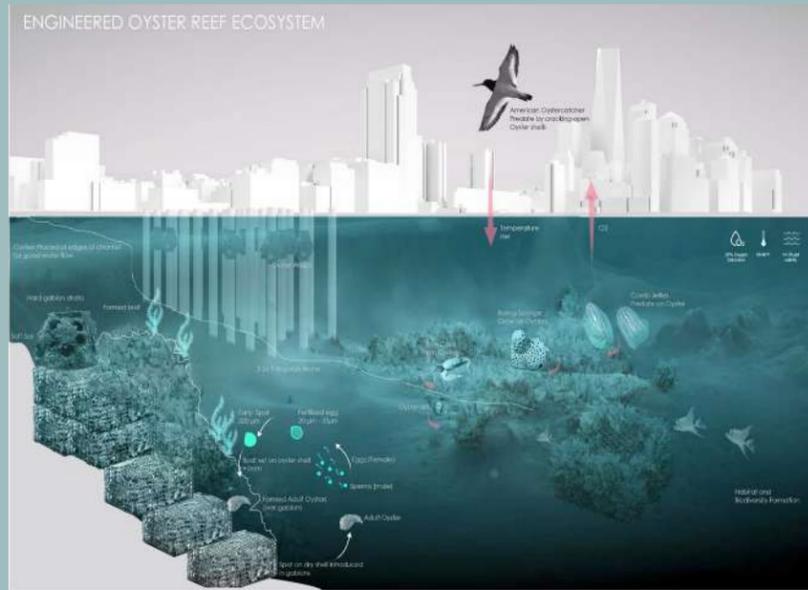
clarifies the urgency for action. The extent of oyster reef habitat loss justifies more explicit recognition in protected areas policies. Oyster reefs should be regarded with other similar wetlands as an “under-represented wetland type.” As a product of this, we propose the New York Convention on Oysters as a subset of the Ramsar Convention. Through a sharing of resources and administrative bodies with the Ramsar, the New York Convention forms the Standing Committee, the

Convention of Contracting Nations, The Administrative body, The Scientific and Technical Review Panel, the Communication, Education, Participation and Awareness Body and the Funding body. The Convention will regulate and stipulate guidelines for the creation and execution of the reefs from start to end. It also creates an index of oyster reef sites around the world, identifying the reefs that need immediate attention.

Through connecting scientists, community initiatives, volunteers and local governments in the restoration process, the New York Convention acts as a central governing body that creates reports, sources funding, and helps monitor and study the reefs.

## POTENTIAL OYSTER RESTORATION SITES STUDY





The convention sets criteria for recognizing oyster reefs around the world - which are reefs that form habitat, offer protection and home for marine species, contain natural or near-natural reef types, and support vulnerable and threatened oyster species as well as the species that are important for maintaining the biodiversity of a region. The convention compiles the global reef data into an index, where it recognises endangered oyster species in the world. The reefs are classified as native natural reefs, and near-native natural reefs. Which are managed / preserved oyster reefs, artificial reefs, experimental reefs abundant in the continents. It also studies the conditions of these oyster reefs and classifies them as Likely to thrive, Fair, Great Risk, Functionally Extinct and Disappeared sites. The Convention recognizes potential restoration sites based on their conditions, and compares it with the community initiatives ongoing within the regions. The sites with reefs at risk and without community initiatives are more likely to decline further and need to be urgently acted upon.

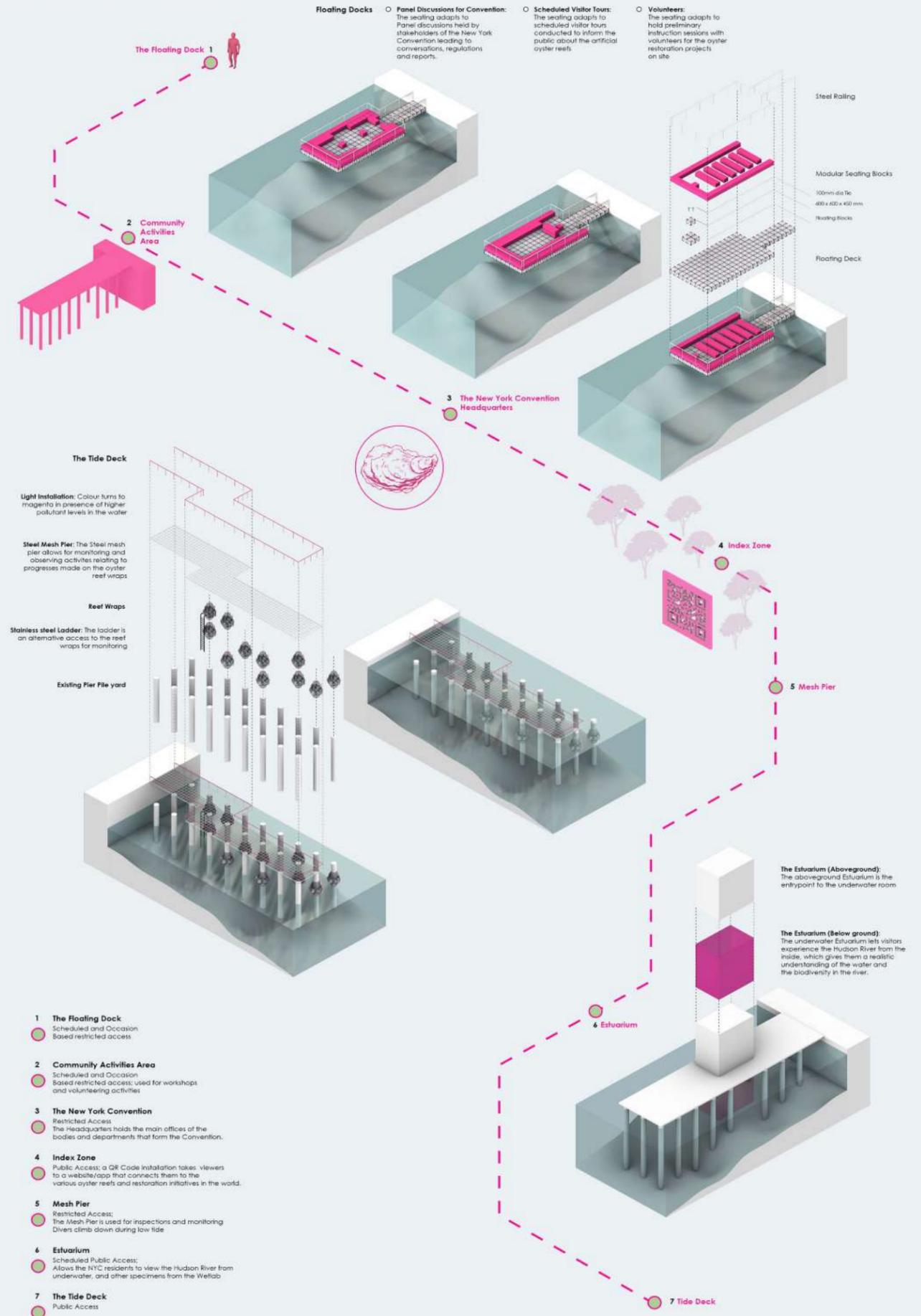
### The Oyster Life Cycle

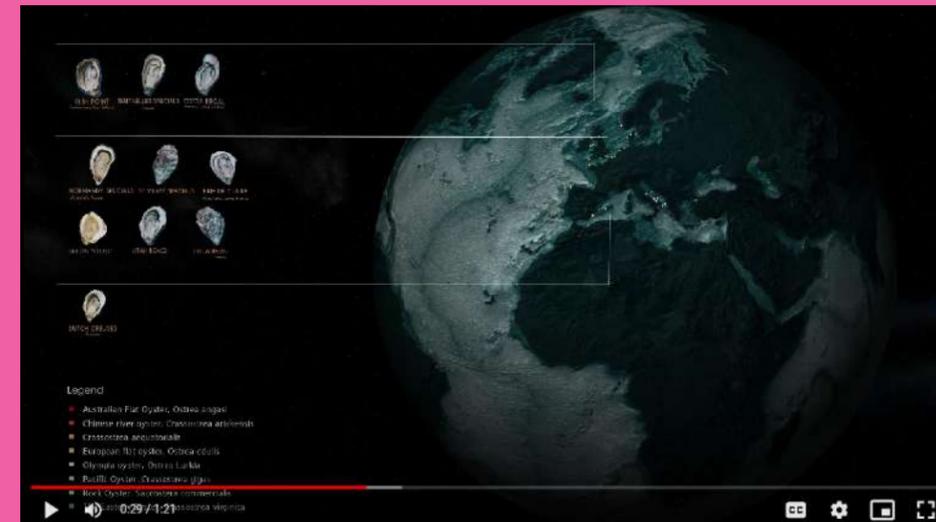
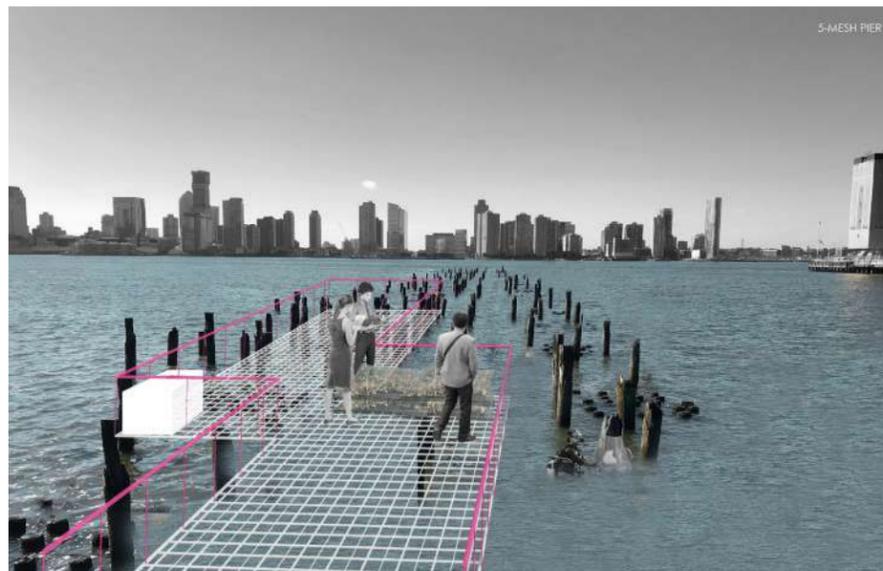
The Oyster Reef restorations conducted by these initiatives depend on a variety of technologies introduced in estuarine waters to help the re-introduced reefs grow. These technologies consist of oyster gabions, reef wraps and reef balls that help provide hard strata for the oysters to grow on, in the soft soil base of the Hudson river. They are placed in near ideal water and climate conditions - 2-26ft brackish water, 68-90F, and 20% oxygen saturation. The introduced spat on dry shell grows into adults which in turn produce larvae that form new spat which deposit on the adult shells again; forming the reef. The reefs formed helped create a habitat for a variety of aquatic biodiversity. Sounds can be used to measure reef biodiversity. This is the sound of a healthy oyster reef at 1 year of its formation. A degraded reef has very little sound.

### HUDSON RIVER PARK AS A RAMSAR SITE



### HUDSON RIVER PARK AS A RAMSAR SITE





The Hudson River Park is a proxy for oyster reefs around the world. By creating the New York convention on Oysters, we use Hudson River Park as a proxy designated site of the convention. The site becomes a preserved landscape with regulated initiatives and public guidelines that control operations and access to the site and ensure the thriving of the habitat. The convention introduces absolute, conditional, and user-based restrictions such as restricting motorized boating, public access and CSO systems on oyster reserve locations. It also proposes a set of small interventions laid on a trail that engage different users in different restoration activities along the site, making the Hudson River Park an oyster reef reserve.

The trail begins with the Floating Court, which acts as a platform to hold panel discussions between the stakeholders, a space for instructing volunteers, and holds scheduled visitor tours. Made of floating dock blocks, the Court floats on the water, allowing the people to feel the waves of the river and connect

with the surrounding landscape. From here, the user is directed to the Oyster Workshop which is an occasion-based restricted area which hosts workshops on monitoring for volunteers. The New York Convention Headquarters is located on Pier 40, which houses all the founding bodies and departments of the convention. The trail then leads to the Observatory, which has restricted access. It is where the reef is monitored regularly. The mesh of the pier allows transparency for viewing the reef wraps at low tide, and the railings are light installations that indicate the quality of the water of Hudson River. Further on the trail is the index zone which is a QR Code installation that can be scanned to connect the people to the index that connects them to the oyster reefs around the globe. This is then followed by the Estuarium which is relocated from its current projected site to Pier 26 where the underwater section allows the visitors to experience Hudson river as it is, from the perspective of the biodiversity that resides within it.



# 2



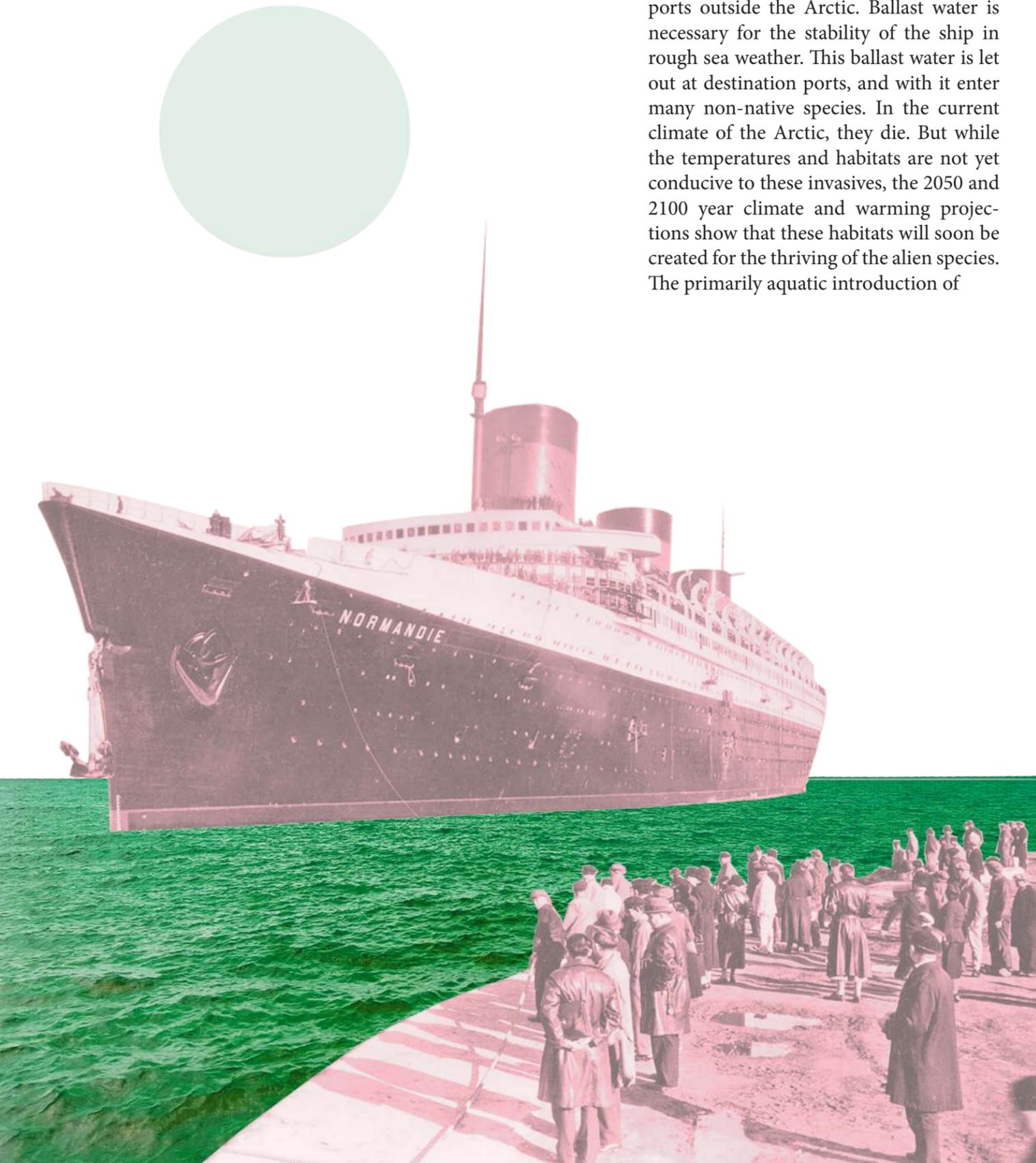
## ALIENS IN THE ARCTIC

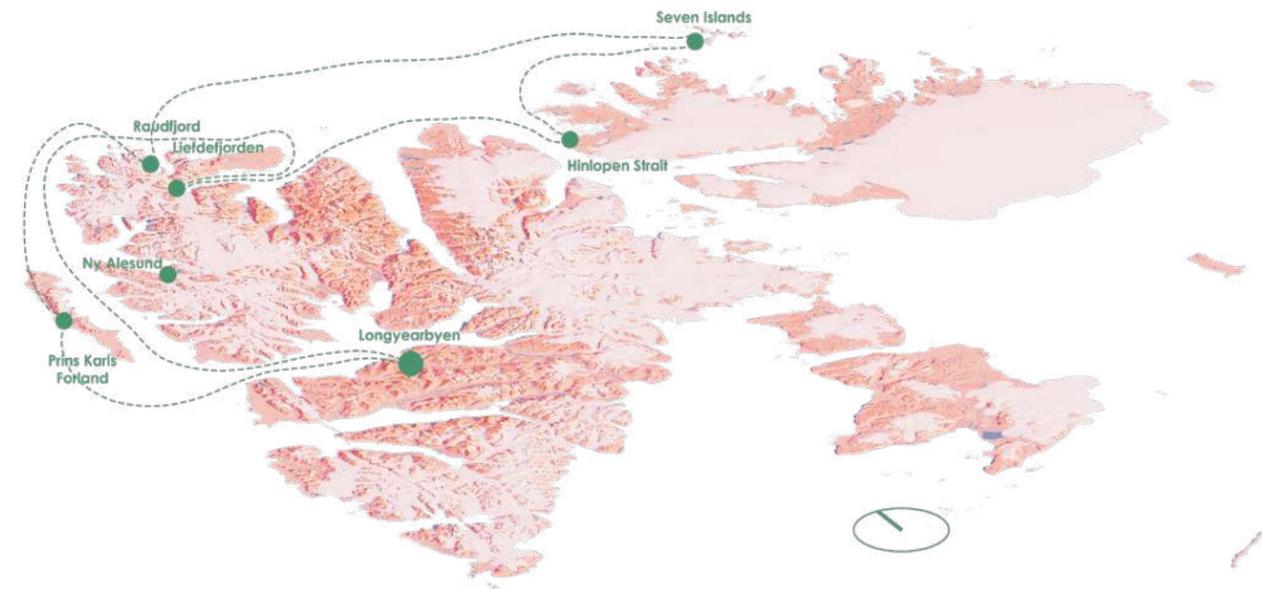
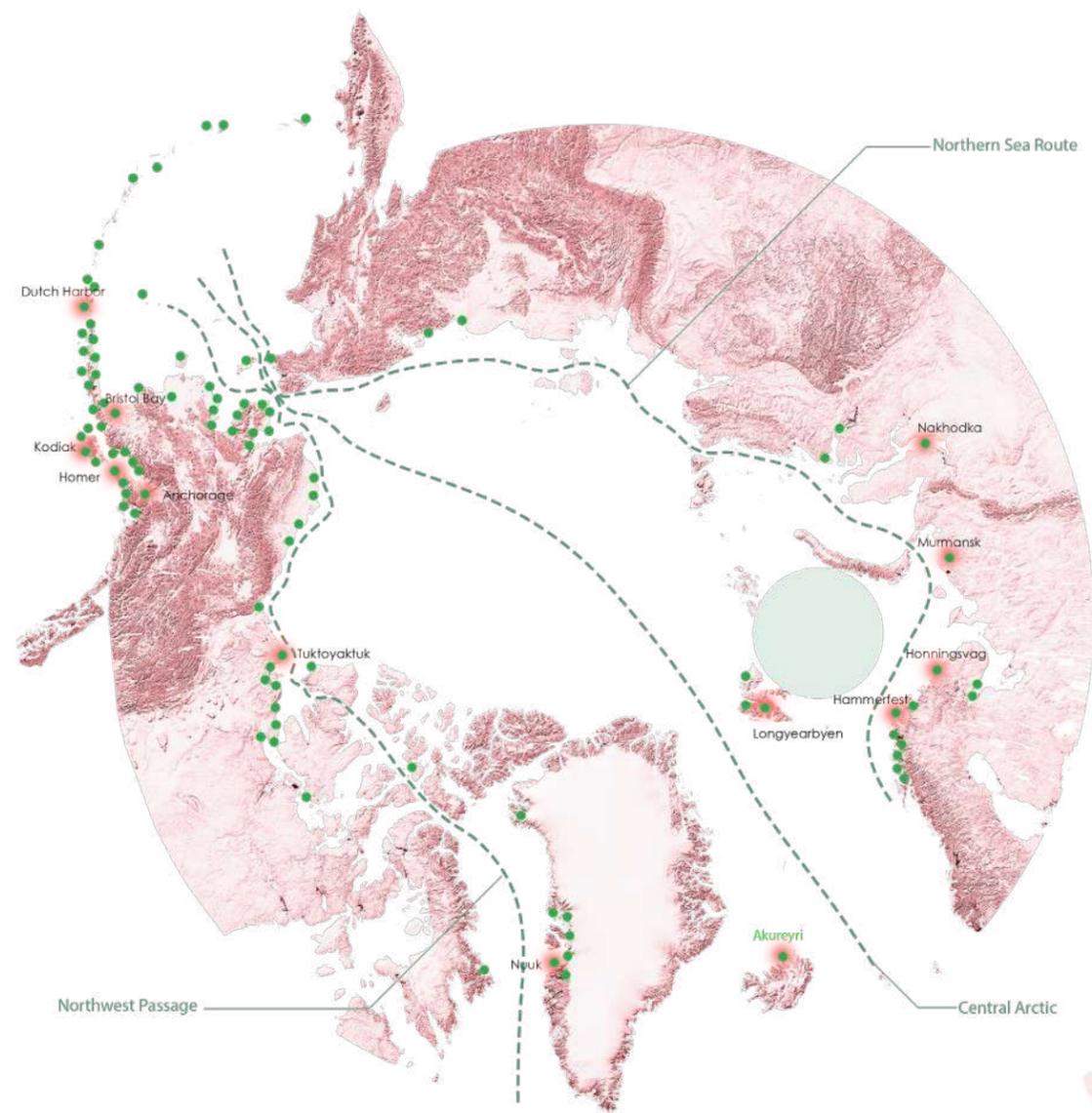
The Arctic is known for its unforgiving landscape, and many residents call this place their home. Though not extensive in their species diversity, there is an abundance in the population of the few species that inhabit these freezing lands. For these native organisms, Invasive species are an ecological threat, especially in the Arctic.

STUDIO: Are Icebergs Free  
SEMESTER: Fall 2022, Advanced Studio V  
CRITICS: Leslie Gill and Khoi Nguyen

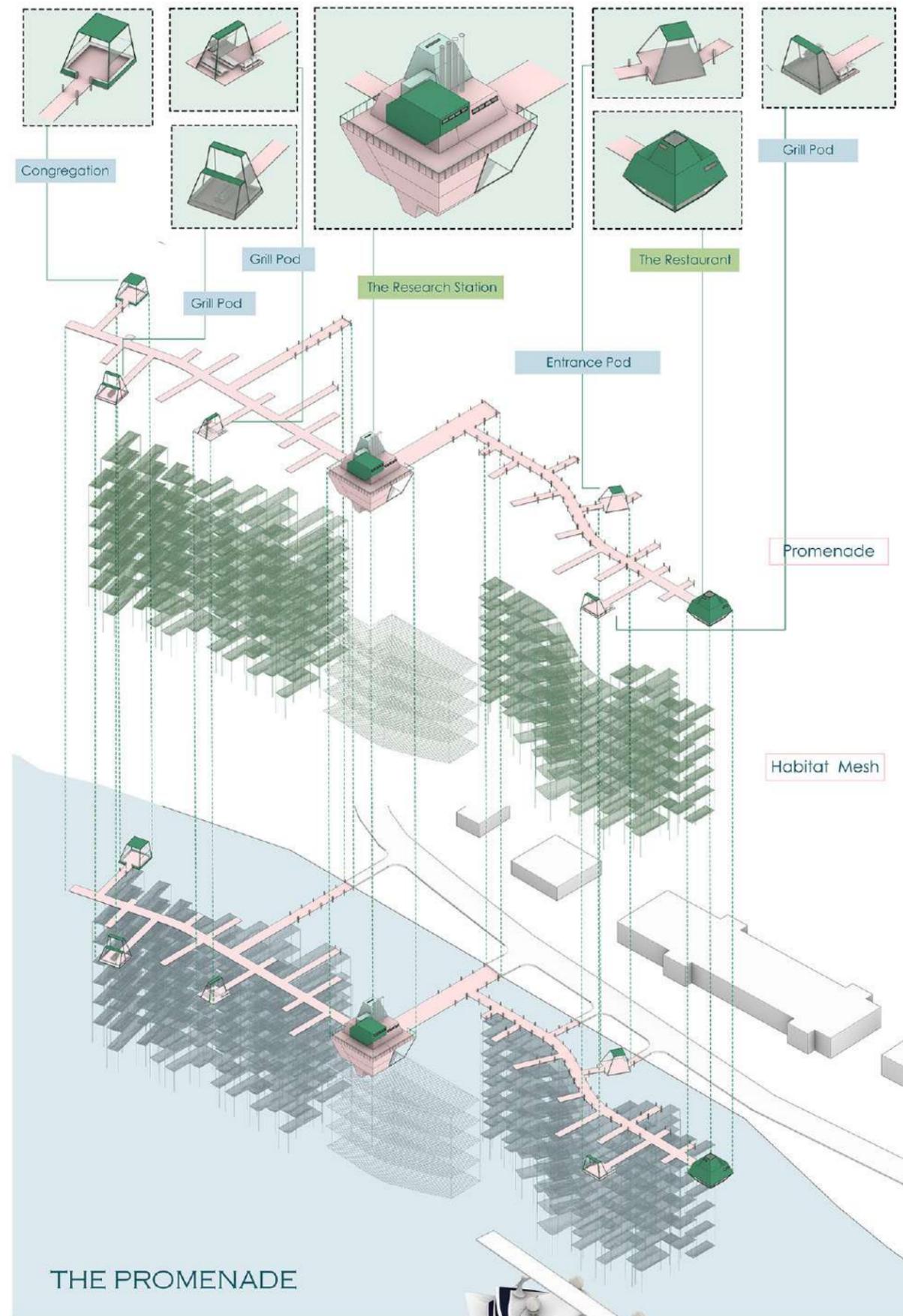
These invasives are introduced to the present-day Arctic through ballast water from ships that have collected the same from ports outside the Arctic. Ballast water is necessary for the stability of the ship in rough sea weather. This ballast water is let out at destination ports, and with it enter many non-native species. In the current climate of the Arctic, they die. But while the temperatures and habitats are not yet conducive to these invasives, the 2050 and 2100 year climate and warming projections show that these habitats will soon be created for the thriving of the alien species. The primarily aquatic introduction of

these invasives is a testament to the growing disaster-tourism or eco-tourism that is flourishing in the Capitalocene, participated in by all the residents of the world that is contributing to the very specific effects of climate change experienced by the nations of the Arctic. This geopolitical reality is of relevance to the understanding of the very politics of habitat shifts, changing the identity of an invasive to a “neonative” as researchers recognize them. As the ice caps melt, the Arctic becomes not only home to such neonatives but also to political attention in search of oil, land, and new battlegrounds.





The North Pole's anthropogenic existence is an ever-deteriorating identity, the collective convergence point of the consequences of human activities in the Arctic and elsewhere. The ice caps are melting, species' behaviours are changing, shifting foraging grounds and affected migratory pathways are a few actors on a large network of geopolitical, socio-economic, and environmental collapses. The invasive species coming into the Arctic are essentially products of human intervention and meddling. This begs the question - Are these species invasive, or are We?



## How do we decide good or bad nature? Are all invasives bad? Shifting foraging grounds through shifting microclimates can envision a coexistence between the Natives and Invasives.

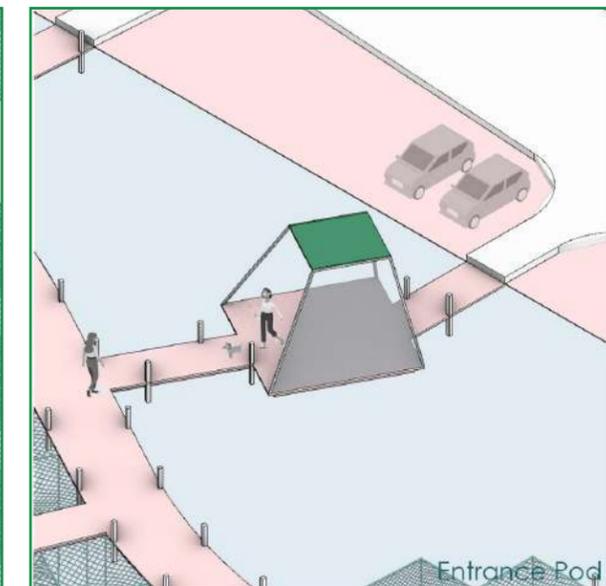
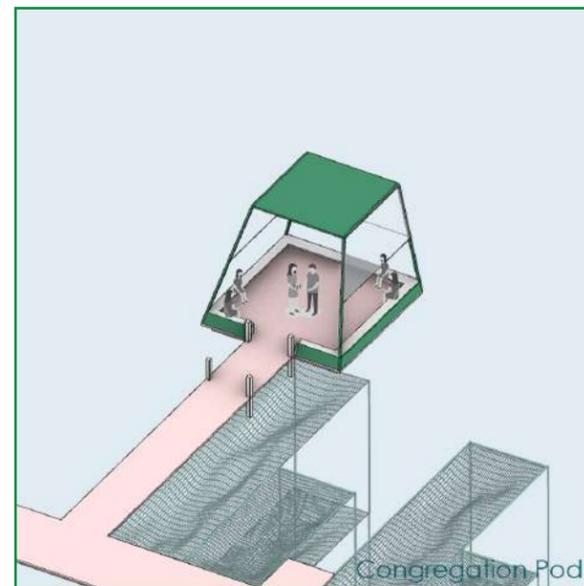
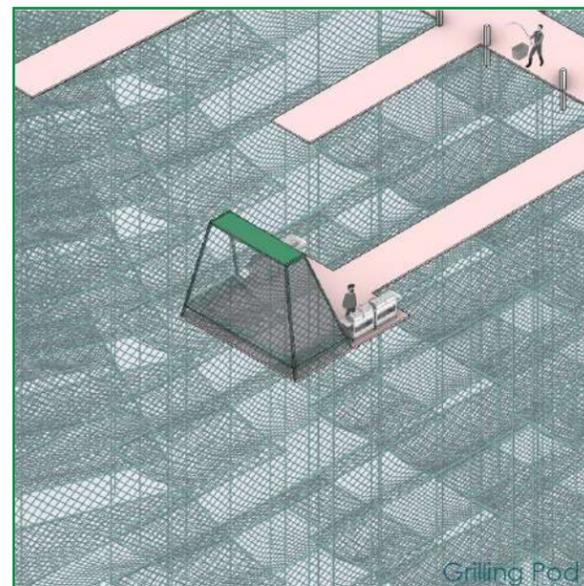
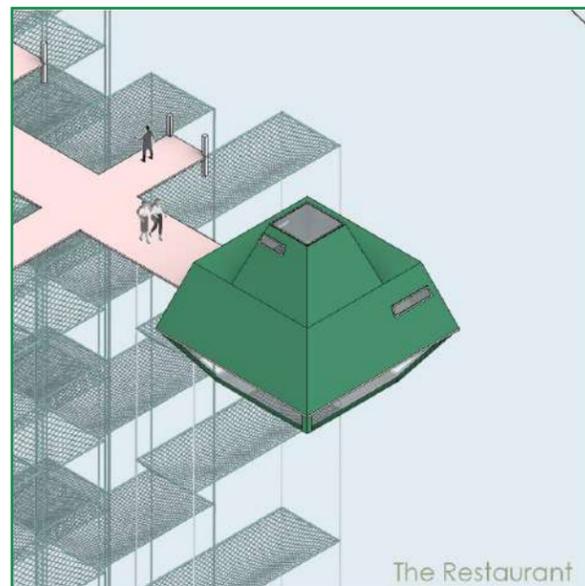
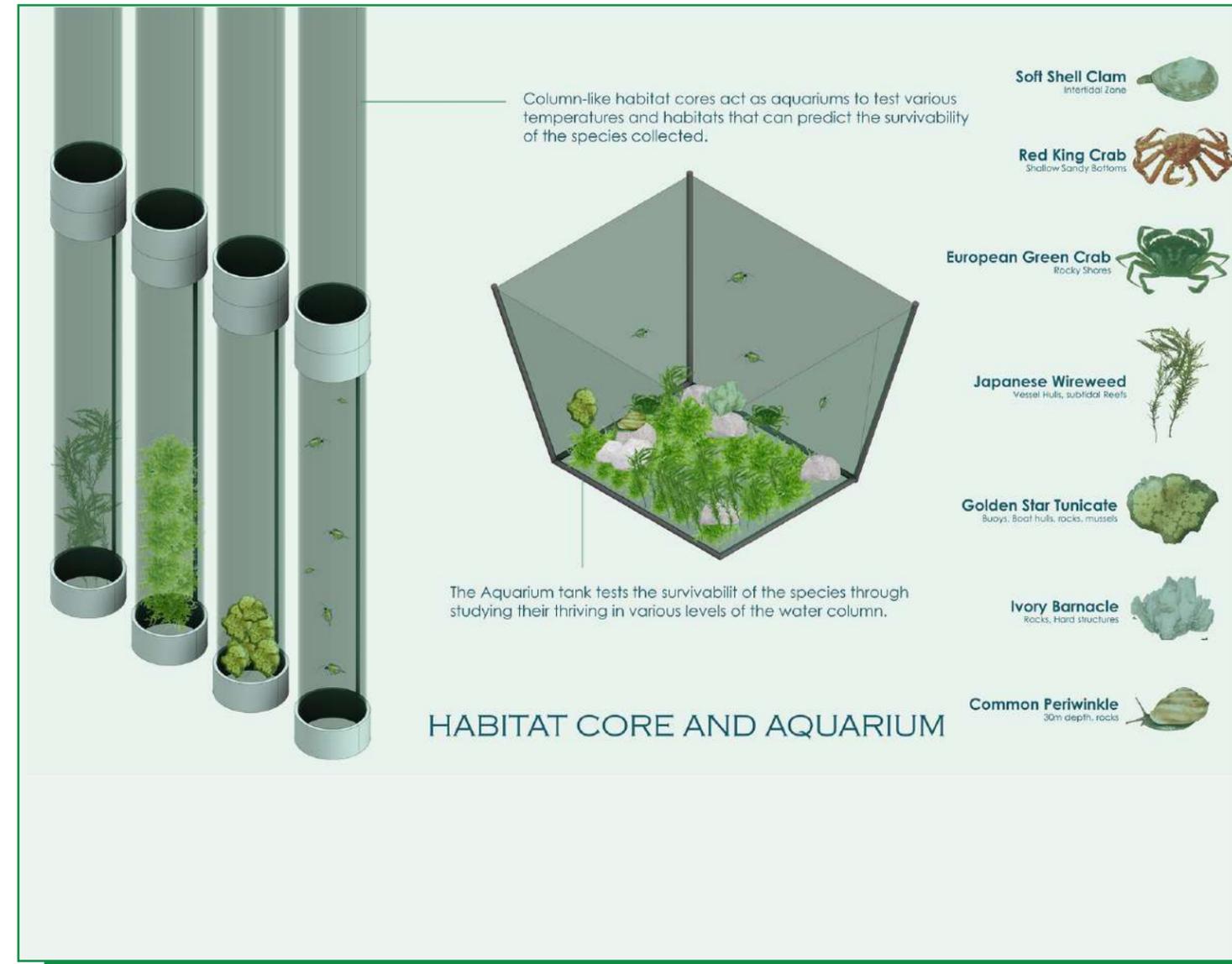
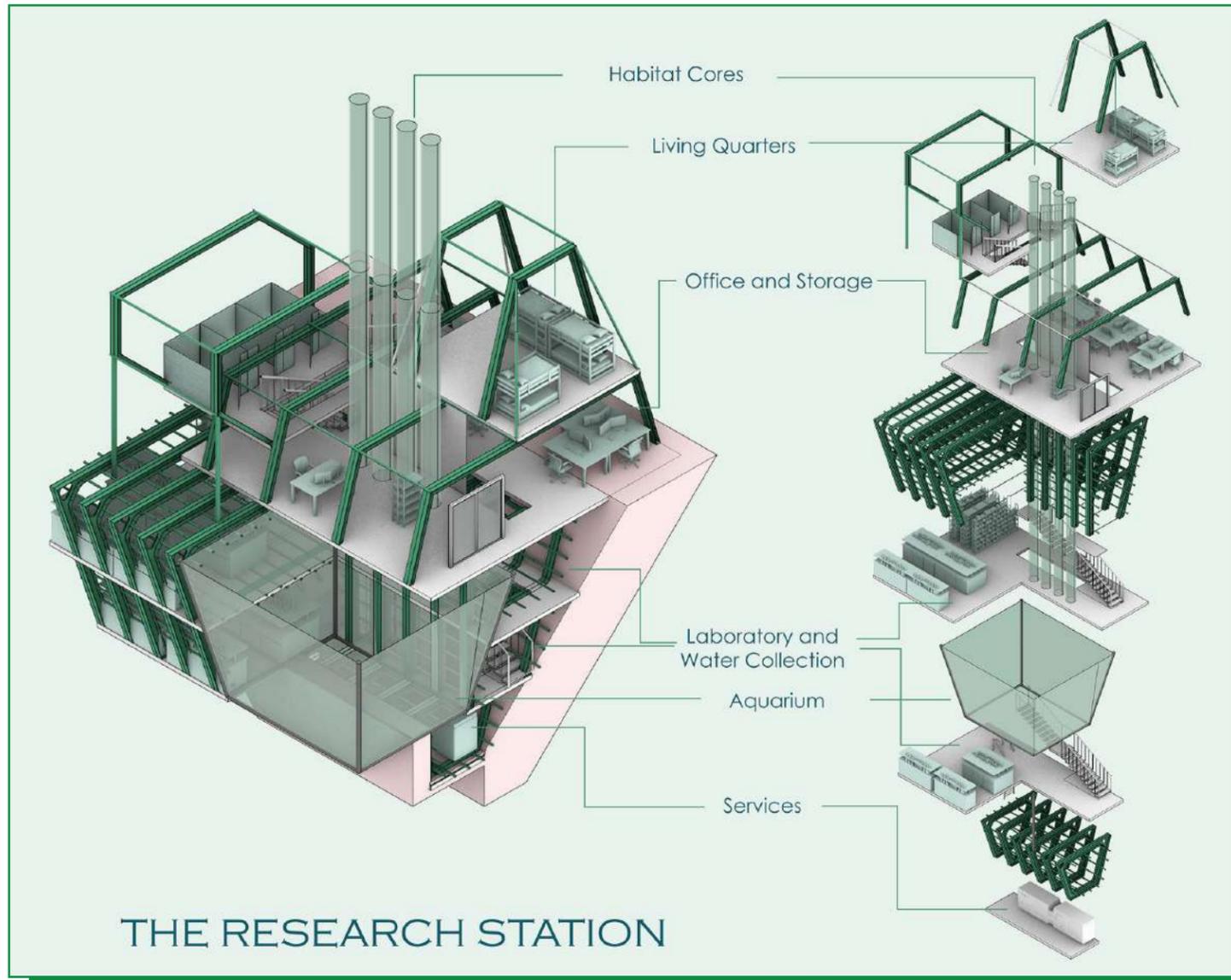
Because of the primary aquatic introduction of these invasives, the numerous Arctic Ports and their traffic in the waters became an important zone for research, overlaying it with the area of the Arctic that is projected to heat up the most in the near future. This heating zone - found towards the east of Svalbard would make the area most conducive to invasive survivability.

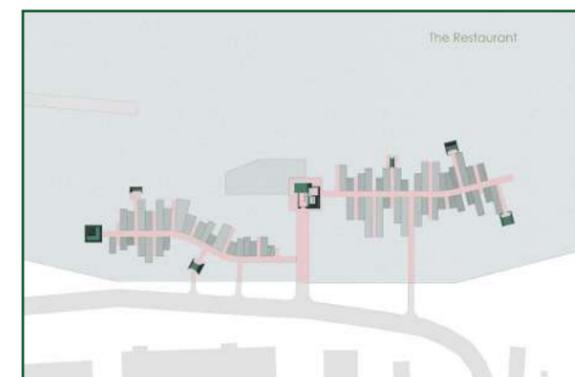
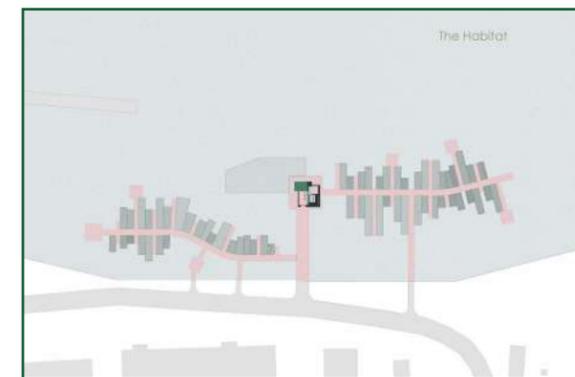
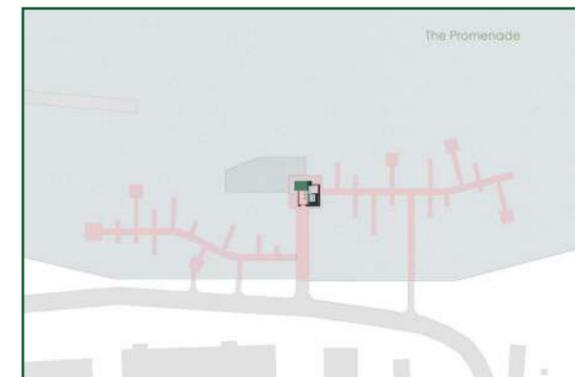
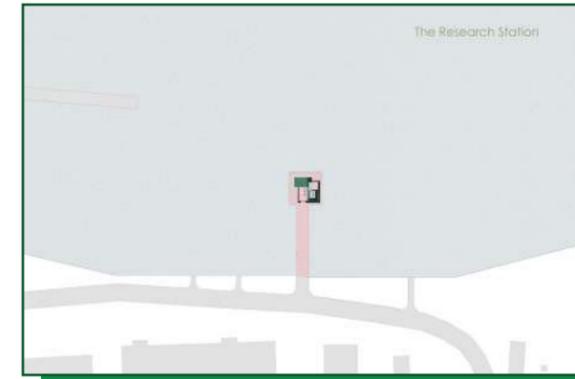
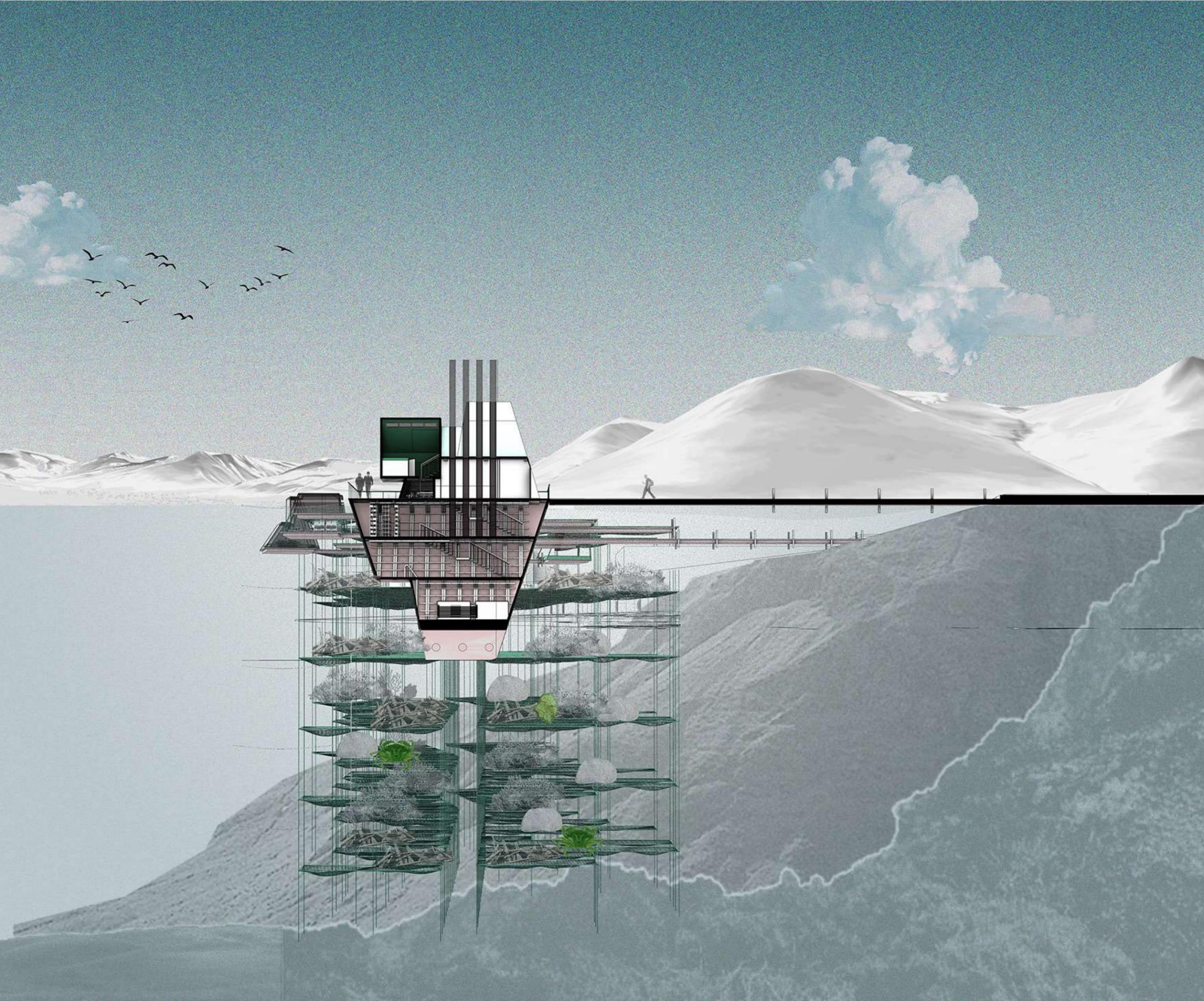
This map overlay of port traffic and rising water temperature led to an imminently changing landscape. Picking Svalbard as the site for its proximity to the heating zone, I studied ship movements around the islands, focusing on Longyearbyen due to its status as the busiest port with about 100 ships on port in the span of a week.

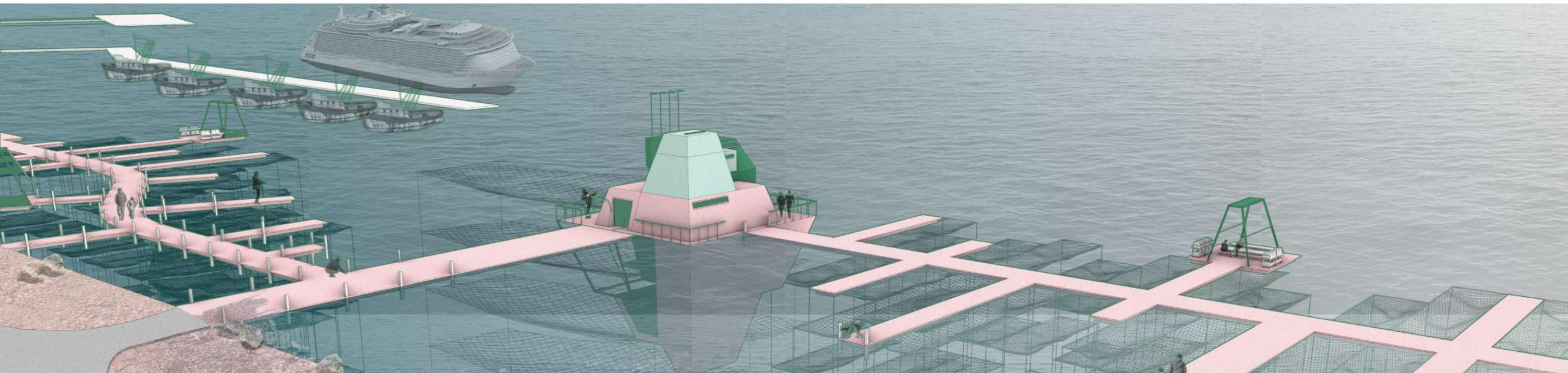
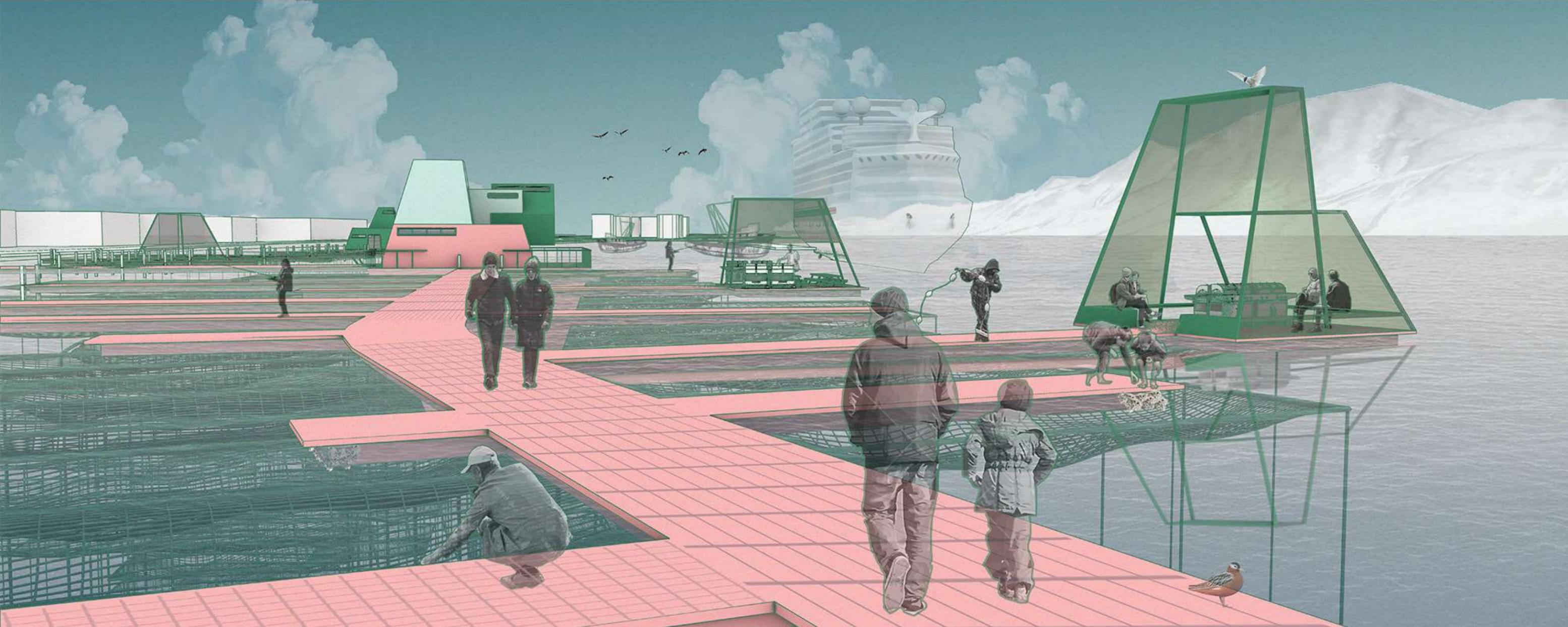
The Longyearbyen port becomes the subject of research and the project proposed opens up in phases. The first phase is the research station, which becomes the eye of the project that grows and expands temporally over the coastal landscape. The research station functions as a starting point to the research, beginning with extensive research on the water column it resides in.

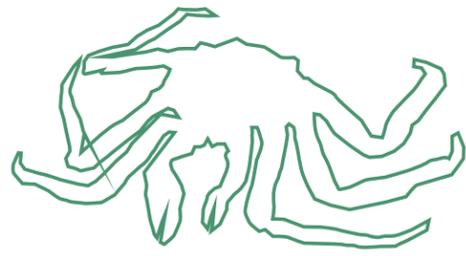
Located right next to Longyearbyen port, the waters become an optimal sample collection resource. The Research Station is designed to be more than just a backdrop to the activities within - floating on the water by utilizing a ballast tank mechanism not unlike a ship, the structure collects water in its ballast, which is then sampled from within the research labs. This mechanism eliminates the expenditure on heavy sampling tools and machinery, allowing the building to participate in the research.

Water sampling, soil core sampling and indexing of the aquatic species of Longyearbyen is ongoing due to the Pol Nor project. The research station houses an aquarium and habitat cores designed to test the species collected from the water samples - they are tested in various temperatures, habitat conditions, lighting and oxygen levels to study their survivability in the recognized Arctic conditions of the future. As the research solidifies into a collection of predicted "invasives", the second phase of the project begins - The Habitat Meshes. The meshes create an 'invasive apartment'sque aquatic underground where habitats conducive to these invasives is provided. This next phase of the project proposes a habitat created for the invasive species so as to make Longyearbyen port as an invasive trap, so that the collective congregation of the invasives in these cultivated habitats keeps the rest of the island shoreline safe from invasions. As the Habitat meshes layer onto each other with sedimentation and aquatic debris on the meshes, the third phase of the proposal, The Promenade, overlays on them. The promenade creates niches and platforms for people to interact with these invasives in their carefully inserted habitats, where they can fish the species out of the meshes, and further consume them. With cookouts and congregation spaces on the water, the proposal envisions an alternative to the problem of invasives, by introducing a consumption-based control and interaction-based research and public understanding of the very contexts of human residences in the Arctic. The project also proposes new recipes for the invasives fished on the promenade - to be consumed as part of a new cuisine that can keep these invasives in check.

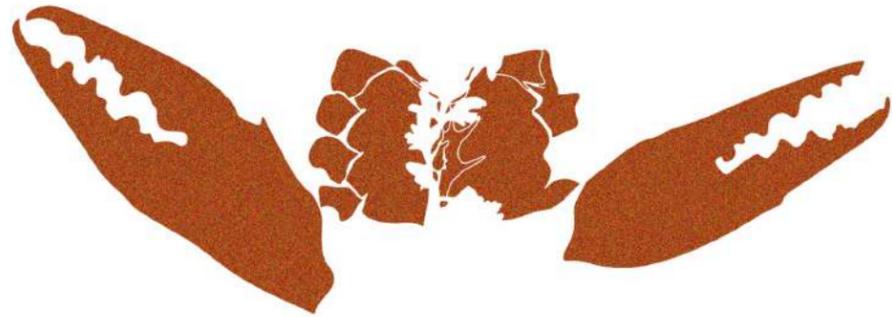




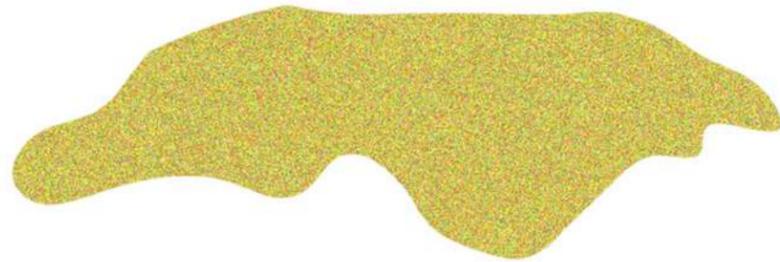




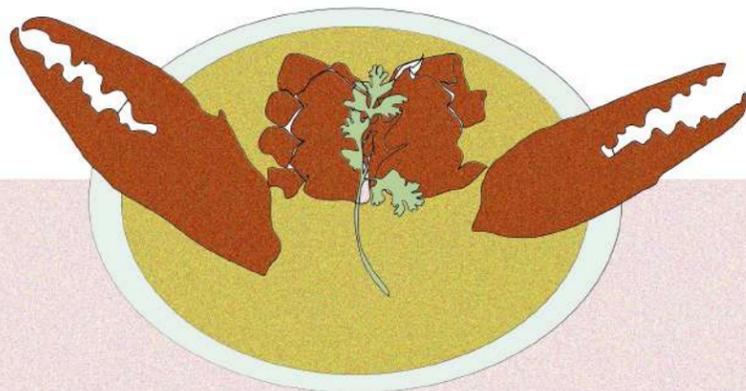
Cilantro



Red King Crab



Shiro curry



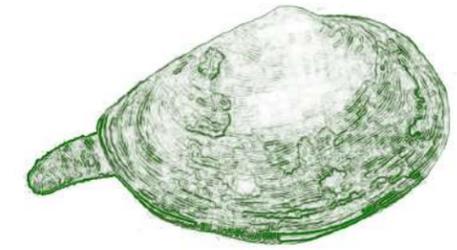
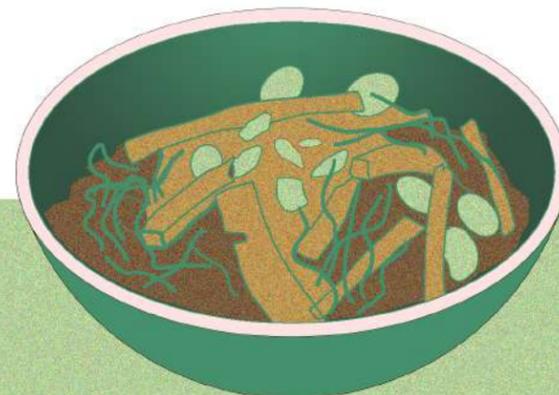
Green Beans



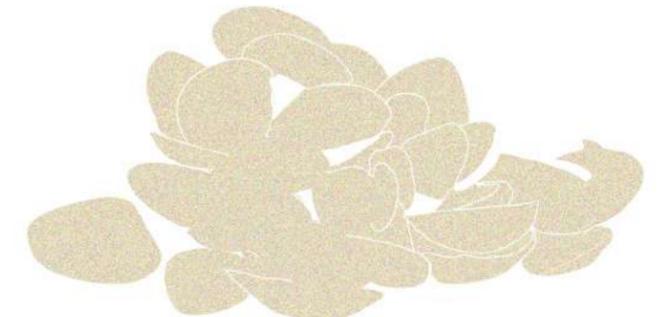
Cooked Japanese Wireweed



Gravy



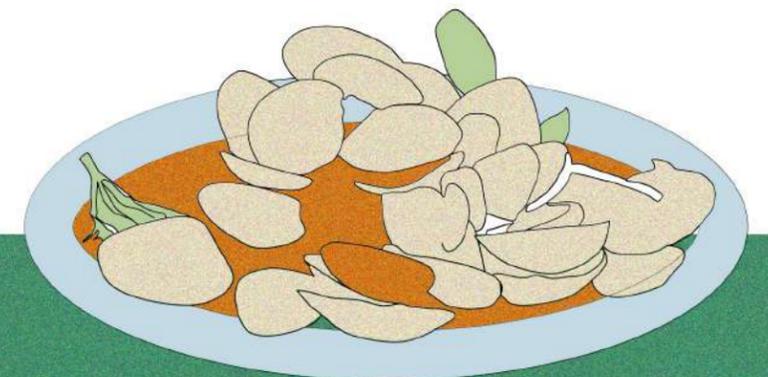
Cilantro

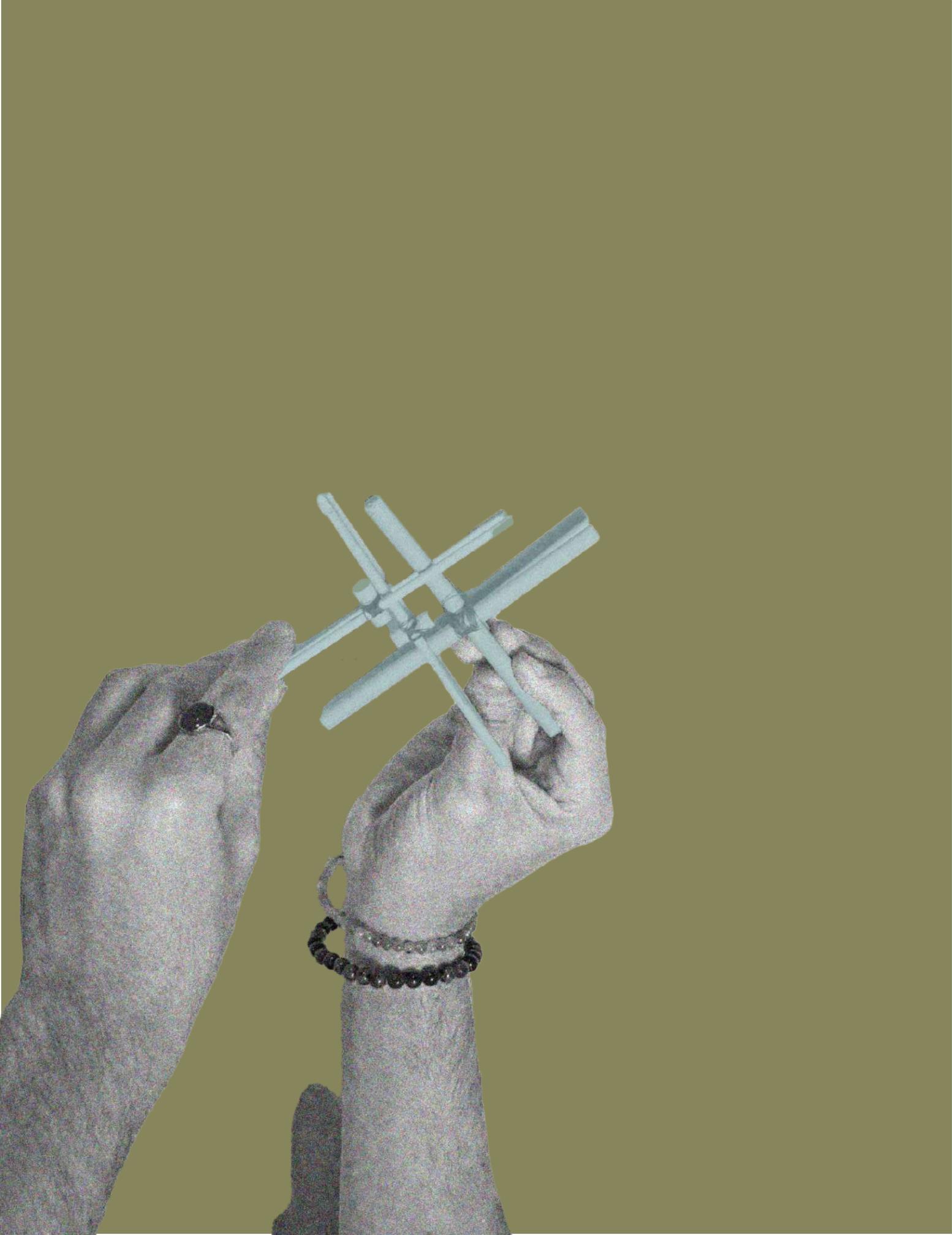


Soft Shell Clams



Marinara Sauce





# HAUNTED LANDSCAPES AND THE NEW AUTOCHTHONOUS

The heart of Venezuela's electricity system is built on the Caroní River just before it pours into the mythical Orinoco, a reflective pool with a 4,000 square kilometer surface area that feeds the Simón Bolívar hydroelectric plant (Guri Dam) which in turn provides 70% of Venezuela's electricity. Over a decade ago, the Venezuelan government issued the electrical emergency decree. Ever since, Guri has been at the center of controversy over the causes behind frequent power outages.

STUDIO: Capitalocene Energetic Landscapes  
SEMESTER: Spring 2023, Advanced Studio VI  
CRITICS: Mireia Luzarraga, Alejandro Muino, Andrea Molina  
COLLABORATORS: *Kriti Shivagunde, Javier Flores*

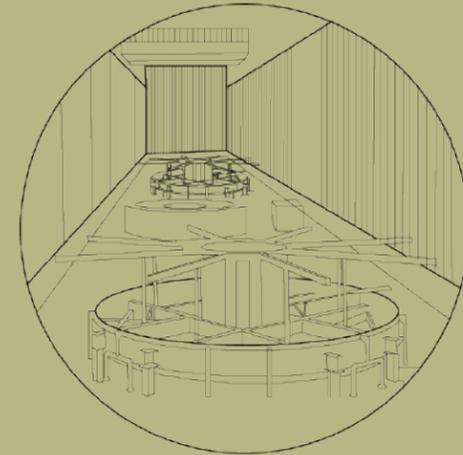
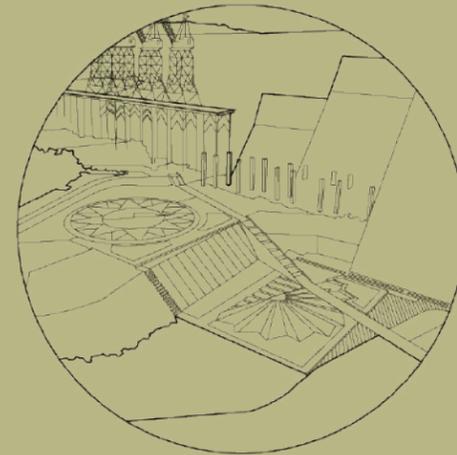
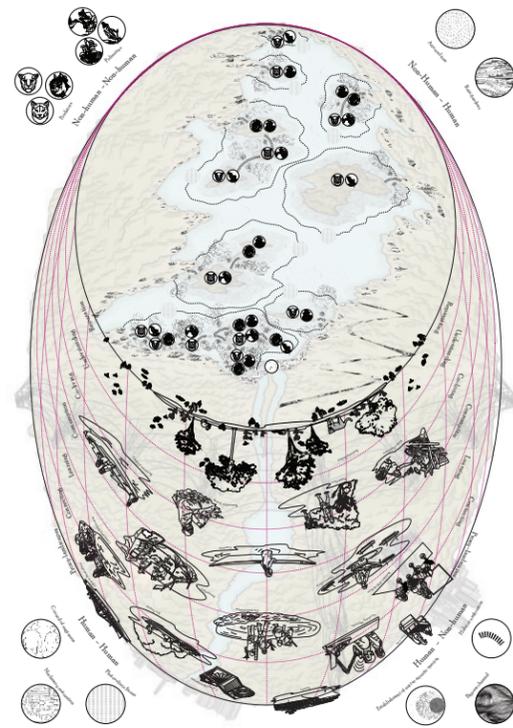
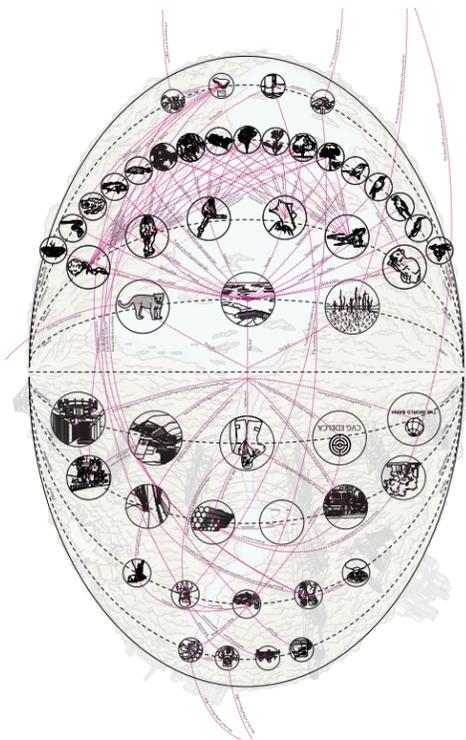
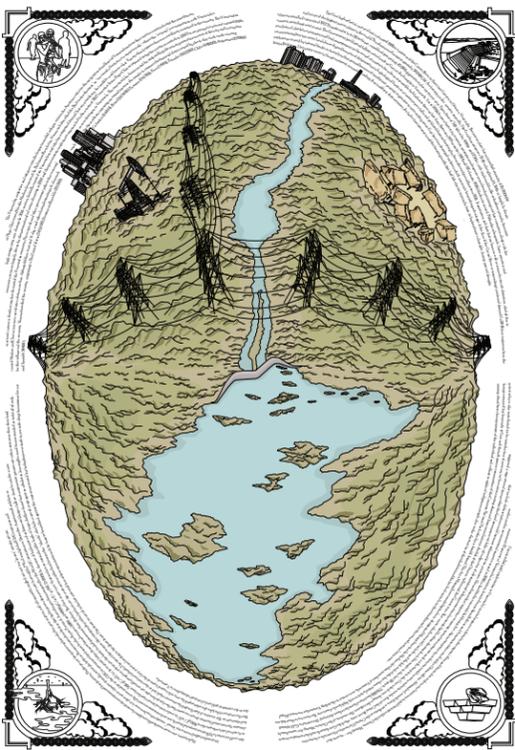


The Guri Dam finds itself symbolically and geographically located at the conjunction of urbanization and the tropical ecology of Venezuela. The cosmogram identifies the various socio-economic-political and ecological actors that impact and are impacted by the reservoirs and highlights their interconnected identities to flesh out a map of butterfly effects.

Exploring the ecological impacts, the construction of the dam immediately flooded the river, causing the tips of hills to become islands of fragmented habitats with terrestrial species stranded on these landmasses. It also created a ghost forest of lost carbon sequestration potential, as well as a departure of predators. This furthered a trophic cascade of overconsumption by leafeater and frugivorous species, uncontrolled population growth in the base of predators and also declining vegetation-cover, overall extirpating the species on these islands. Mercury poisoning in the water caused by mining has made fishing and consumption impossible. The electrical lines from the power plant to the cities encroach on indigenous Pemon and Warao lands, and a recent drought decimated the water levels of Guri Lake causing a 7 day blackout in Venezuela causing further collapses in economy, political trust, and mass migrations.

The many actors involved in this cosmogram of Impacts and Impacted - offers multiple opportunities of intervention that could help the Guri Lake and its tangible and intangible environment. During the brainstorming process, we explored a hybrid structure of intervention that is interconnected in its effects - where Guri lake could them become a proxy landscape for the many waterbodies in and around Venezuela with similar problems and climate challenges.

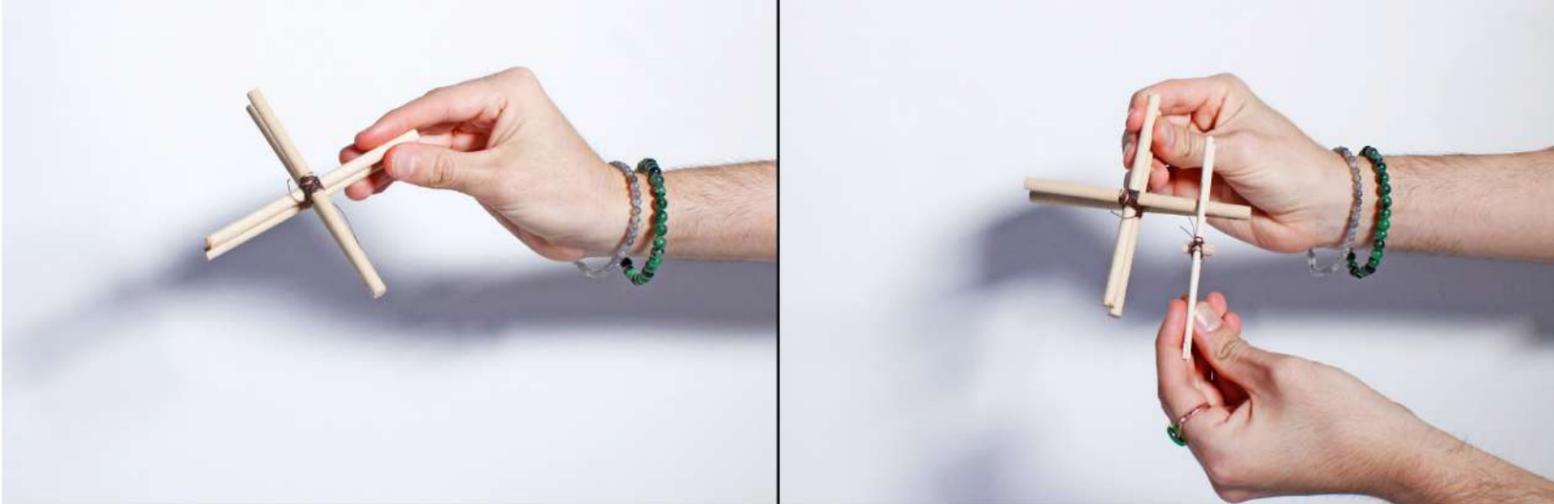
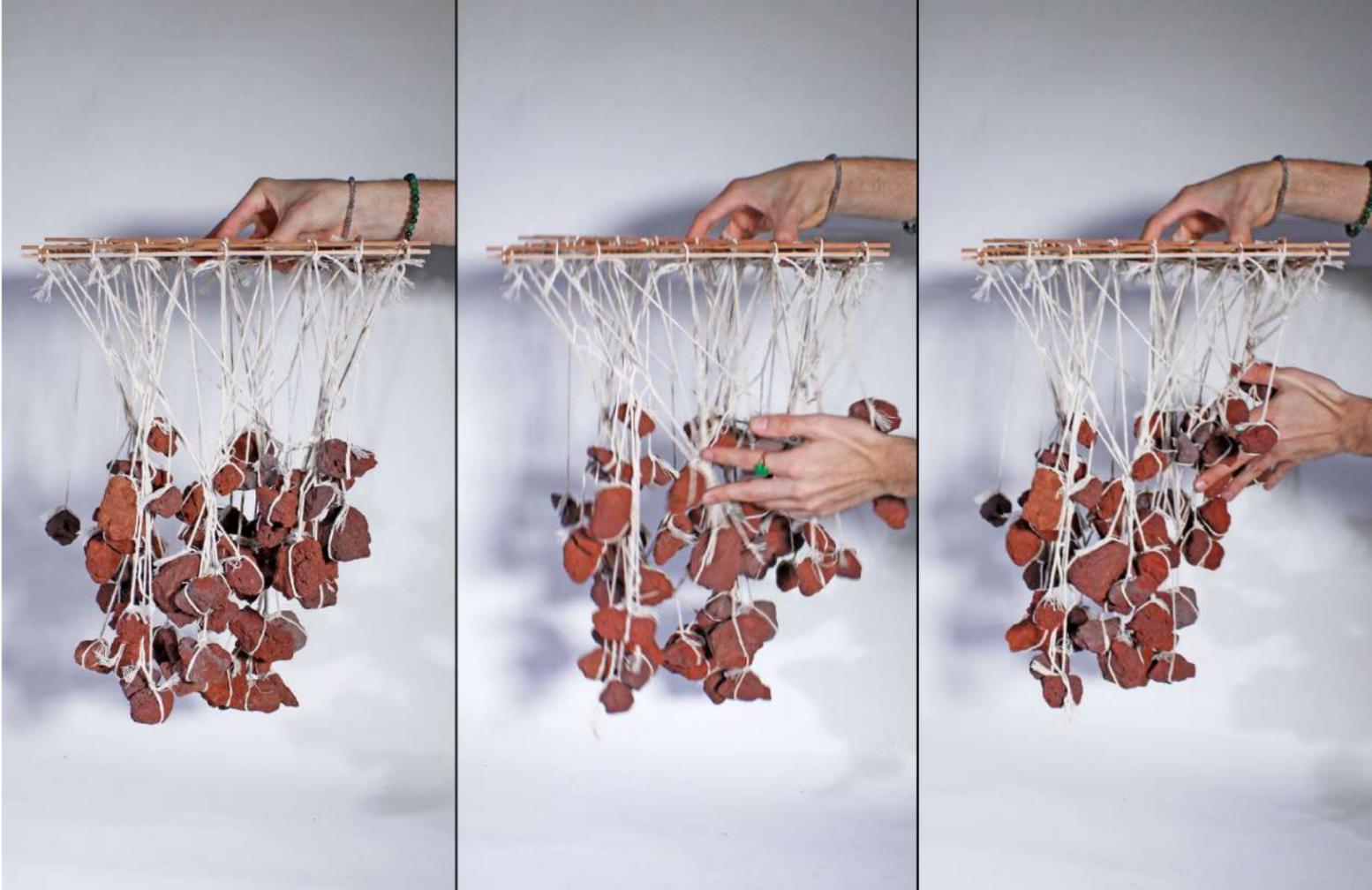
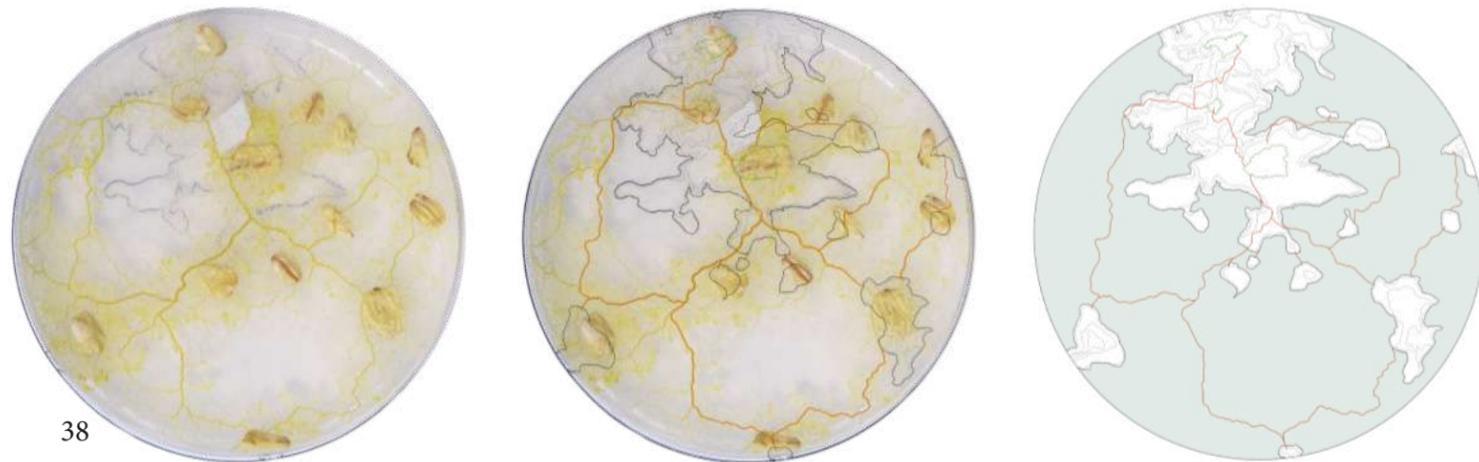
The aquatic landscape of Guri, which is the Guri lake is a newly formed landscape that did not exist before the construction of Guri Dam. The shift of this ecology has in turn created a habitat for species that now belong in this lake ecosystem - researchers call such species as Neonatives or the New Autochthonous. Restoring the habitat of Guri Lake is as much bringing back the vegetation of the hills that existed before as it is the controlled insertion of a new yet important biodiversity of the aforementioned neonatives. Extensive research on fragmented landscapes shows that connecting these separate habitats is one of the most crucial necessities for the survival of the species inhabiting them. After mapping out our islands, we identified a broader site to place our intervention, and began to narrow it down further.

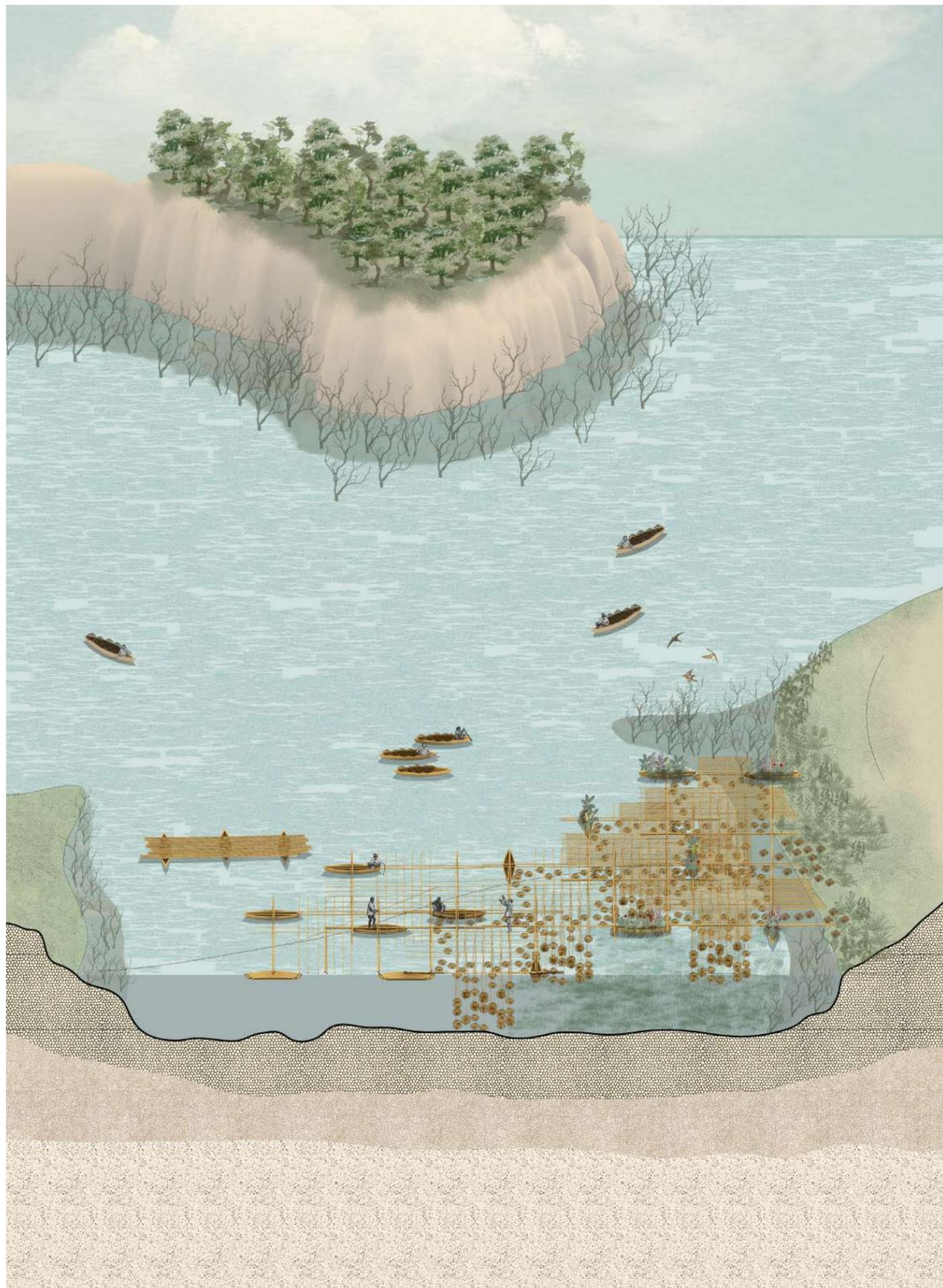


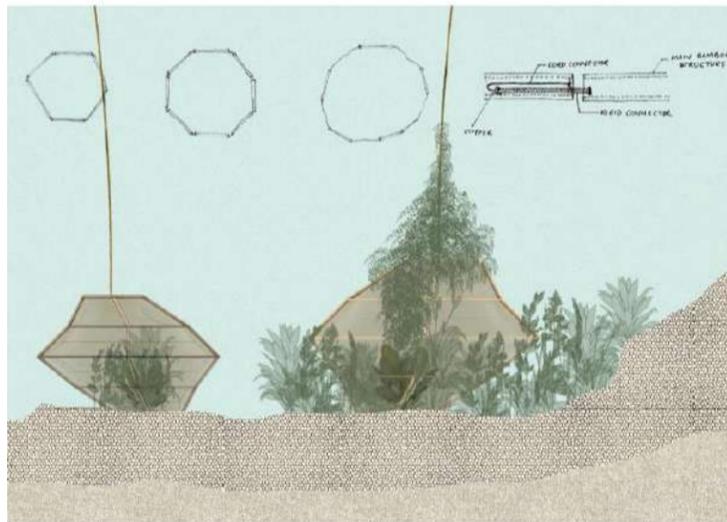
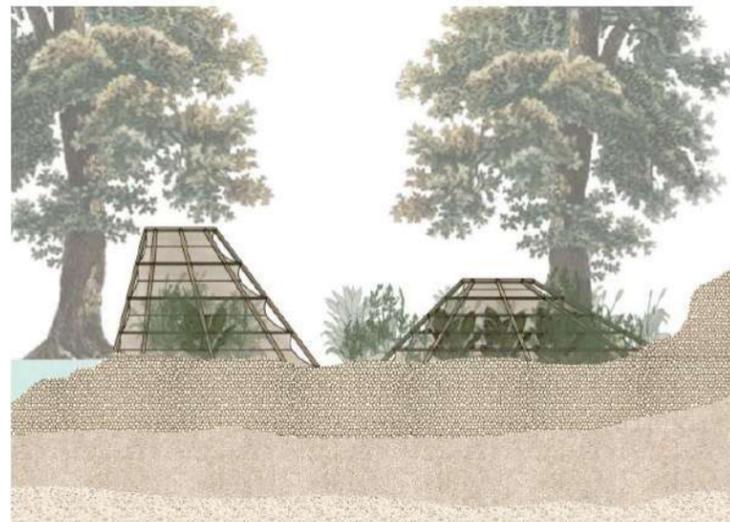
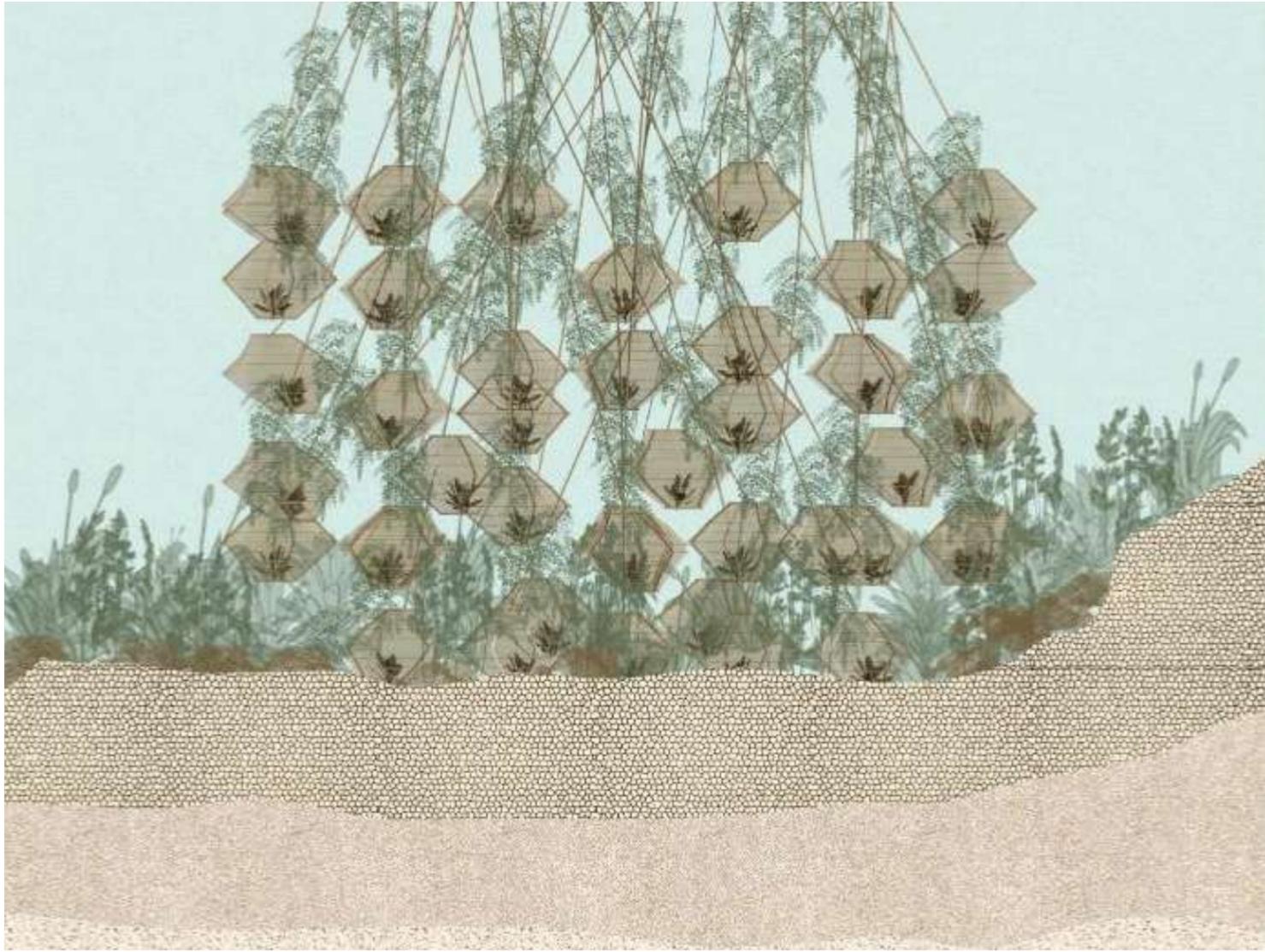


Slime molds are a species of intelligent fungi/mold that have assisted in optimal way finding operations in urban planning - especially the Tokyo metro system - due to their methods of connecting points efficiently. Using slime mold to identify effective connections between our islands we were able to further zone into our site, tracing the lines of mold to form the lines of our design. We traced a landscape of 1km radius, placing oats on the islands we wanted the slime molds to connect. The lab exercise was intended to design with an intelligence other than human - the petri dishes above show the molds growing in one direction, retreating and growing in another direction they find better suited. The lines we thus traced became spaces to insert our apparatus of species introduction and connection. The design deals with two systems - the pod and the raft. The species to be introduced and reintroduced are enclosed in a system of protection that unravels over time, decaying into organic matter as the species within grow and reproduce. These “pods” are connected to a deployment raft floating on the surface of the water. The

raft is an interlocking grid of bamboo sourced within the forests of Guri, and worked upon by the Pem-on and Warao communities, floating atop dug-out canoes. The pods and their connector ropes are deployed into the water from the raft, and overtime, the water currents intertwine the pods to form porous entanglements underwater. The pods are designed as a collapsible bamboo apparatus held together with layers of Moriche fabric screens; the dissolution of the fabric over time in the water expands the pods, until only the bamboo structure remains and the plants grow beyond the constraints of the pod. The structures left behind as well as the entangled rope connectors act as collectors of sediment that gradually solidify into a freshwater reef, offering habitat for the aquatic species. The pods deployed on ground operate through decay, collapsing the structure, flattening it over time, allowing the plants to grow out of it. The autochthonous species introduced on site are classified as Floating, Intermediate, or Underwater species.



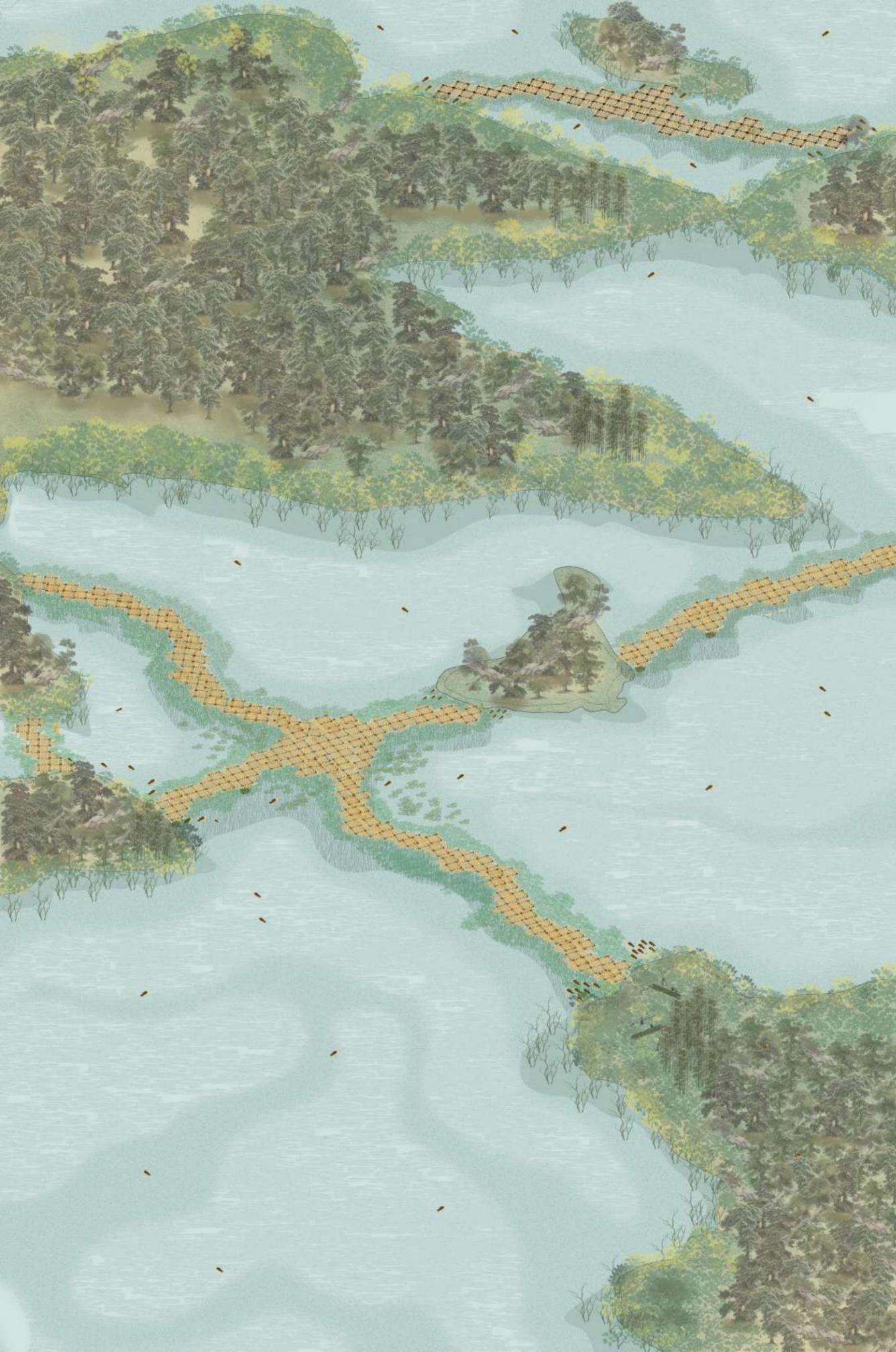




## HERBARIUM



Haunted Landscapes and the New Autochthonous

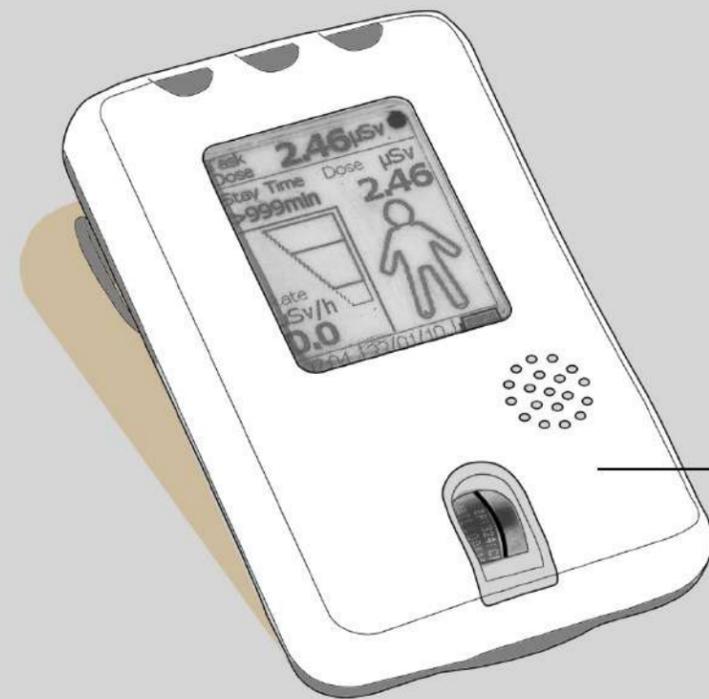


The species introduced help in the creation of new trophic chains that help the ecosystem to flourish. They make and provide food, construction materials, reproductive spaces for the many frugivorous birds and butterflies, mercury absorption etc. The rafts are constructed in dimensions sourced from the species on site - working with the girth, length and strength of the material.

Once the deployment is completed, the 15mm bamboo is used as a matted flooring over the gridlines of the base, to create a solid yet porous surface for the people to walk on.

The deployed raft is then connected to a new raft, and as newer rafts connect to the older deployed grids, the islands are bridged, with the surface acting as wildlife walkways between the fragmented ecosystem. The Guri Lake ecosystem is an unintentionally created experimental landscape, and to protect the species inhabiting these islands and the aquatic inbetweens is also an experimental endeavor that is constantly studied and supervised by researchers, aided by the government in reparation efforts.





Mistrust about the government values of radiation levels caused residents and evacuees to carry their own dosimeters

# 4

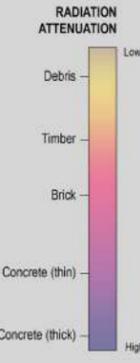
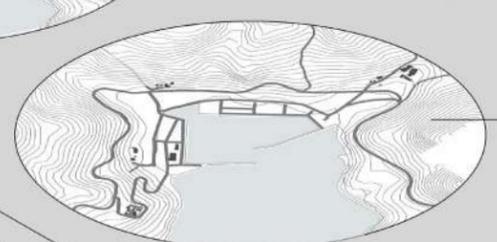
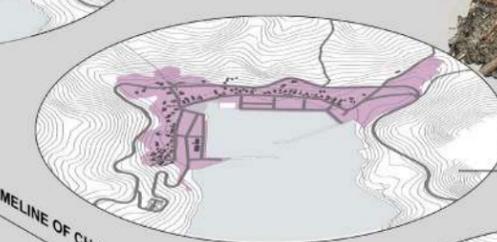
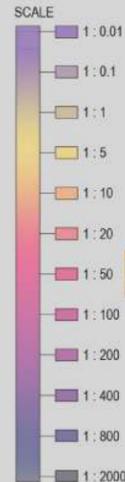
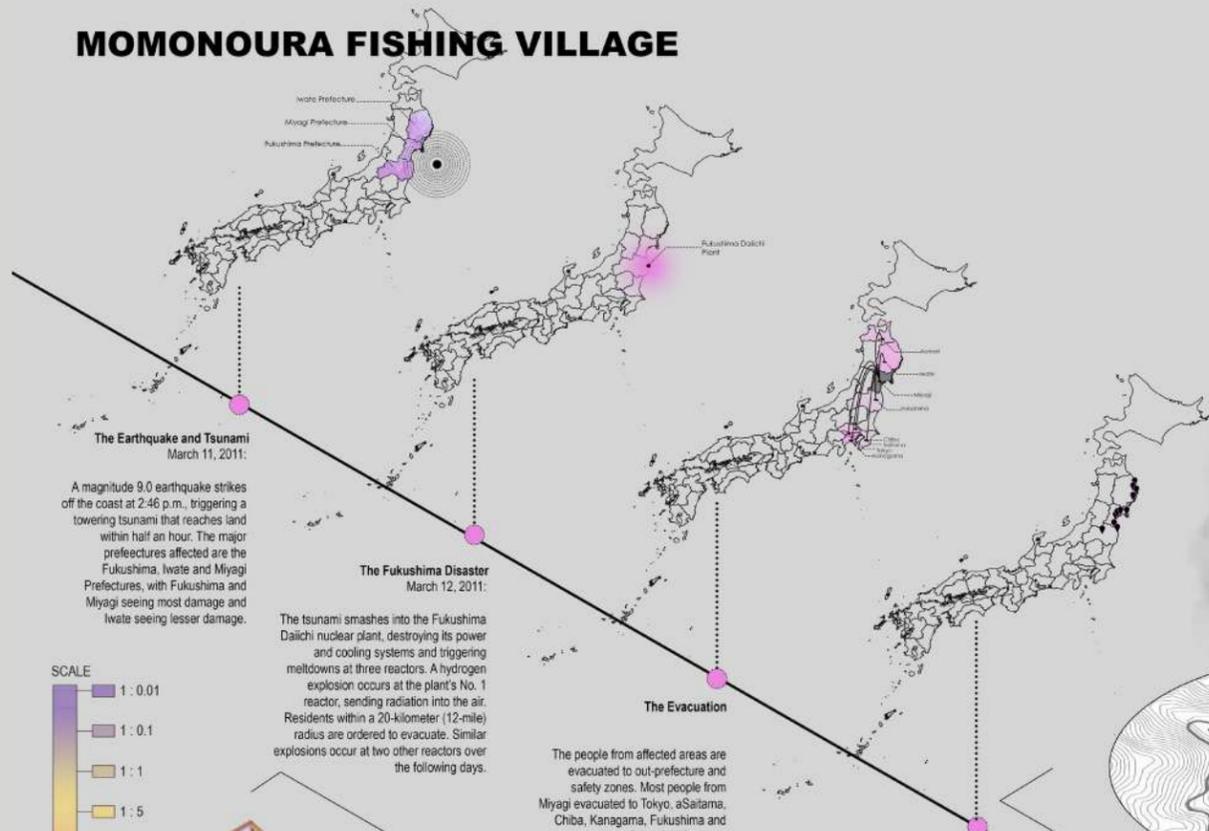


## REBUILDING MOMONOURA

On March 11th 2011, a 9.0 magnitude earthquake hit Japan's coast, 81 miles east of Sendai - the worst earthquake in Japan's recorded history. The earthquake sent rolling tsunami waves towards the eastern coastline of Japan, decimating not only numerous coastal villages but also the Fukushima Daiichi nuclear reactors sitting behind an ineffective sea wall. What came after was a socio-political handling of the compounding natural and man-made disaster unfolding within coastal towns, but with impacts being lived miles inland, as well as beyond borders.

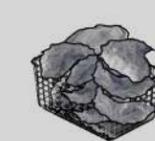
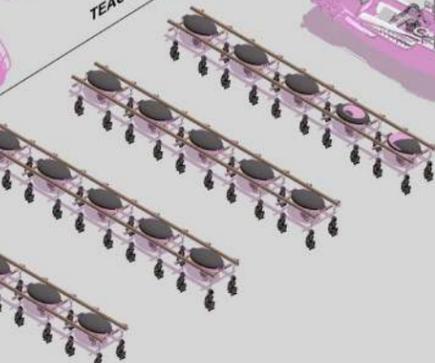
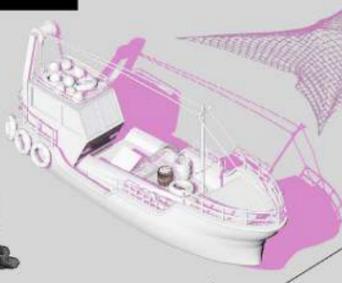
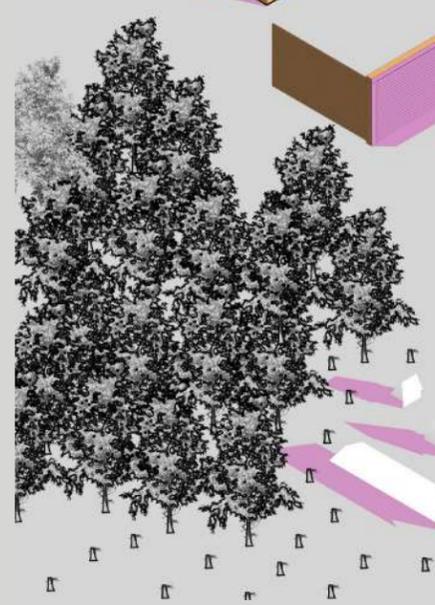
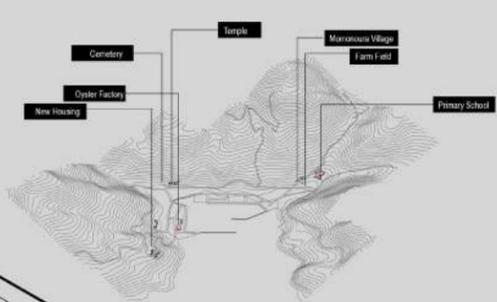
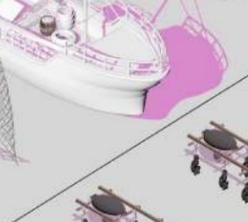
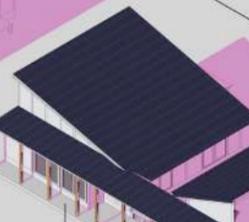
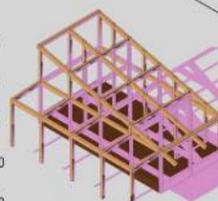
PROJECT: Fall AAD Research Assistantship  
SEMESTER: Fall 2022  
PROFESSOR: Dean Andres Jaque

# MOMONOURA FISHING VILLAGE



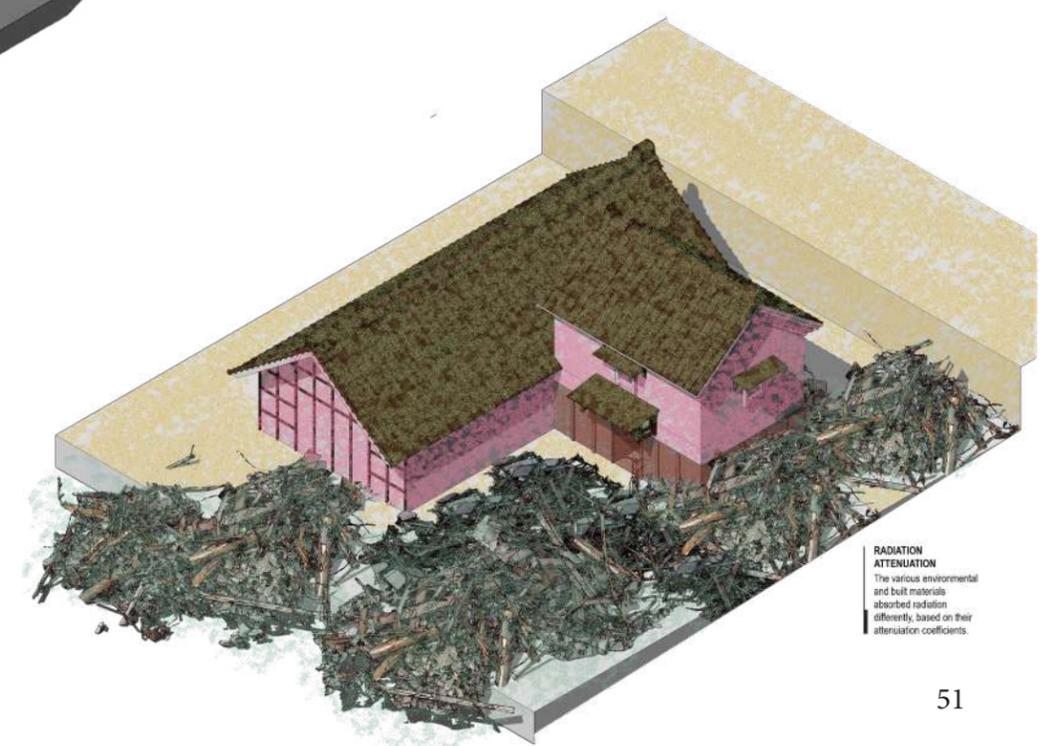
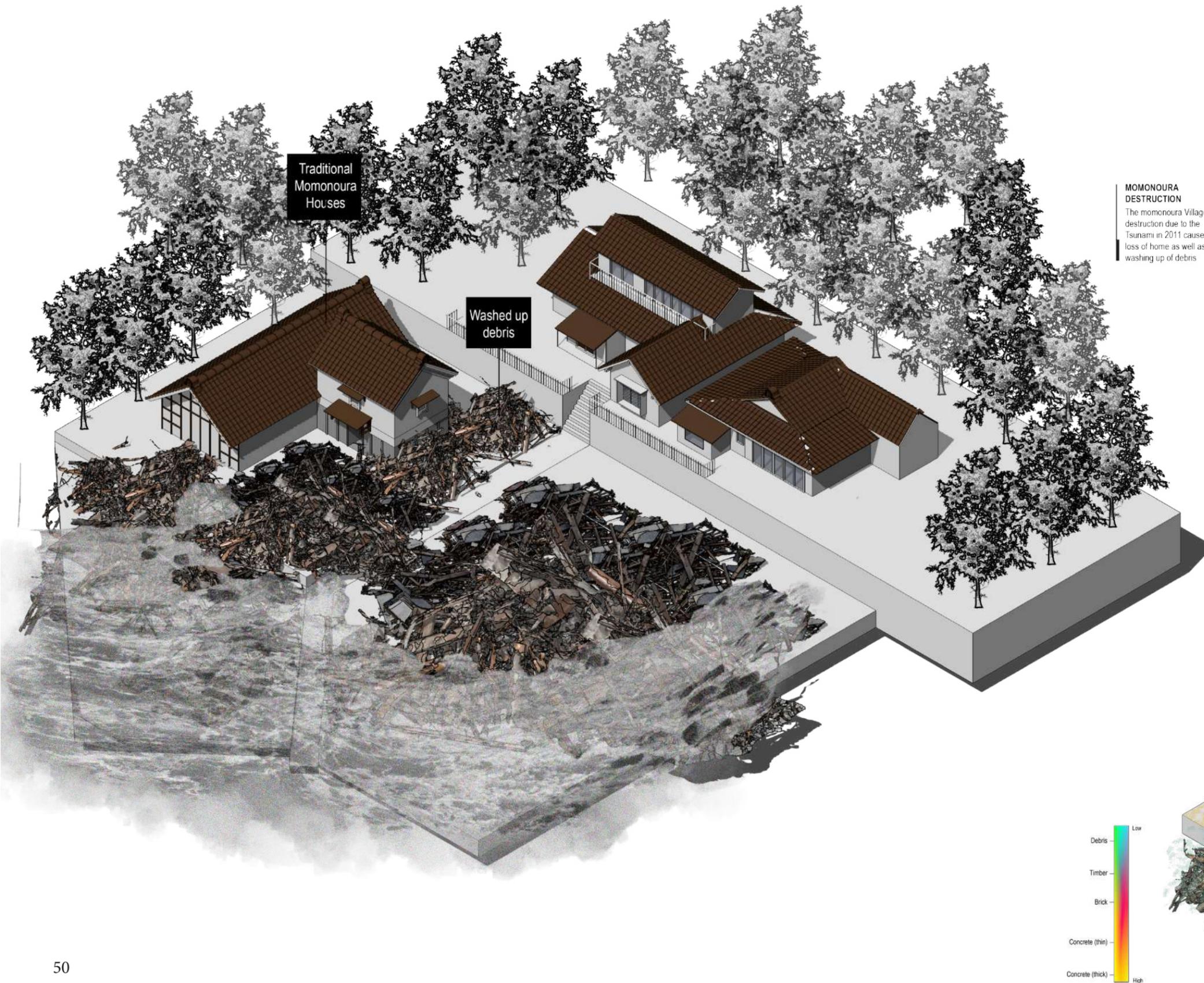
**RADIATION ATTENUATION**  
The various environmental and built materials absorbed radiation differently, based on their attenuation coefficients.

Medical about the government values of radiation levels caused residents and evacuees to carry their own Geiger counters.



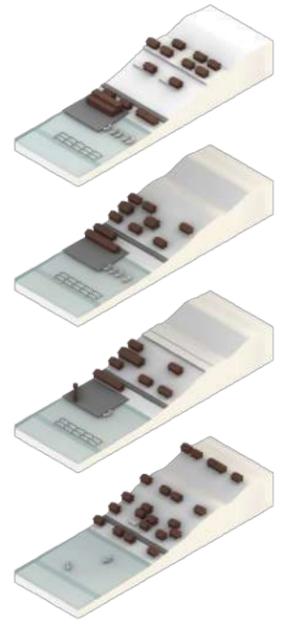
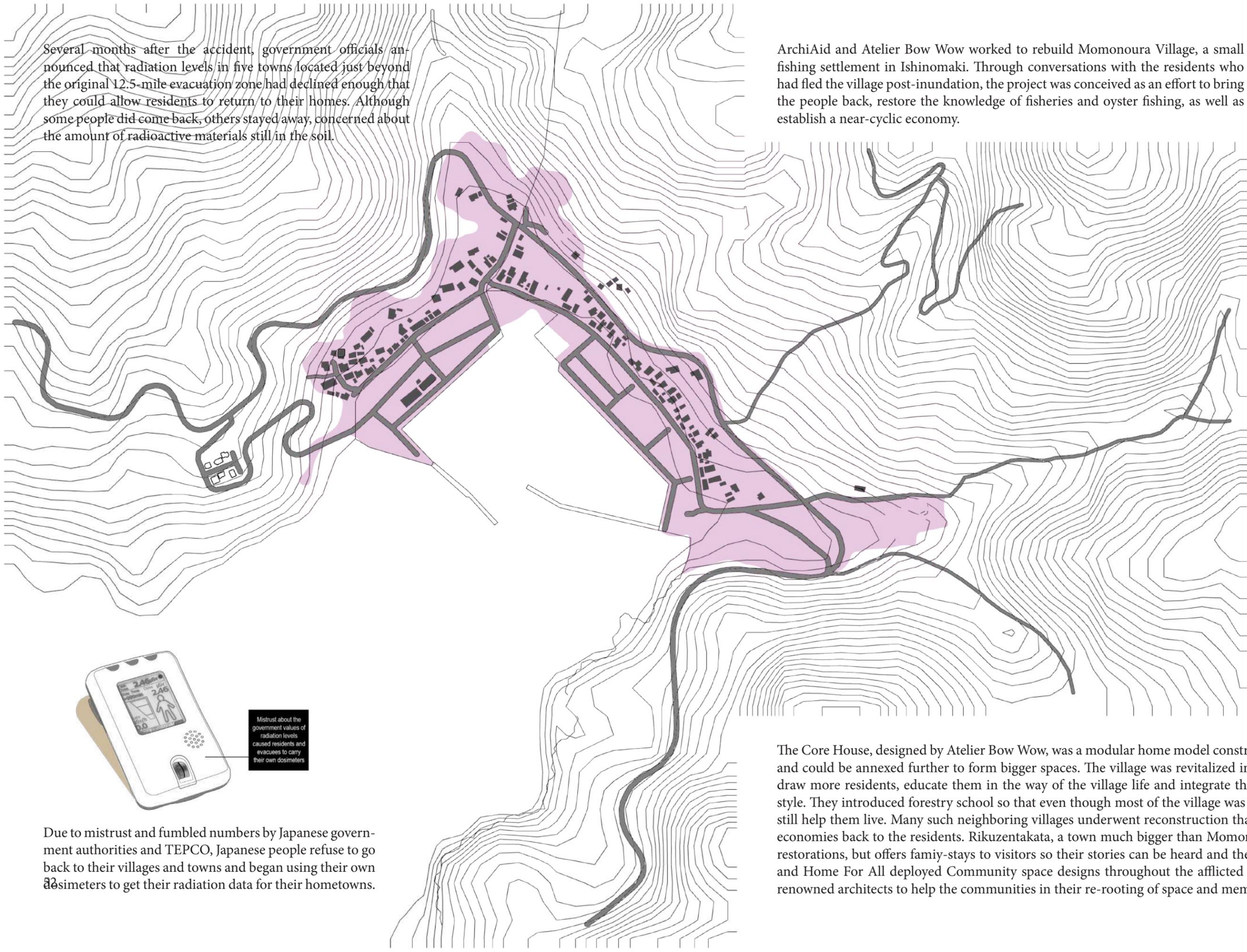
Rebuilding efforts were undertaken in the aftermath of the disaster. Interviews, questionnaires and panel discussions were held for the communities to formulate a plan of redevelopment. ArchiAid, a collective of 300 Japanese architects came together to join the emergency reconstruction efforts, especially since official groups involved largely neglected the needs of the communities in question. Home For All was one such endeavor of renowned architects building community spaces, schools and other necessary infrastructures for the people. But the designers and builders were confronted with compromised materiality. The Fukushima nuclear meltdown had contaminated water, soil, terrestrial vegetation, marine life, the expansive debris collected in heaps and even the air around them. The government proposed using soil with lower radiation levels as the foundation for roads and other infrastructure, an idea that was met with opposition, yet implemented due to lack of support, policies and funds. Many infrastructures thus constructed contain the people within their radioactive environment. What then is the politics of radioactivity in the process of rebuilding for disaster-struck communities and what role can architects have in this relief operation?

Image 3: (left) Momonoura Village destruction due to tsunami Source: Illustrated by author for Dean Andres Jaque  
 Image 4: (below) Radiation in material and debris Source: Illustrated by author for Dean Andres Jaque



Several months after the accident, government officials announced that radiation levels in five towns located just beyond the original 12.5-mile evacuation zone had declined enough that they could allow residents to return to their homes. Although some people did come back, others stayed away, concerned about the amount of radioactive materials still in the soil.

ArchiAid and Atelier Bow Wow worked to rebuild Momonoura Village, a small fishing settlement in Ishinomaki. Through conversations with the residents who had fled the village post-inundation, the project was conceived as an effort to bring the people back, restore the knowledge of fisheries and oyster fishing, as well as establish a near-cyclic economy.



Mistrust about the government values of radiation levels caused residents and evacuees to carry their own dosimeters

Due to mistrust and fumbled numbers by Japanese government authorities and TEPCO, Japanese people refuse to go back to their villages and towns and began using their own dosimeters to get their radiation data for their hometowns.

Image 5: (left bottom) Evacuees use their own dosimeters Source: Illustrated by author.  
Image 6: (left) Inundation of Momonoura Source: Illustrated by author.  
Image 7: (above) Changing Momonoura over the years Source: Illustrated by author.

The Core House, designed by Atelier Bow Wow, was a modular home model constructed in the Itakura technique, and could be annexed further to form bigger spaces. The village was revitalized into a fishing school, so it could draw more residents, educate them in the way of the village life and integrate them into a hand-to-mouth lifestyle. They introduced forestry school so that even though most of the village was washed away, the forests could still help them live. Many such neighboring villages underwent reconstruction that brought the people and their economies back to the residents. Rikuzentakata, a town much bigger than Momonoura is still underway with its restorations, but offers family-stays to visitors so their stories can be heard and their coastal lives lived. ArchiAid and Home For All deployed Community space designs throughout the afflicted Eastern shoreline, by bringing renowned architects to help the communities in their re-rooting of space and memory.



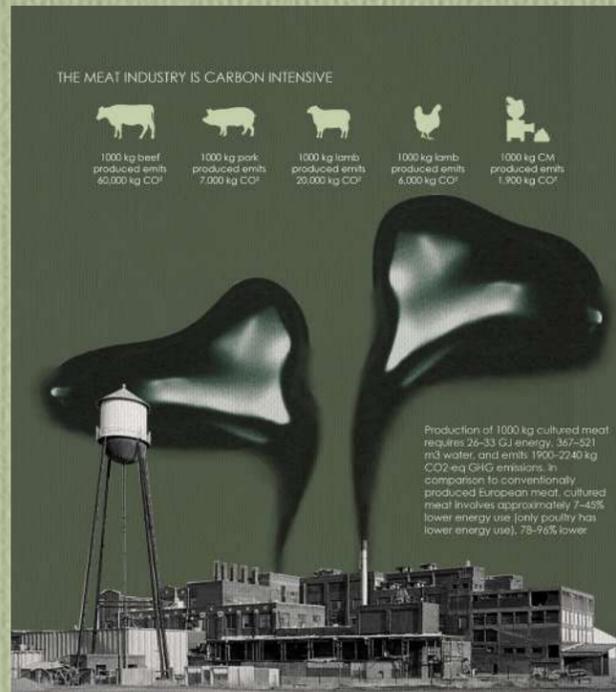
# LAMB TO THE SLAUGHTER

Decarbonizing the Meat  
Manufacturing Industry

Lamb to the Slaughter explores the extensive and intensive damage to forested land as well as global climate change perpetrated by the meat industry, dismantling the meat or vegan debate by proposing a reforestation inclusive lab-grown meat industry as an alternative, studying the reduced impact and emission on the land, animals and environment.

COURSE: Man, Machine and Industrial Landscapes  
SEMESTER: Fall 2022, Building Science and Technology  
Elective  
CRITICS: Sean Gallagher





The global population, 7.3 billion today, is expected to surpass 9 billion by 2050. The Food and Agriculture Organization (FAO) has forecast that in 2050, 70% more food will be needed to fulfill the demand of the growing population.



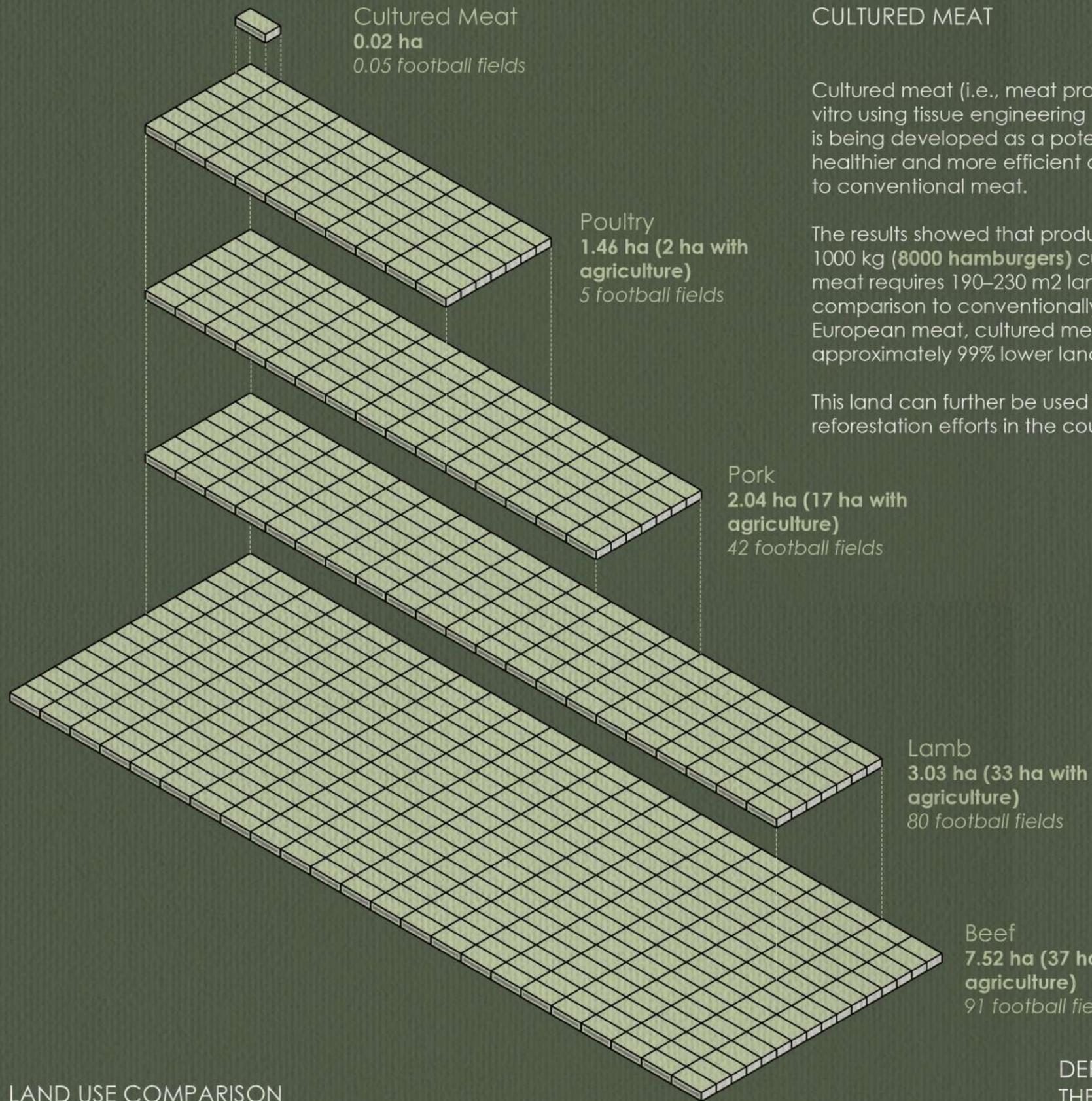
The current land usage for agriculture needed for animal feed is 5 billion hectares, which is approximately 5 times the land area of USA. This land requirement is projected to increase by 25% by the year 2050, putting a great strain on land availability, and forestry.



The meat production presently is approximately 300 million tonnes and annual meat production will need to rise by over 200 million tonnes to reach 470 million tonnes by 2050 to meet global food needs.



Livestock systems will contribute to addressing the issue of global food and nutrition security in the world. Animal farming must produce larger quantities of high quality and affordable meat, milk, and eggs, through production systems that are environmentally sound, socially responsible, and economically viable.



LAND USE COMPARISON

## CULTURED MEAT

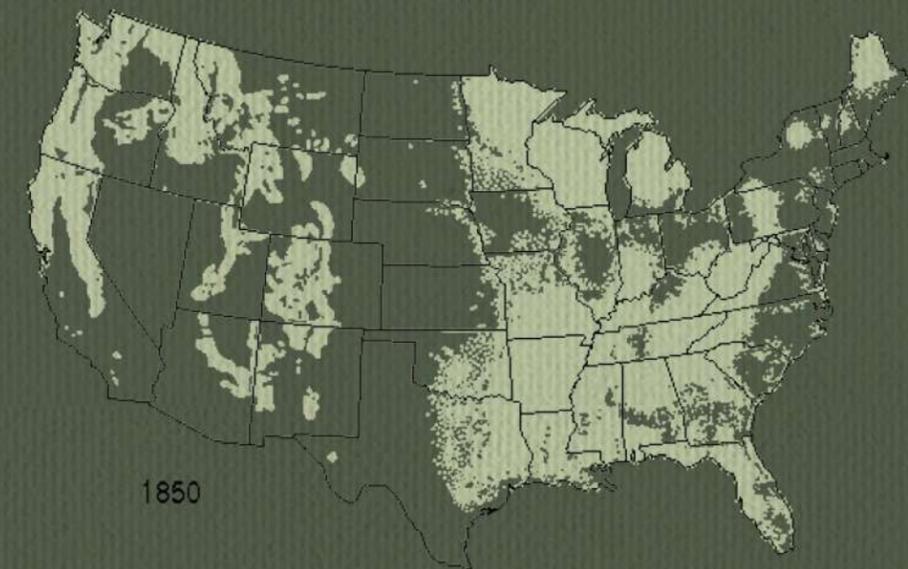
Cultured meat (i.e., meat produced in vitro using tissue engineering techniques) is being developed as a potentially healthier and more efficient alternative to conventional meat.

The results showed that production of 1000 kg (8000 hamburgers) cultured meat requires 190–230 m<sup>2</sup> land. In comparison to conventionally produced European meat, cultured meat involves approximately 99% lower land use.

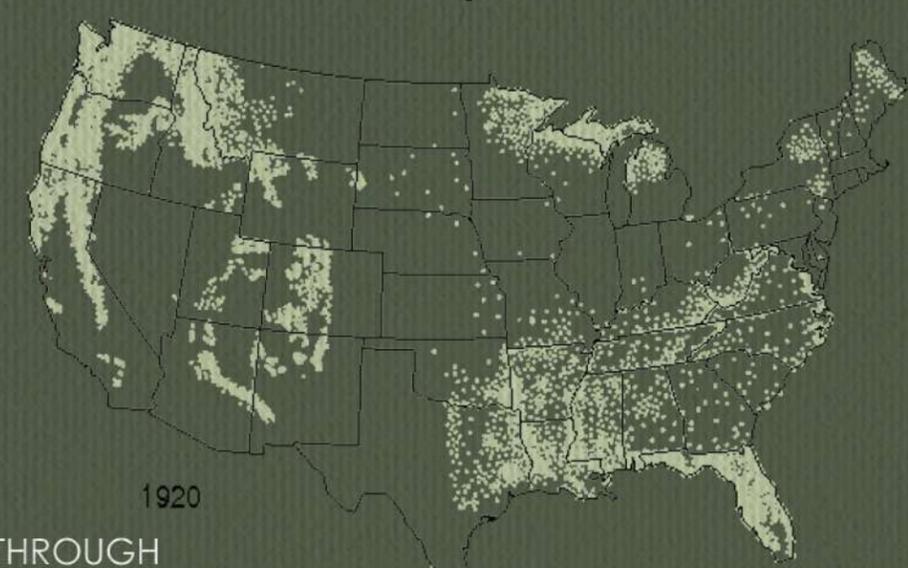
This land can further be used to aid reforestation efforts in the country.



1620



1850

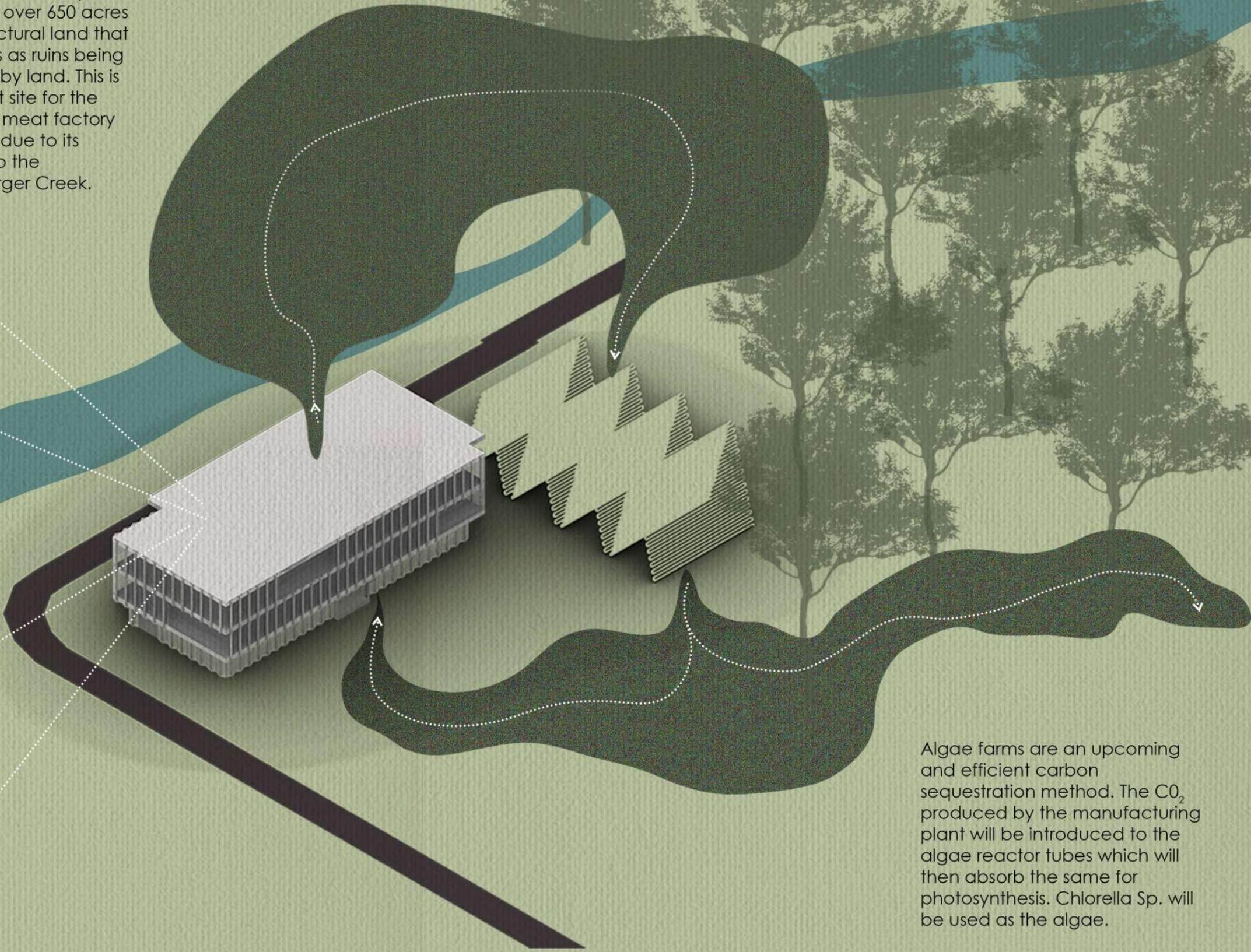
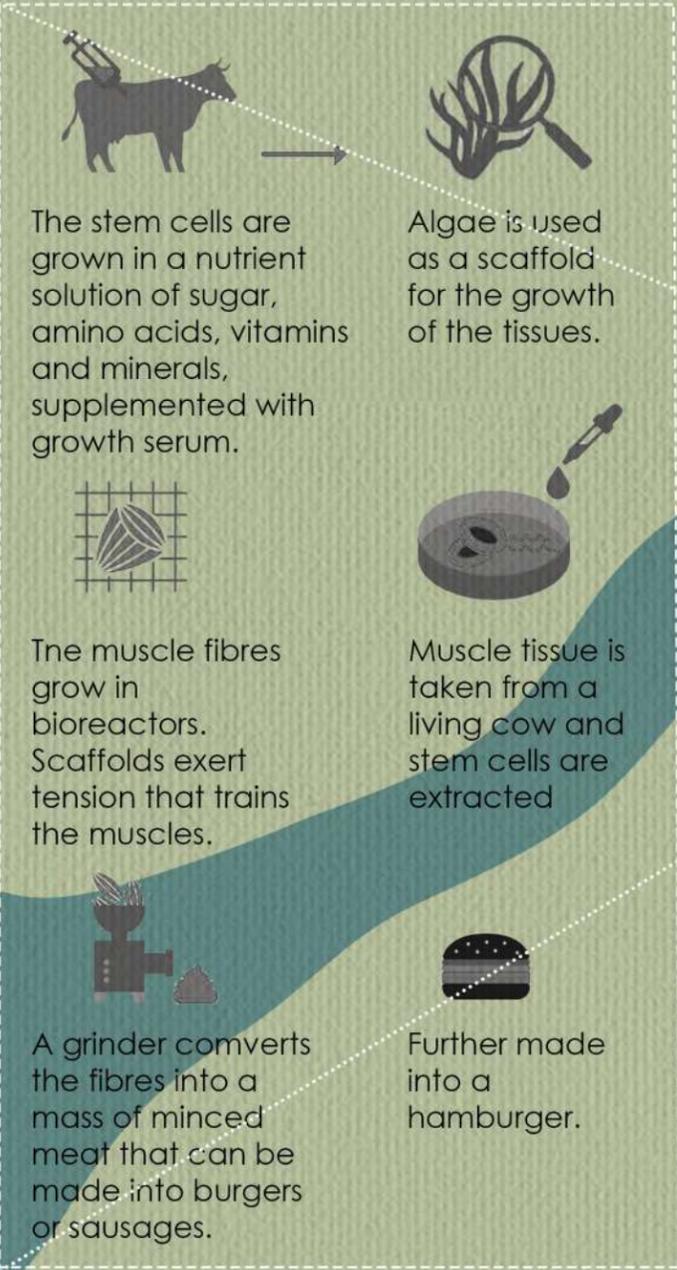


1920

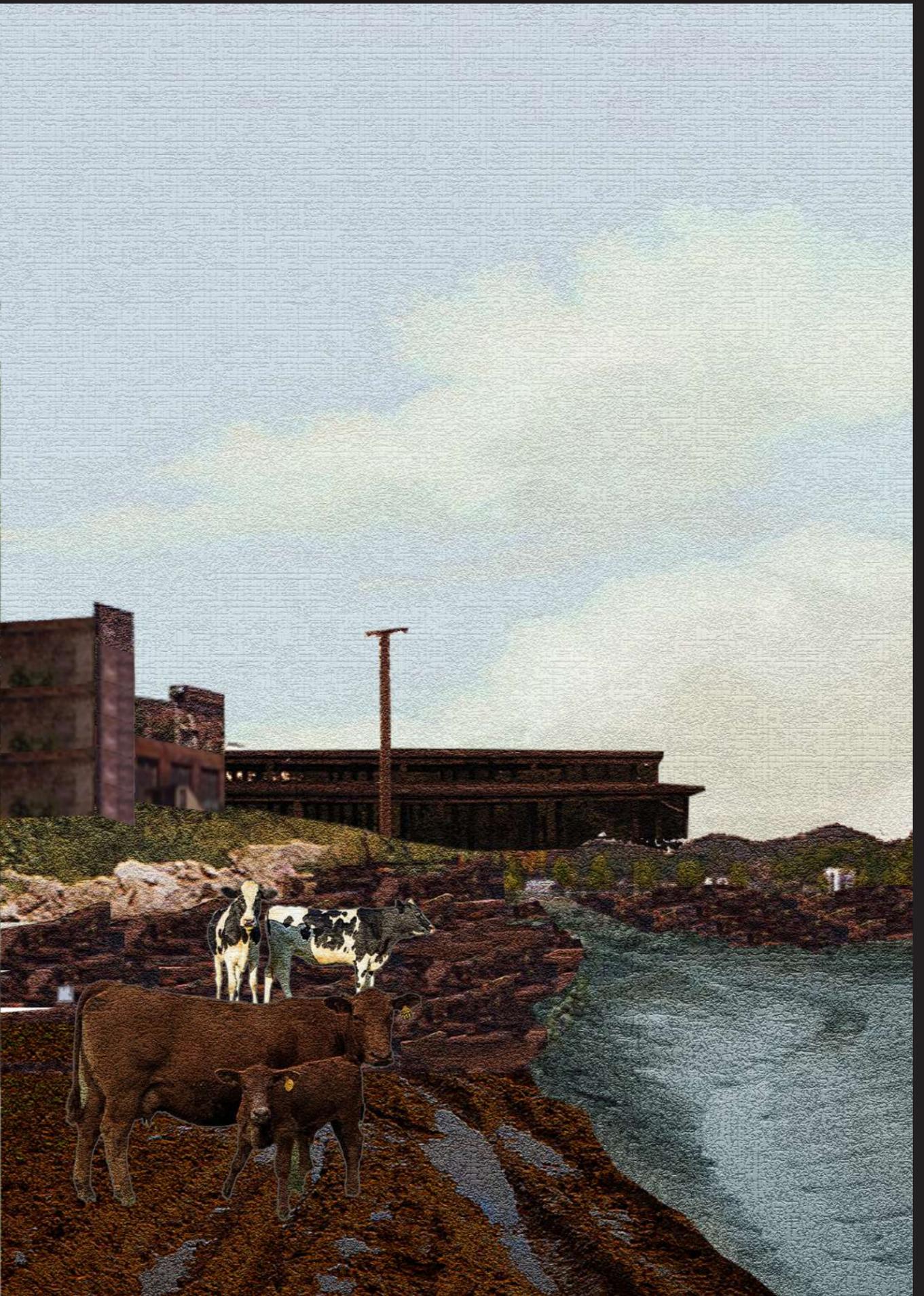
DEFORESTATION THROUGH THE YEARS



The Armour Meatpacking Factory, located in St. Louis, Illinois is an old and abandoned meatpacking plant. Part of the larger National City Stockyard landmass, the stockyard expanded over 650 acres of infrastructural land that still remains as ruins being reclaimed by land. This is the perfect site for the Cultivated meat factory proposed, due to its proximity to the Schoenberger Creek.



Algae farms are an upcoming and efficient carbon sequestration method. The CO<sub>2</sub> produced by the manufacturing plant will be introduced to the algae reactor tubes which will then absorb the same for photosynthesis. Chlorella Sp. will be used as the algae.





# WALTZ WITH BASHIR

Political Urban Memoryscapes

Where does a city exist? Is it in the spatial permanent infrastructure that one can touch and reside in? Or does it also exist in the minds of the many that have lived, still live, and the ones that long to live in these urban landscapes? *Waltz with Bashir* employs animations to narrate a murky recollection of traumatic events that are elusive to film. The movie tied the 1982 war between Israel and Lebanon, and a massacre in Beirut through retelling of missing memories leading to the manipulation of the same.

COURSE: The Arab City in Film

SEMESTER: Fall 2022, History & Theory Elective

CRITICS: Yasser Elsheshtawy

COLLABORATORS: *Kriti Shivagunde, Ridhi Chopra, Weiyu Xu*

**Shmuel Frenkel**, an Israeli Lebanon War veteran who was in Ari Folman's infantry unit. By interviewing Frenkel, Folman learns he had repressed the fact that, at one point, his company were confronted by and killed a boy who had an RPG. The title of the film comes from a scene in which the unit is under heavy fire and Frenkel forcefully takes another soldier's MAG, goes into the open, and fires wildly, in "some sort of trance" as he "waltzes" between enemy bullets with Bashir's image on posters in the background.



**Zahava Solomon**, an Israeli psychologist and researcher in the field of psychological trauma. Zahava provides professional analysis for some events in the movie, using clinical terms. For example, she explains that Folman's confrontation with the boy with the RPG was forgotten because his brain used a defence mechanism called **dissociation**. At some point, his dissociation ceased to work and he lost his mind.



**Ronny Dayag**, an Israeli Lebanon War veteran and high food engineer. During the war, he was a Merkava tank crewman. Dayag testifies that, as the only survivor of an ambush on his unit, he suffers from survivor's guilt.



**Carmi Can'an** (voiced by Yehezkel Lazarov), an Israeli Lebanon War veteran who once was Folman's friend and now lives in the Netherlands. Carmi chose to be a combat soldier to prove his masculinity, but, in response to Folman's remark that he was expected to excel in science, testifies that, after the war, "he could be nobody".



**Ron Ben-Yishai**, an Israeli journalist who was the first to cover the Sabra and Shatila massacre.



**Ari Folman** Israeli filmmaker who recently finished his military reserve service. Some twenty years before, he served in the IDF during the Lebanon War.



How does a built, physical space become a solidified memory fragment in people's minds? Everyone experiences space differently, and so the very urban landscapes that contribute to the collective memories of the people are still distinct, dissimilar and personal. Waltz with Bashir, by Ari Folman is an experimental documentary on the massacre of several Palestinian civilians in the Sabra and Shatila camps in Beirut as a 'violent ethnic cleansing'. The movie ties the 1982 war between Israel and Lebanon, and the genocide in Beirut through retelling of missing memories leading to the manipulation of the same.

Ron Ben-Yishai, who was in Beirut covering the war when the massacre took place. Eventually, Ari's memories start to come back into focus, and he remembers that he "was in the second or third ring" of soldiers involved in the massacre, as his unit fired flares into the sky at night. The Sabra and Shatila Refugee Camps were a form of informal housing for Palestine refugees fleeing into Lebanon. Initially comprising around 500 residential units, the camp has grown tenfold since its establishment. Most of the growth has been vertical, with new shelters being erected on top of existing ones without proper foundations.

*When cities offer space for othering and the construction of difference, it divides its foundations, creating rifts that fester into irrevocable wounds to the urban fabric.*

The conclusion is, thus, landed in the potential of how urban spaces can be interpreted by designers, architects, and planners through a different lens of memories and perception and feelings. Further, it questions the applied methodology of how cities are constructed in the contemporary part of the discipline.

The movie explores the many facets and narratives of this war through an animated visual medium, placing the story across varying landscapes of peace, unrest, real and intangible backdrops to bring forth an unconventional documentary

In the movie, Ari Folman (the director) is pushed to recollect traces of his memories from his time in Beirut at the time of the Sabra and Shatila Massacre. He remembers snippets from the day of the massacre. His friend, a therapist, explains that, given the nature of human memory, the vision might not be an exact record of what actually occurred, though it certainly deals with matters of great importance to Ari's inner world. Ari interviews friends and other soldiers who served in the war, as well as a psychologist specializing in PTSD and Israeli TV reporter

Most of the streets of Shatila are very narrow alleys in shadow. The concrete structures are right next to each other and two or three stories tall. Mosque Square opens up suddenly into startling bright sunlight. The three main roads of the camp run through the chaos of the square. There is often a traffic jam as cars, trucks, scooters and pedestrians compete with each other, honking and yelling. Worn electric cables and rubber tubing for water hang in a low tangle throughout the camp and are even denser in the square. Sometimes electric sparks fly from the cables; we are told that people are occasionally electrocuted. Trucks get caught in these tangles and everyone around jumps in to help free them.

Films have always been tools to portray the surreal and manipulate, even implant memories and narratives. This goes on to form deep-rooted impressions and stir up emotions of a permanent nature of the existing cityscapes. The telling of history and of events has always been reliant on memory, where city landmarks help tie together these unfolding events in a timeframe few have experienced or seen. Cinema has thus been used to





# 7 ANIMORPHS



We have always seen animals through a lens of human need and service. Animorph tries to reinforce animal traits as separate from the human world through a set of playful and light objects and games. Animorphs is made especially for children, so that they inculcate animal perception different from the usual.

COURSE: Environments, Animals, Tech  
SEMESTER: Fall 2022, Visual Studies Elective  
CRITICS: Gal Nissim



# Animorphs

Play Me! Play Me!



The Animorphs Card Game is a fun children's game that employs scenario-based prompts to win!

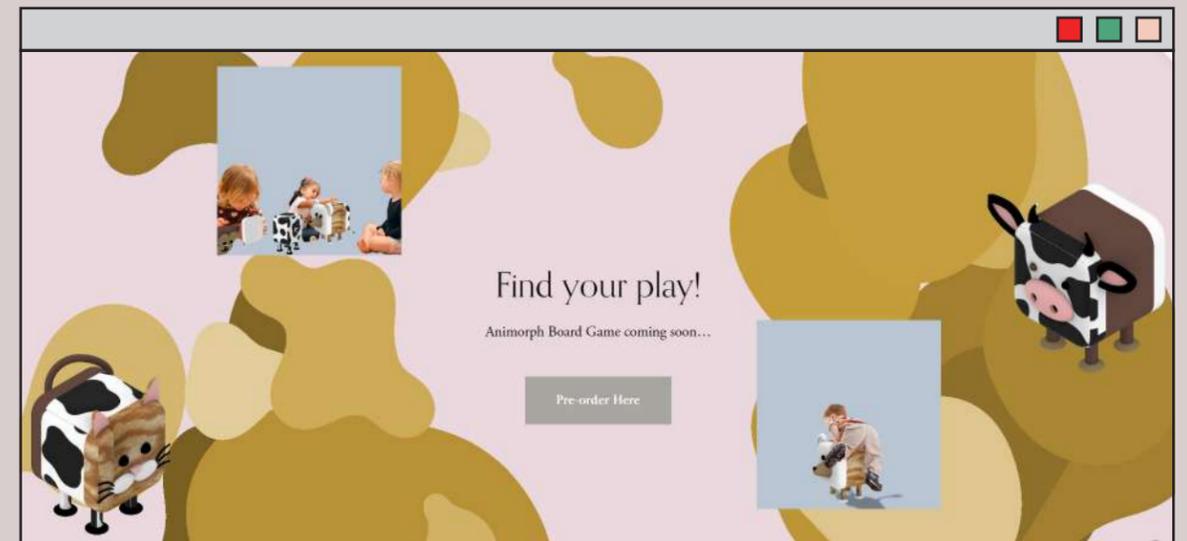
[Shop](#)

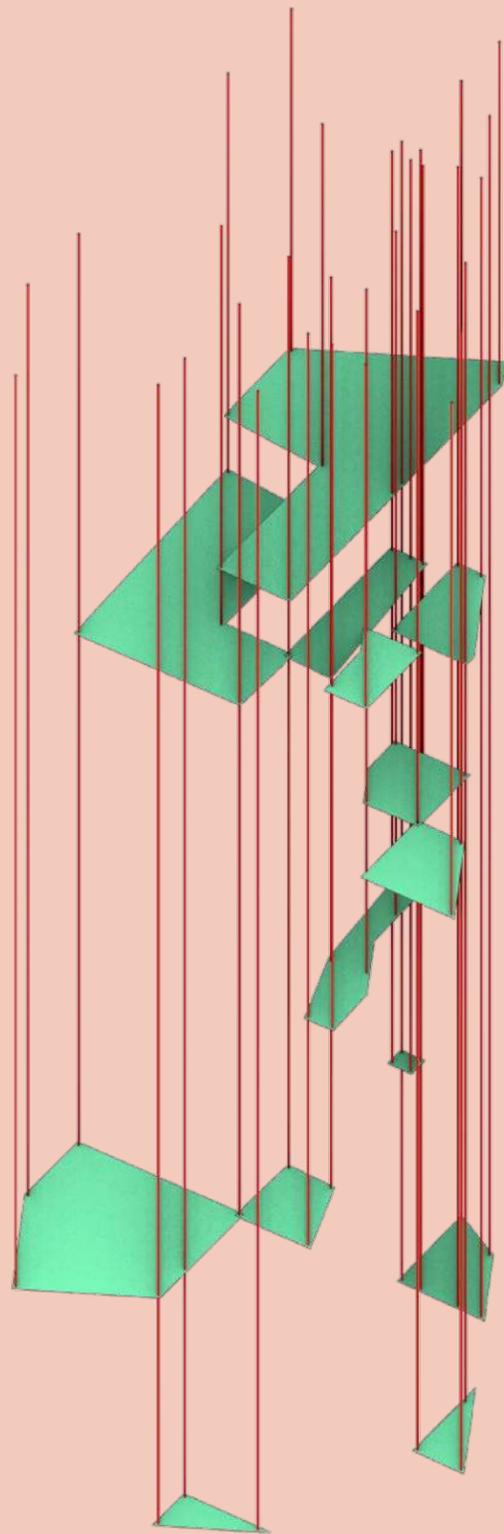


Animorphs takes inspiration from Exquisite Corpses, the surrealist art movement that took place as games in the 1920s. While existing in the intersection of play, dexterity, puzzle-solving and learning, the games focus on the distancing of animals from perceiving them through human needs, but placing them then as individuals with independent characteristics that they truly live with.

The Animorphs card game is for the kids, and employs scenario-based prompts to win. With 24 Animorph cards, and 24 prompt cards that suggest a scenario per card, the children are pushed to pick animorphs that would best suit the scenario based on their two positive and one negative trait. This brings animal perceptions into play with problem-solving instincts.

The Climber Stools are an assemble-your-own type of furniture for the children which take new animal forms with every iteration. Introducing them into spaces of play can involve dexterity and coordination, except instead of just play toys, these can be climbed on.

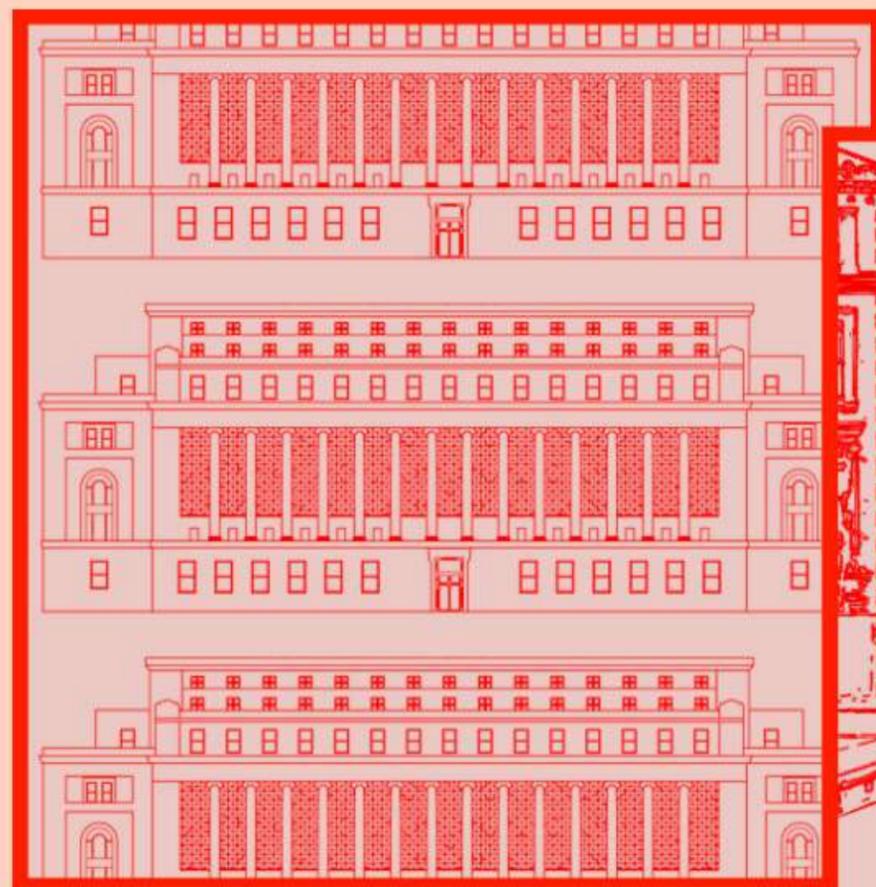




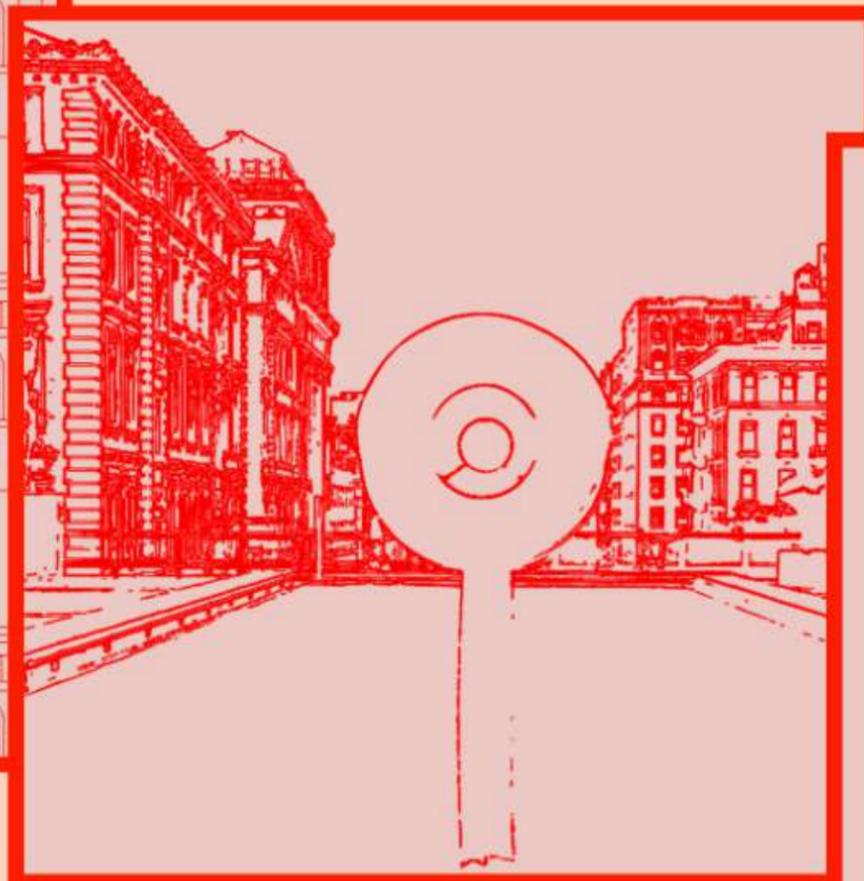
# UNDER AND ABOVE THE COLUMBIA EXPANSION

Columbia University's imposition on Harlem threatens its culturally diverse heritage by encroaching neighborhood boundaries that diminish community belonging, ownership, local economies and its historical contributions to art, architecture, music, and cuisine. intends to bring to light this reality of Columbia's role in gentrifying Upper Manhattan.

COURSE: If Buildings Could Talk  
SEMESTER: Spring 2023, Building Sciend & Tech Elec-  
tive  
CRITICS: Sharon Ayalon  
COLLABORATORS: *Kriti Shivagunde, Javier Flores, Victoria  
shay, Florianne Jacques, Valentina Jaramillo*



Columbia University and Harlem



Revson Plaza on Amsterdam Avenue



The Shard

What began as response to a segregated gym in Columbia University has continued on through the years in the historical capitalist occupancy and property ownership subjected on the residents of Harlem by the university. Numerous student protests and unheard pleas later, the university is still set to expand into Morningside Heights for more student housing and departmental infrastructures.

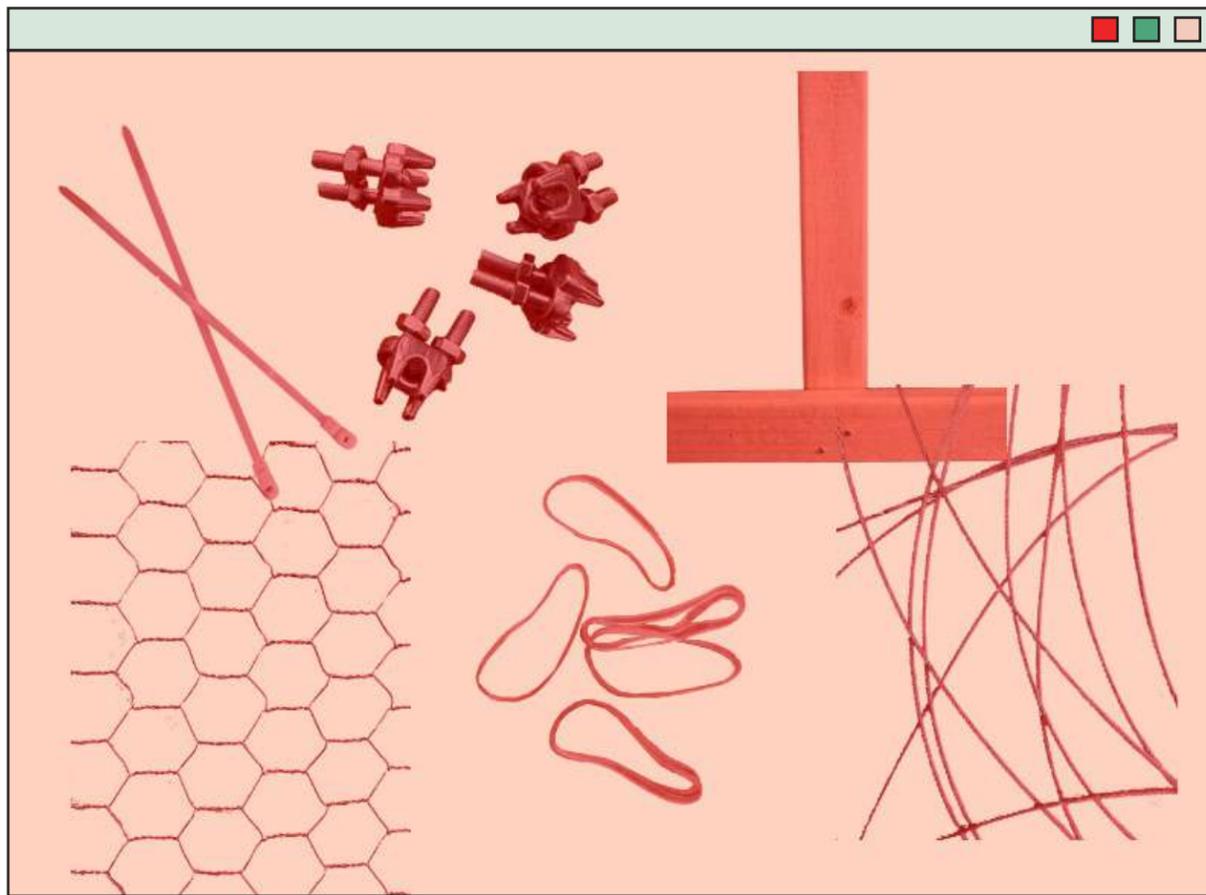
#### REVSON PLAZA ON AMSTERDAM AVENUE

While bridges typically connect spaces and people, Revson Plaza, an elevated overpass above Amsterdam Avenue that connects Columbia's main campus buildings, disconnects the surrounding neighborhood communities from access to public spaces. This site exemplifies the existing physical boundaries that segregate Harlem from the rest

of Manhattan's predominantly white neighborhoods - while dousing the street below with darkness. The project attempts to highlight this physical separation that Revson Plaza forms which symbolizes the larger inequity faced by the residents of Harlem.

#### THE SHARD

Columbia University's prime location in Morningside Heights is an ever-encroaching growth into Harlem's historical occupancy. Through data sourced from [urbandisplacement.org](http://urbandisplacement.org), The Shard is a hanging installation visualizing the gentrification and displacement data with translucent, mirrored and polychromatic acrylics at Revson Plaza. Derived from hard data on Harlem's periodical gentrification, the work abstracts the neighborhood zones into lay-



ered shards of glass, with the stable neighborhood layers towards the top that gradually descend to the gentrified neighborhood layers at the base. The viewers experience the piece differently depending on where they are situated on the site; from the ground, one can sense the overpowering presence of Columbia's institutional imposition, and from the top, you can see the longstanding repercussions of gentrification caused by the University's continual expansion. The Shard intends to bring to light this reality of Columbia's role in gentrifying Upper Manhattan.

This project evokes how through data and information one is able to create a piece of art, this piece of art its final purpose is to call attention, becoming a beacon point that will then guide user to its base information. Art and abstraction transforms into a vessel that reveals the real nature of urban life.

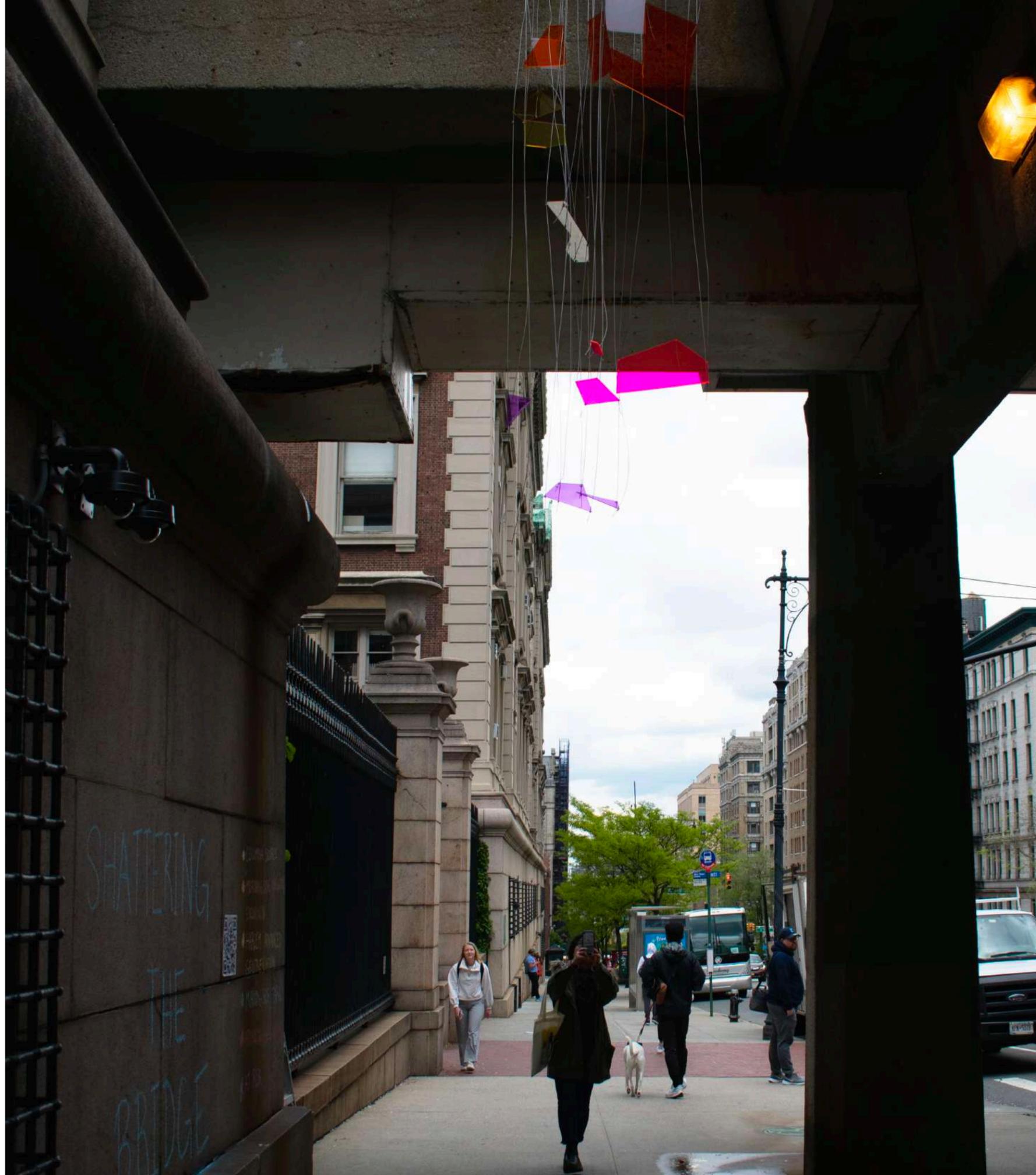


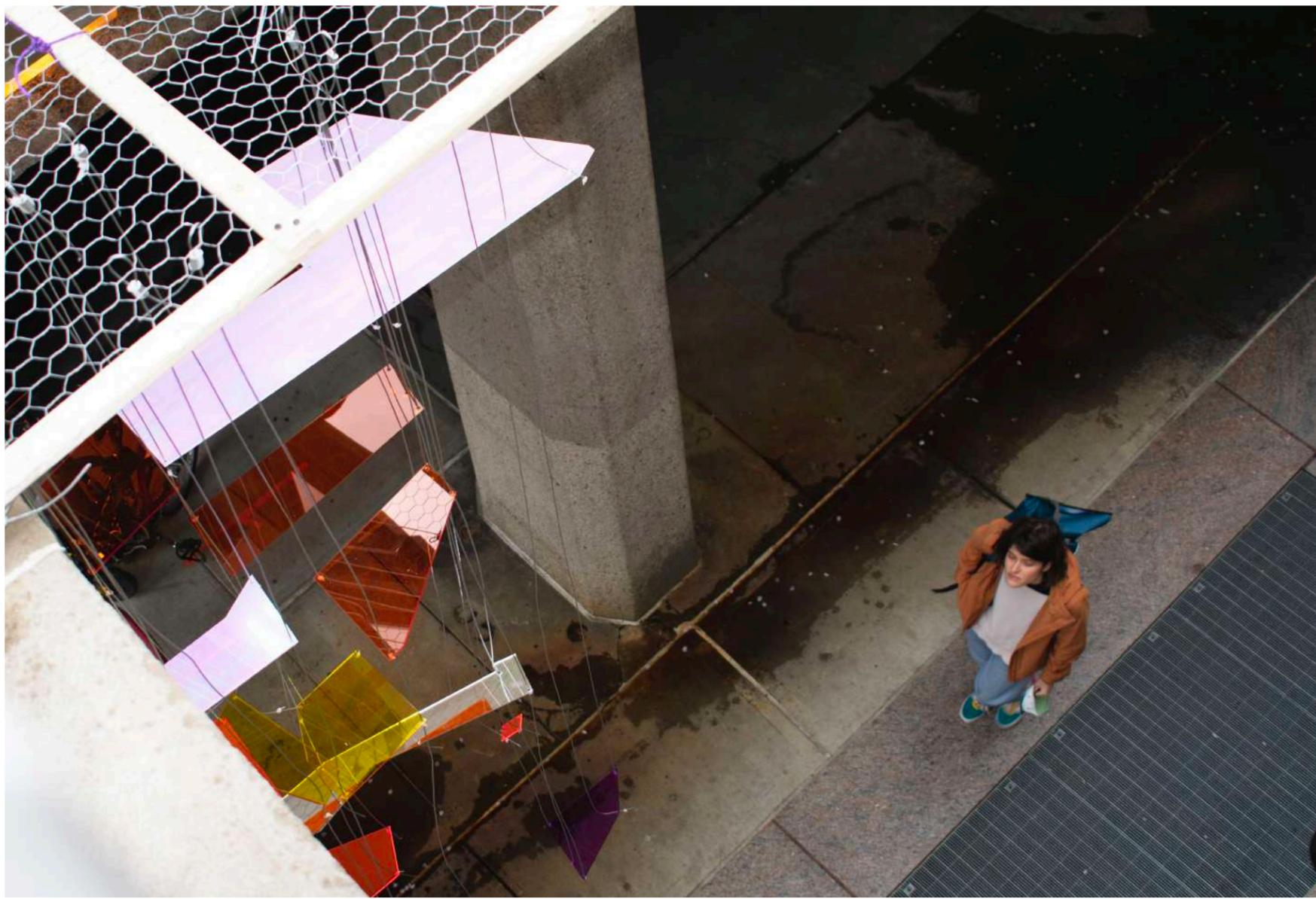
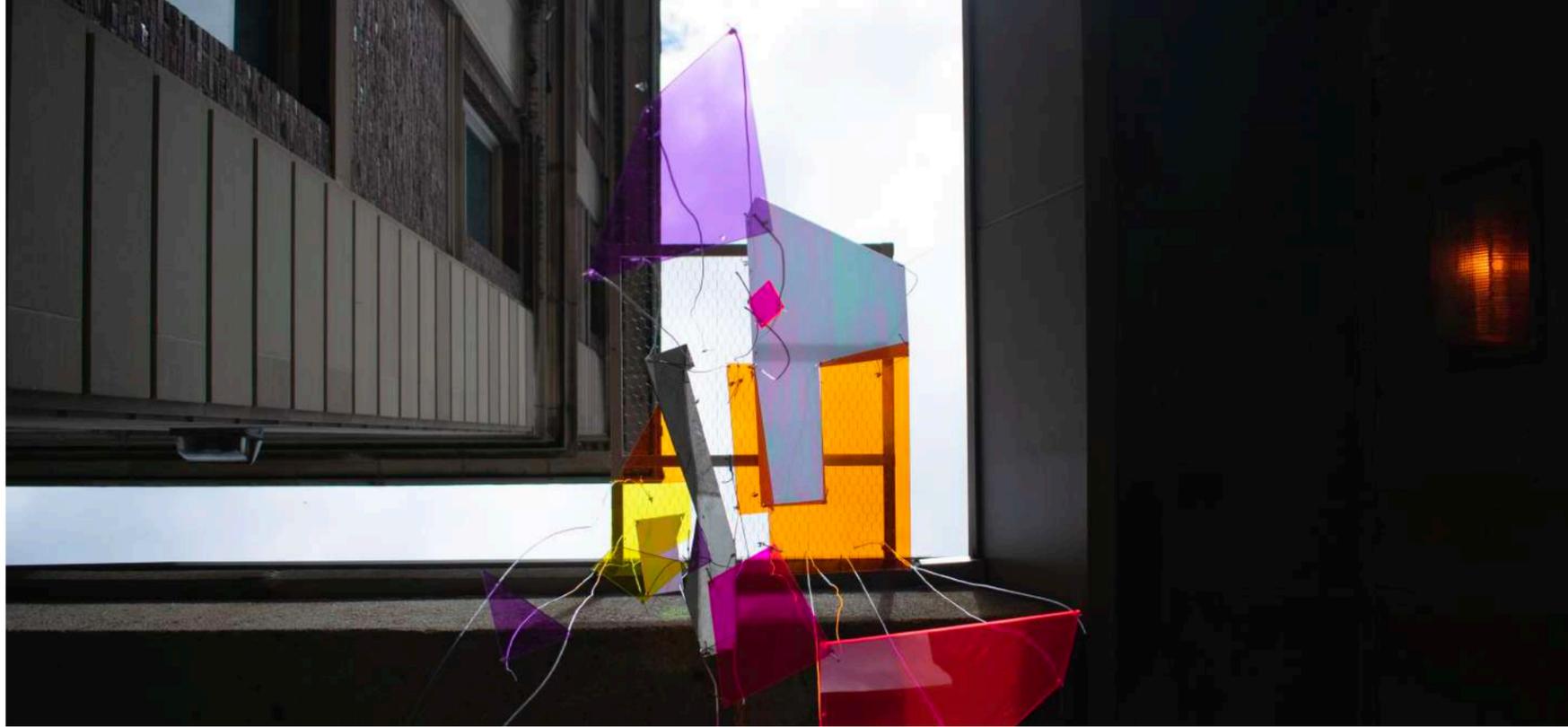
# The Shard

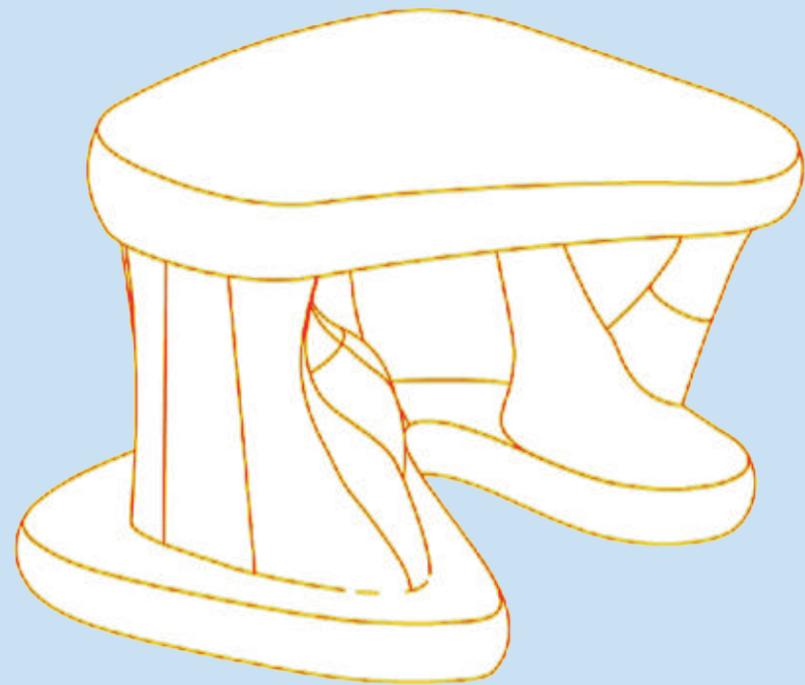


Columbia University  
Ongoing Displacement of  
Low-income Households

Columbia University's prime location in Morningside Heights is an ever-encroaching growth into Harlem's historical occupancy. Through data sourced from [urbandisplacement.org](http://urbandisplacement.org), The Shard is a hanging installation visualizing the gentrification and displacement data with translucent, mirrored and polychromatic acrylics at Revson Plaza. Derived from hard data on Harlem's periodical gentrification, the work abstracts the neighborhood zones into layered shards of glass, with the stable neighborhood layers towards the top that gradually descend to the gentrified neighborhood layers at the base. The viewers experience the piece differently depending on where they are situated on the site; from the





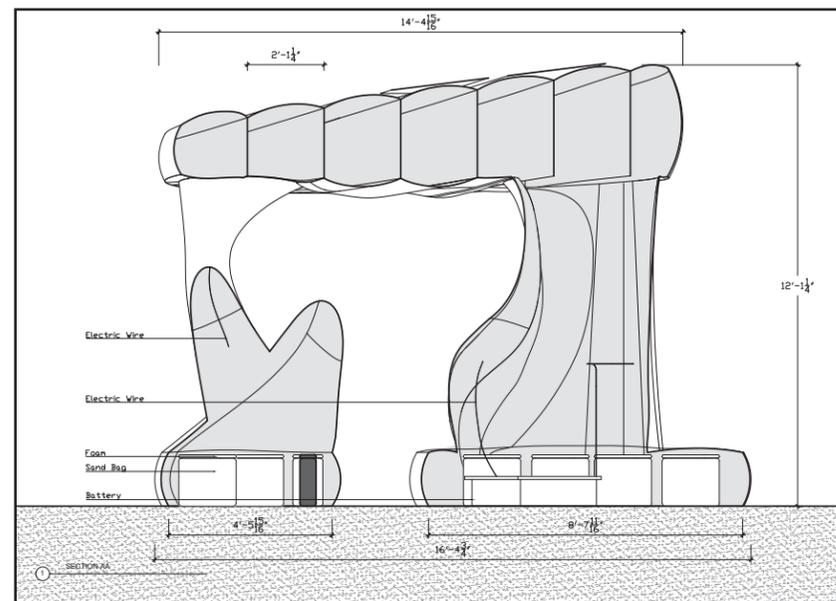
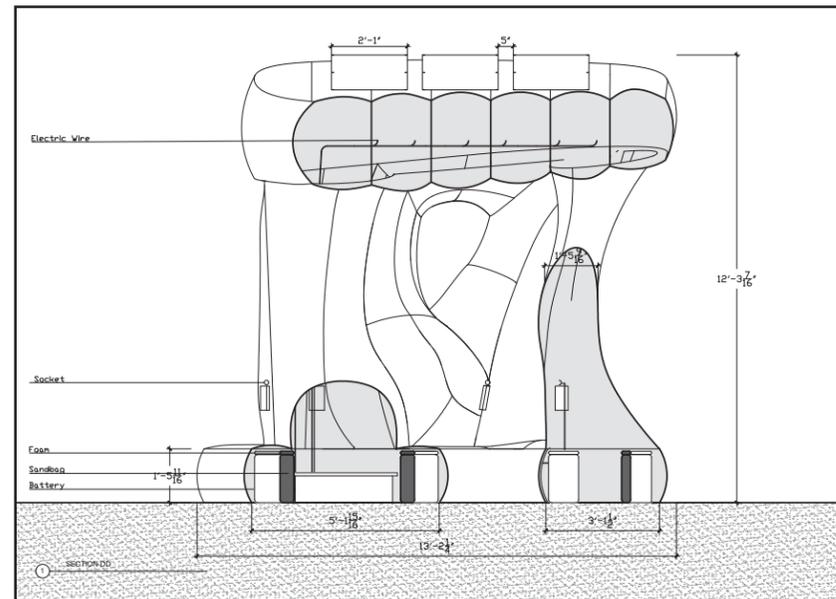
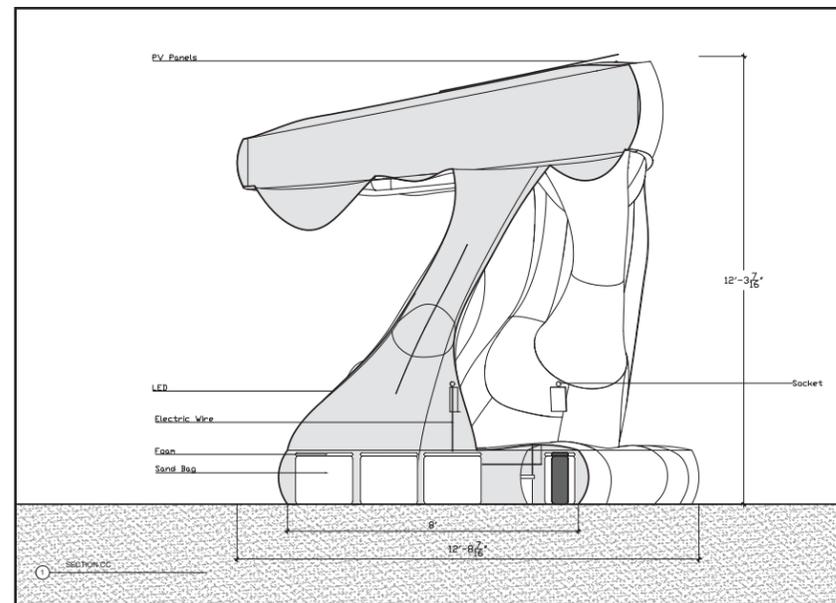


# GSAPP X GOO CLOUD



What can an inflatable do? It pushes air around a containment that expands with the pressure of the air within. Thinking of inflatables as giving shape to air, we designed GSAPP x Goo, a form that simultaneously pushes and pulls in its visuals.

COURSES: The Outside In Project  
SEMESTER: Spring 2023, Visual Elective  
CRITICS: Laurie Hawkinson, Galia Solomonoff  
COLLABORATORS: *Kriti Shivagunde, Andy El Set, Chayanidh Chantraprapawat, Syed Haseeb Amjad, Haolan Luo, Cohaul Chen*

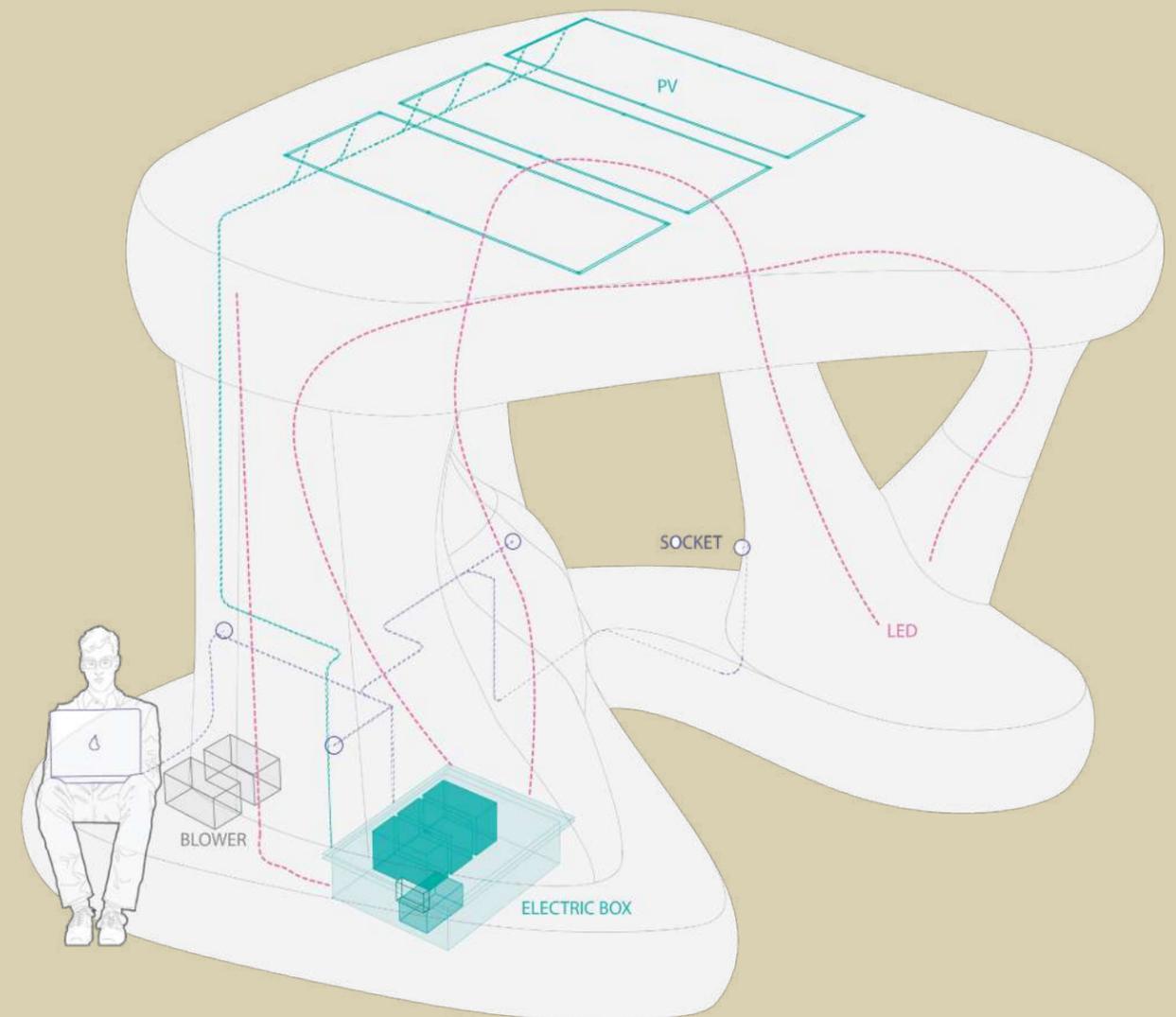


The evolution of the design progressed from a hybrid inflatable + wooden structural ensemble, to a purely inflatable form. The initial idea took inspiration from a balloon restrained by rigid geometrical frames causing the inflatable to bulge around them.

After reiterations by the manufacturers (Areaqubica), the design changed further to resemble Goo, with columns like strands of bubblegum stepped on and stretched out. The Pavilions were designed as charging stations, electricity powered by 3 solar panels on the “roof” of Goo connected to internal electrical wiring.

LED Strips run along the ribs inside the inflatable, glowing through the fabric in the evening. The design of Goo involved the making of construction drawings, of placing sandbags, displacing seatings and foam, holes through ribbings and back and forth with structural consultants, electrical consultants and the inflatable manufacturers.

GSAPP x GOO sits proudly atop the Cafe ramp in front of Avery Hall, with its mushroom-esque form in white sailboat material offering seating, connectivity, ambient light and music to the students and staff of Columbia University.





# 10



## THE MAN OF ALL THINGS Man Plus, John McHale, Future of the Future

COURSE: Transscalarities  
SEMESTER: Summer 2022  
CRITICS: Andres Jaque, Bart Jan Polman

The Human being has always been an amalgam. Animals inherit claws, teeth, spikes, hard-backs, venom, and innumerable other weapons to defend, prey and survive in the same world in which humans inherit no exercisable weapon except their brain. The brain is a weapon, but one that cannot be wielded independently. The human evolution into the anthropocene is a history of the Sapiens plus technology. From hunting tools, fire, the wheel, to the microchip, the robotic arm and the metaverse, human civilization has imprinted a legacy into the very core and space of the discovered universe, and the path still continues. John McHale's book, *The Future of the Future*, is an exploration of this existential morphology that presides over all things today, and also attempts a mapping of the technological hybrid ex-

istence of the human as well as a prediction of what could come in the future.

In the Chapter titled *Man Plus*, he writes about how Our cyborg technologies exist at transscalar levels: the microscopical scale e.g. medications entering our bloodstream helping us survive or chemicals that alter our psychological and metaphysical identities to that of the satellites connecting us to the unknowns of the universe, or the virtualities possible by the internet; the human extensions have reached inwards and outwards through cybernetics, and bionics and human explorations.

While encompassing a comprehensive info-dialogue and vague rhetoric, the book published in

1969, serves as an evidentiary indicator of not only the techno-explorations, but also the state of society of the time.

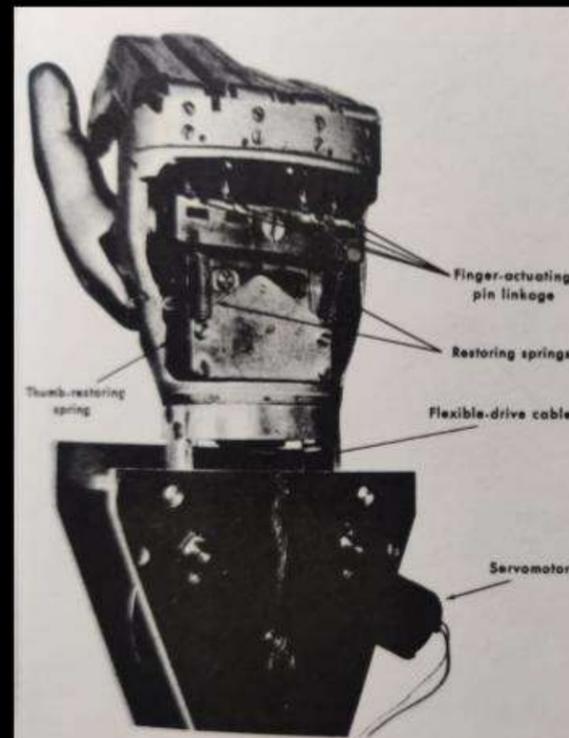
His text is an introduction to technocracy, but it is surprisingly the repetitive use of "Man" that offers more to the reader. Inherent in the name, John McHale places Man in the center of all things, as all things are an extension of Man. The text does not however, include a woman or other identities in this narrative. While this is possibly the conformity of referring to the human populace as 'Man' as is and was usually done, it takes us back to the political backdrop of the 1960s.

The Women's Liberation Movement, a part of the second wave feminism began in the early 1960s and rode on the legislative successes of the Women's suffrage (1900s) and first wave feminism. Ranging from informal groups of suburban married women to lesbian collectives, many of its most important victories took place in workplaces and families where women asked to change the sexual division of labor, and in personal struggles to enter traditional male preserves, from construction sites and coal mines to law and engineering schools.

Knowingly or unknowingly, McHale's text makes invisible the political outcry of his present and the labor of women in cybernetics, scientific and technological advancements. The invaluable contributions of Rosalind Franklin (How would we modify DNA without her discovery), Marie Curie (radium for cancer treatment), etc. to science and many others who were involved in the field or the administration of it are all neatly packaged into the collective word 'Man', placing women and persons of other identities as extensions of Man.

Donna Haraway's 'A Cyborg Manifesto' offers, in that sense, a visionary perspective of the potential of our cyborg identities; a way to affect not only technology, and material growth but also the society which is a man-made reality. If all of us are cyborgs, then we are truly not the pure identities we call ourselves, and this murky social landscape then forms the future of feminism and society.

**Knowingly or unknowingly, McHale's text makes invisible the political outcry of his present and the labor of women in cybernetics, scientific and technological advancements.**



13. Pressure sensitive hand, designed by Prof. Rajko Tomovic of Belgrade, that can be used as a prosthetic device, activated by a newly learned pattern of muscle control or—more alarmingly—by remote electronic control.  
*Design News*, August 19, 1964.



15. Cutaway view showing man in REMORA. Astronaut working in un-inflated suit with variety of manipulator arms, and the gauntlets for delicate operations.  
Bell Aircraft Corporation. Report No. D-7852-95301.