

Graduation Portfolio

MINSUNG KIM

Urban Design Studio Works
2021 Summer - 2022 Spring

Columbia University GSAPP | M.S Architecture and Urban Design '22

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CONTENTS

01 2021 Summer | ARCHA6849 UD Studio I
Reclaim the Air: Airkeepers
Combat Air Pollution

02 2021 Fall | ARCHA6820 UD Studio II
Vacancy Redefined
The World After Property

03 2022 Spring | ARCHA6832 UD Studio III
Seine Bight Water Rangers
Watershed Management & Development Strategy

01

Reclaim the Air: Airkeepers

Airkeepers organization proposal to NJ Department of Environmental Protection & US Environmental Protection Agency

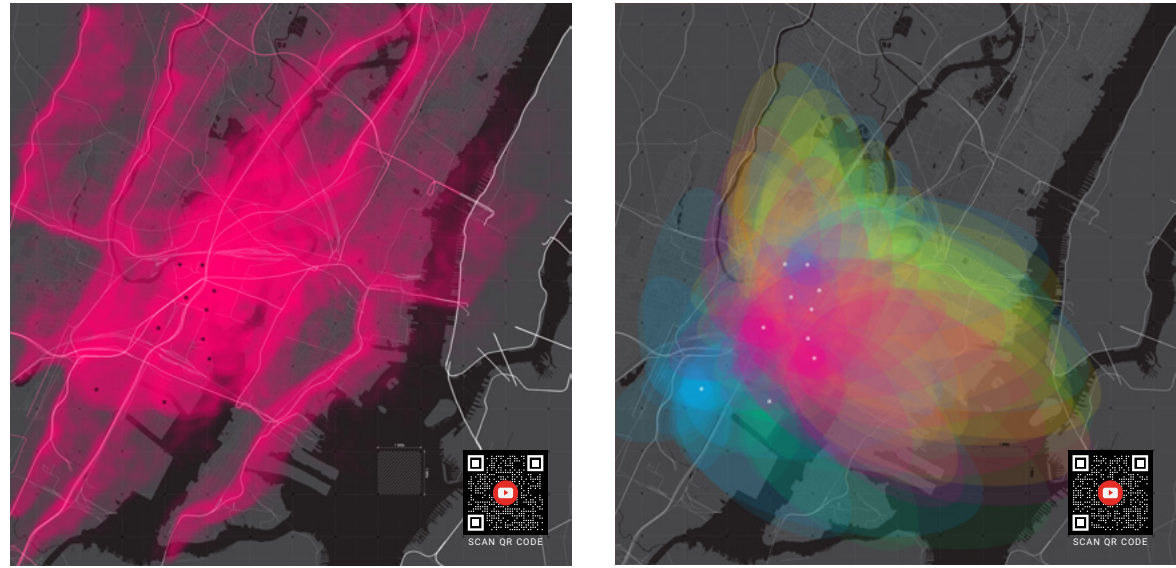
Topic	Urban Acupuncture for combatting Air Pollution
Site	Newark, New Jersey
Year	2021 Summer Studio
Instructor	Nans Voron, Sagi Golan, Tami Banh, Austin Sakong, Jae Shin, Galen Pardee, Sean Gallagher
Team	Carmen Yu, Javier Ortiz, Samuel Dye

We are the Airkeepers, an organization protecting air quality in New Jersey. Founded after successfully suing industrial facilities for air pollution, we are using the civil suit money to establish funds for restoring air quality and for our organization to explore ways to accelerate improvements in community health through design.

Air Pollution Caused by toxic factories, transportation, and foul odors leads to increased health concerns and affects the health of families and vulnerable communities. The current condition is bleak, but it doesn't have to be this way. Our organization is committed to combating air pollution and designing a healthier environment.

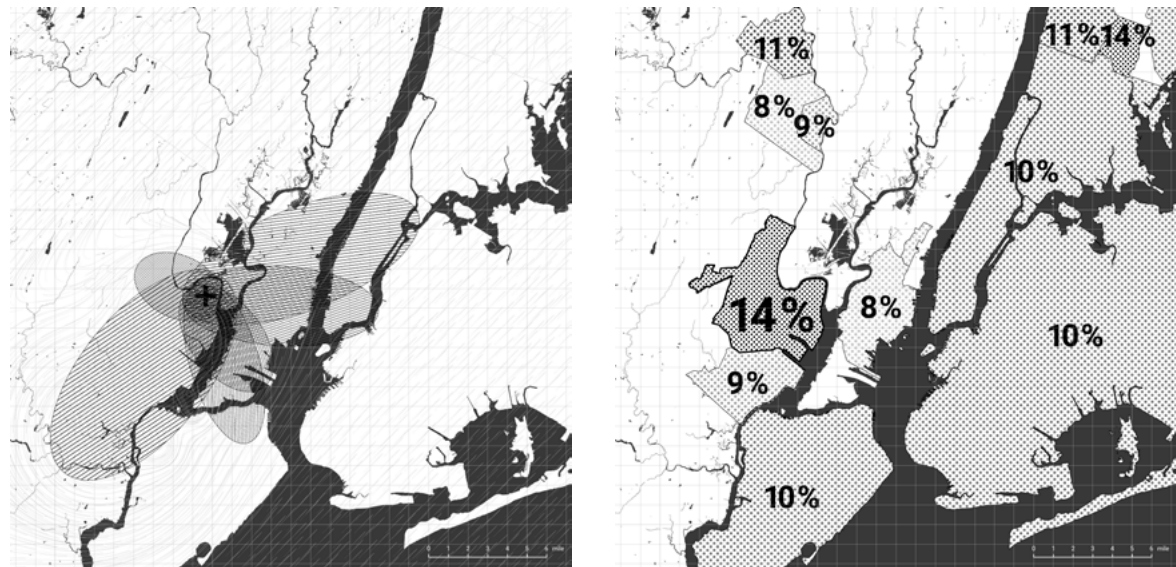
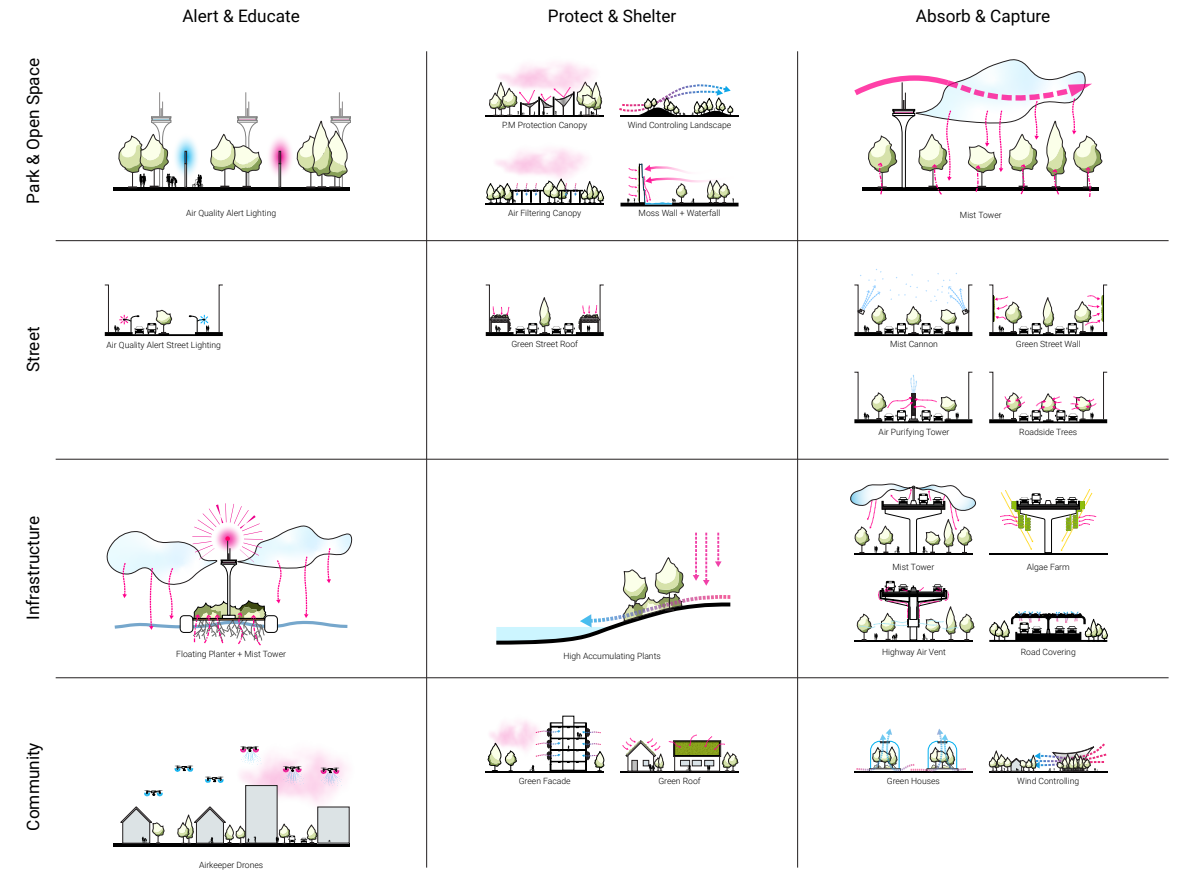
We are proposing a project across multiple scales to combat air pollution. Air pollution does not follow boundaries, therefore, each type of pollutant requires a different intervention at the point they interact with the environment. Design solutions based on capturing technology can also protect and educate the community.





Toxic Pollutants

Air pollution emitted from 8 heavy industries and surrounding highways is threatening people in Newark. During summer, pollutants tend to be stagnating in the area, which mainly affect people in the Ironbound area. In contrast, during Spring and Winter, prevailing wind carries pollutants toward Northeast, and not only people in Newark but also people in Harrison and even Jersey City area suffer from the contamination. It implies that this air pollution issue from Newark is not only the issue of the city.



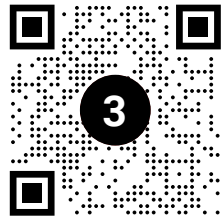
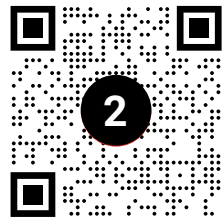
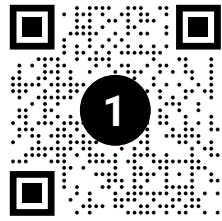
Threatening the Communities

The asthma rate in the Iron Bound area in Newark is significantly higher than in other New York metropolitan areas. Eight heavy industries along the Passaic River emit Toxic Chemicals such as Nitrogen Oxide, Sulfur Dioxide, Formaldehyde, Methanol, Toluene, and particulate matter 2.5 from highways and Newark International Airport is affecting the surrounding area and threatening community health.



Design Matrix - Urban Acupuncture

Since the air pollution issue doesn't have a boundary, we propose an Acupuncture Design being able to be applied in different local conditions. The strategies are categorized into three parts alert, protect, and absorb. Air quality alerting system lets people recognize the invisible threats and educate them. Protective structures provide the local community with air-safe outdoor spaces. The pollution absorption actively captures the pollutant in the air to terraform the polluted area.



Scan QR Code
to watch animation

Combat Air Pollution

The Mist Towers, emitting mist cloud to capture captures air contaminants. The towers pump the water from the near water source, Passaic River, filter the water, and mist it into the air. The water particles capture the particulate matter and toxic chemicals. Then, they drop the captured pollutants down to the ground surface. The hyper-accumulating ground plants absorb the fallen pollutants and prevent them from flowing into the river. Outdoor light poles alert current air quality by using different colors of the light to help the community avoid invisible air pollution.

Airkeeper's intervention is not only protecting the community and local ecosystem but also educating and alerting people to let them combat the pollution together.



02

Vacancy Redefined

Reimagining a world with overridden tangible values

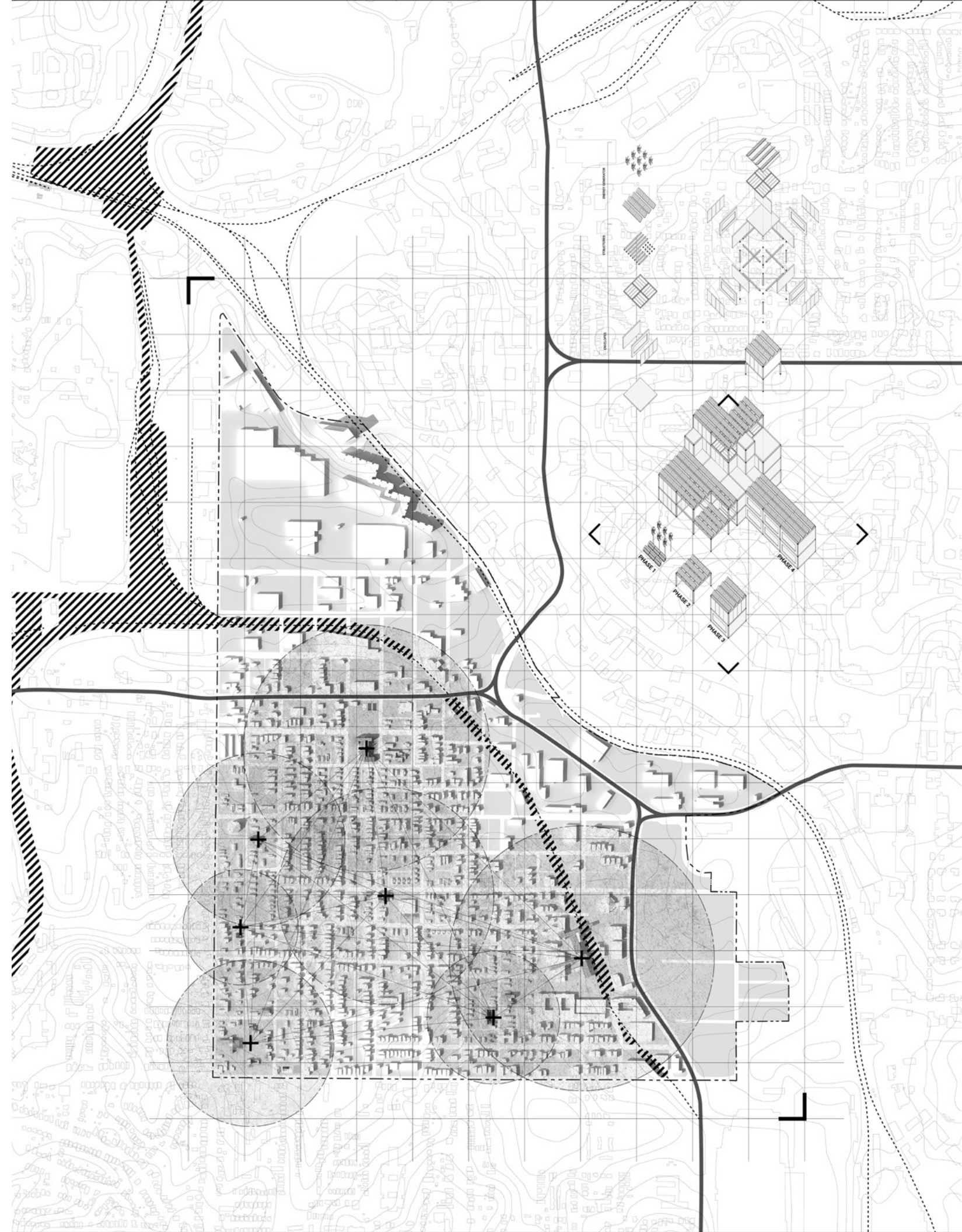
Topic	Redefining Vacancy
Site	English Ave, Atlanta, GA
Year	2021 Fall Studio
Instructor	Emanuel Admassu, Nina Cooke John, Chat Travieso, Lexi Tsien
Team	Daniela Déu, Samuel Dye, Haotian Jiang

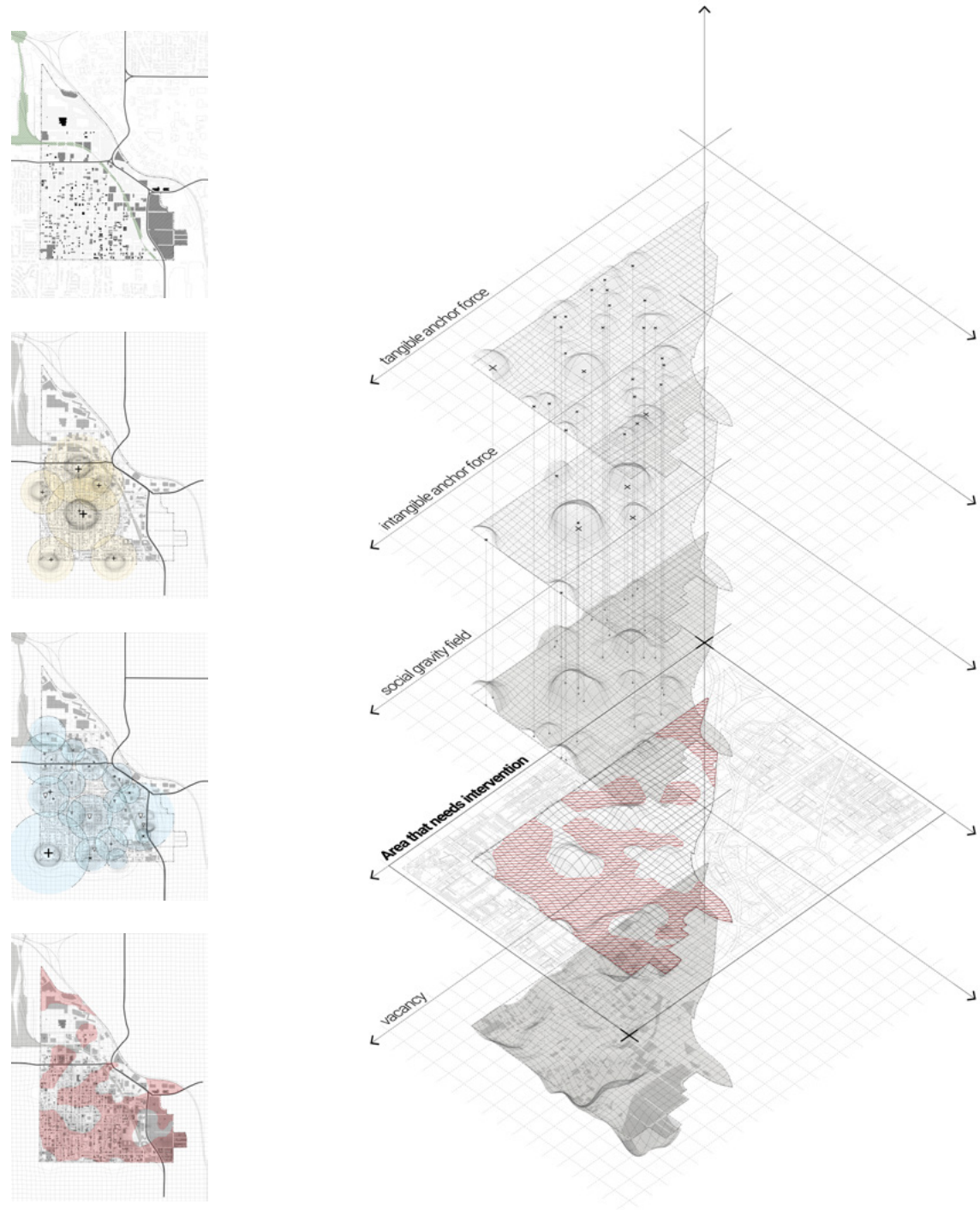
The world of property centers individual value on our relationship to land possession. The land has thus transitioned from a space where life occurs to a space of financial exchange and gain in the market system. By viewing land as a commodity that can be accumulated and hoarded until maximum value can be extracted, the property has been weaponized to perpetuate existing concentrations of power in the hands of a few at the expense of the many.

In our pursuit of a world after property, we seek to challenge our understanding of value; to prioritize human intangible forms of wealth building over financial gain.

Our aim is to target vacant lots, and redefine vacancy as spaces that require care because they have historically been neglected and devalued, and transform them into spaces that generate a new type of wealth centered on collective and communal growth.

As vacancy is not an issue exclusive to English Avenue, our intervention can become the inflection point in an expanding constellation of vacancy redefinitions in other neighborhoods in the Atlanta region at large.





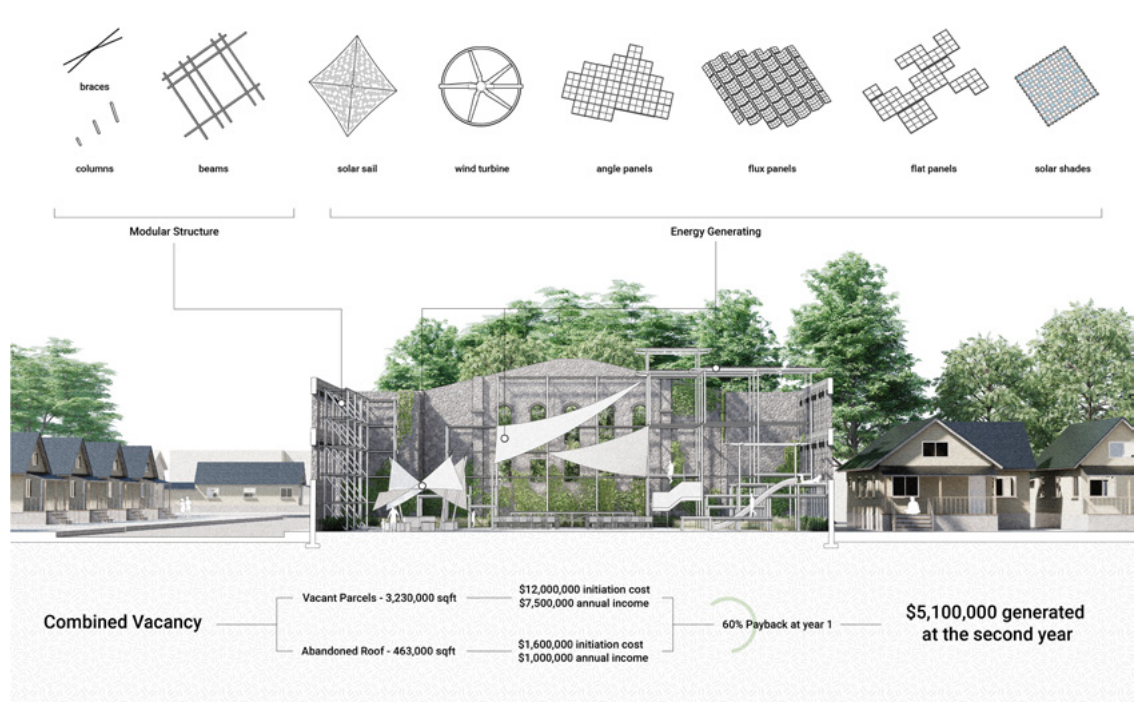
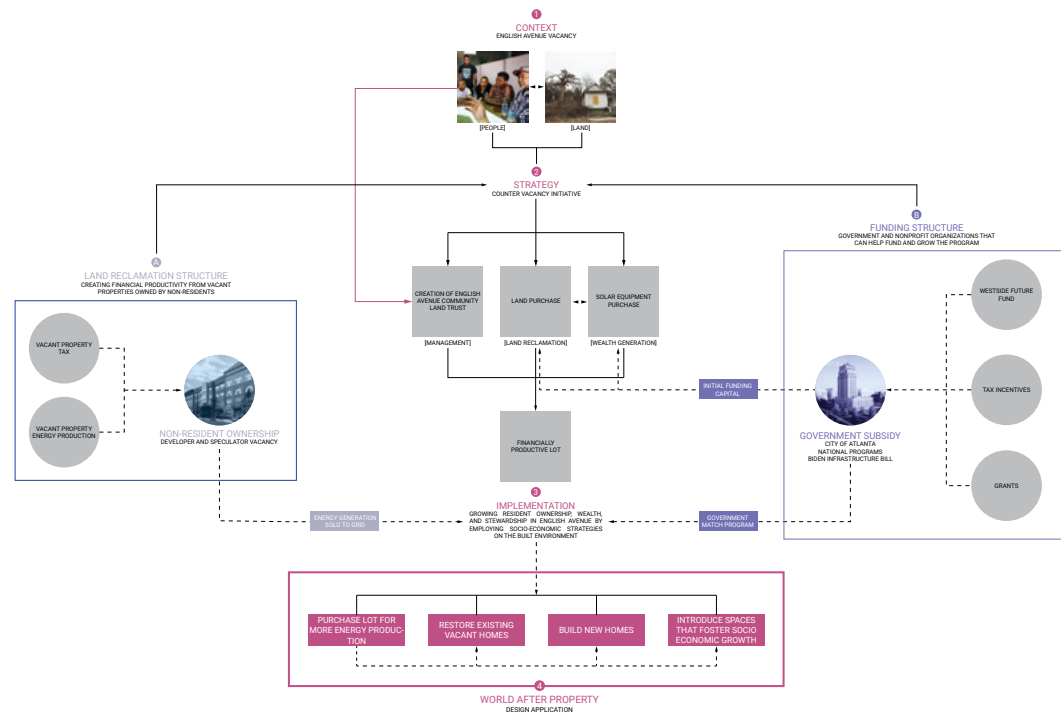
Community in Vacancy

Due to lack of maintenance and high crime rate, approximately 40 percent of properties in English Ave are vacant nowadays. Additionally, 91 percent of the vacant parcels are owned by someone outside English Ave, and 30 percent are owned by Companies, which implies an upcoming development in this neighborhood. Despite the high vacancy, local residents are trying to keep their community and heritage of the neighborhood. Still, few community anchors exist, having a gravity force that attracts and solids their community. There are two types of community anchors. One is tangible anchor, physical places with specific programs, and another is intangible anchor, formed by the community such as social activities and gatherings. Based on research, we were able to translate the invisible forces of each anchor and vacancy to a gravity field map. Merging the data, we mapped the zone of resultant forces, which shows the area that needs care.



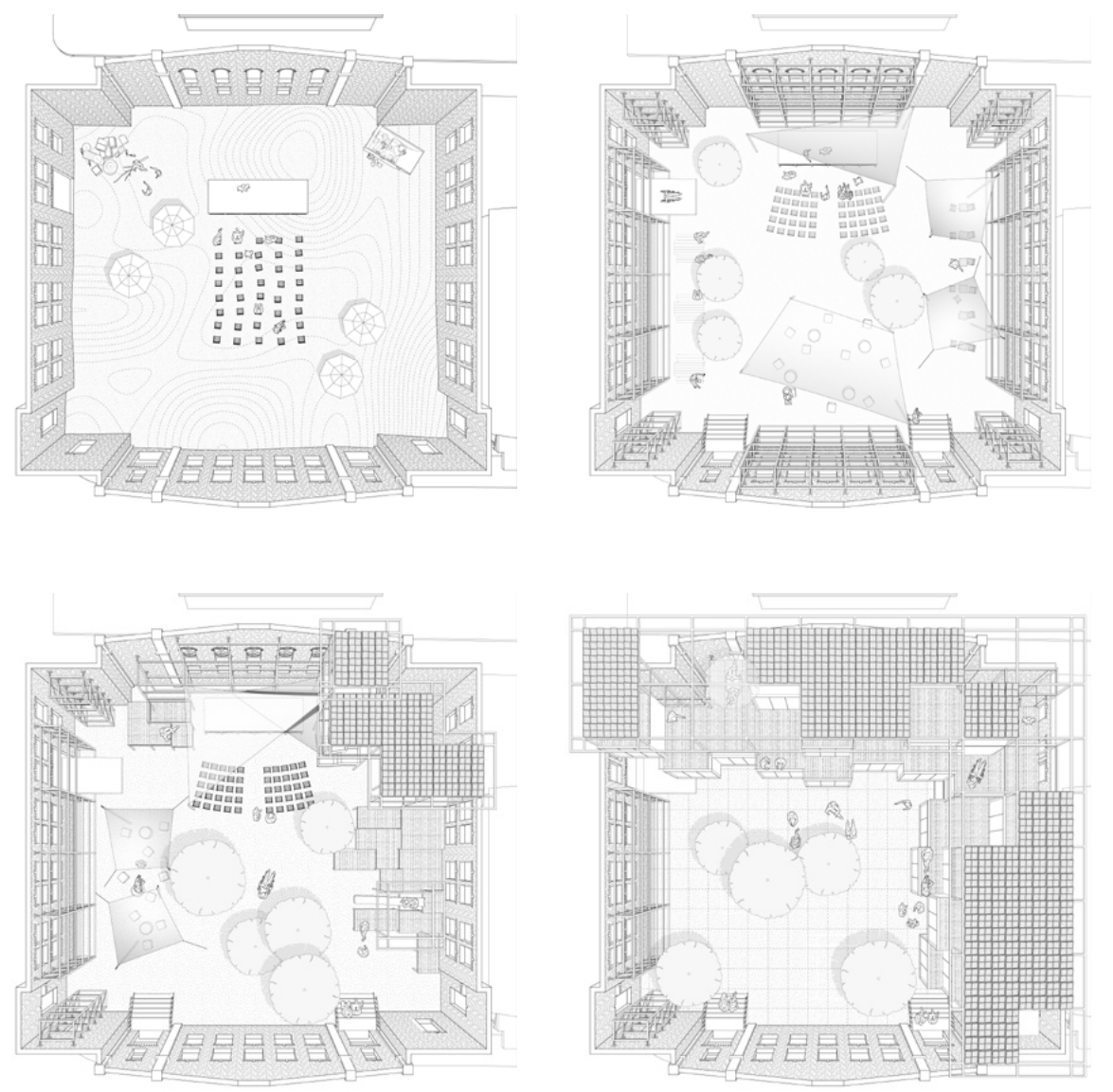
Regime of Property

The power of the regime of property in English Avenue is evident in this series of historic maps chronicling the evolution of the natural and urban fabric, and the shift in our relationship to land. But this influence isn't limited to its effects on the landscape, it also distorts our perception of space, the interactions between the people in it, and our understanding of value, which continuously evolves to maintain existing power structures. This is supported by government policies that have reduced the affordability of housing and increased displacement, including residents from demolished public housing complexes like Herndon Homes. Low income residents in Atlanta are now pushed out further from the city.



Land Reclamation

Vacancy and high levels of corporate holding have led to a reduction in resident ownership. Our policy structure will reclaim stewardship for residents and begin with creating the English Avenue Community Land Trust. Composed of existing residents, they will manage the purchase of vacant lots and energy production equipment. The capital for this initial purchase takes advantage of existing government funds, grants, and tax incentives. In parallel, our structure for land reclamation will reduce non-resident ownership. A vacant property tax is combined with the introduction of temporary energy generation on lots that have remained vacant after two years of purchase. The capital is redistributed through the Land Trust to reclaim lots and invest in community infrastructure. Land reclamation and collective stewardship allow for displaced residents' return while creating the space for the world after property.



Module Implementation

The structure co-exists, assists and grows parallel with the needs and requests of the community. We start to implement our design intervention by renovating the existing structure to reactivate the space while keeping this place as it's original purpose. It then expands itself into a typology welcoming community. Modular structure is highly flexible and cost-efficient so that it can be easily applied to most existing vacant structures, and expanded.

03

Seine Bight Water Rangers

Watershed Management & Development Strategy

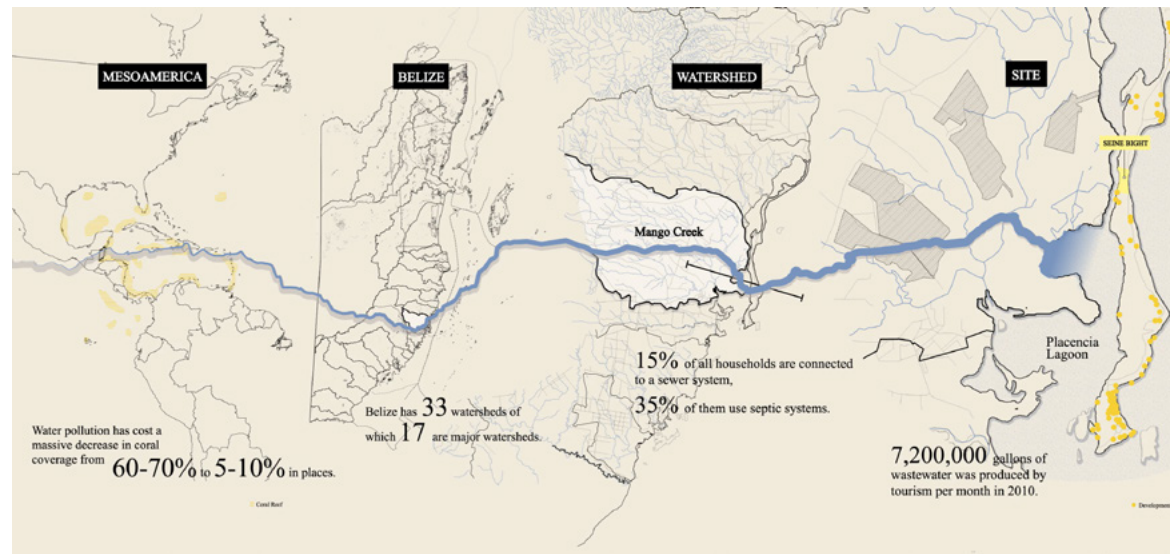
Topic	Proposing Resilient Future Development
Site	Seine Bight, Belize
Year	2022 Spring Studio
Instructor	Kate Orff, Geeta Mehta, Adriana Chavez, Thad Pawlowski, Lorena Bello Gomez
Team	Haotian Jiang, Junfan Chen, Changbin Kim

Tourism and agriculture, the two major industries in Belize, are heavily dependent upon its natural bio-riches. However, due to a lack of regulations and enforcement, these natural resources are being exploited and rapidly deteriorating.

We are designing a resilient future for Seine Bight by planning across district boundaries to watershed scale.

Our design includes three strategies: 1) Monitoring or locating the source of the problem, 2) Enforcing policies and actively solving the problem, and 3) mitigation and creation of resilient infrastructure for the future. The Water Rangers will be involved throughout the design and implementation process.





Watershed

Our project started with the Mesoamerica scale, we looked at key issues of mangroves and coral reefs loss. Pollution, as an example, has reduced the coral coverage from 60% in areas to 10%. We then zoomed into the Belize and its 33 watersheds, especially mango creek, where our site resides, and focusing deeper on the end of the watershed as it is the location with the most human, industrial, and tourist activities.



Housing

Pollution

Coral Bleaching

Inequitable Economy



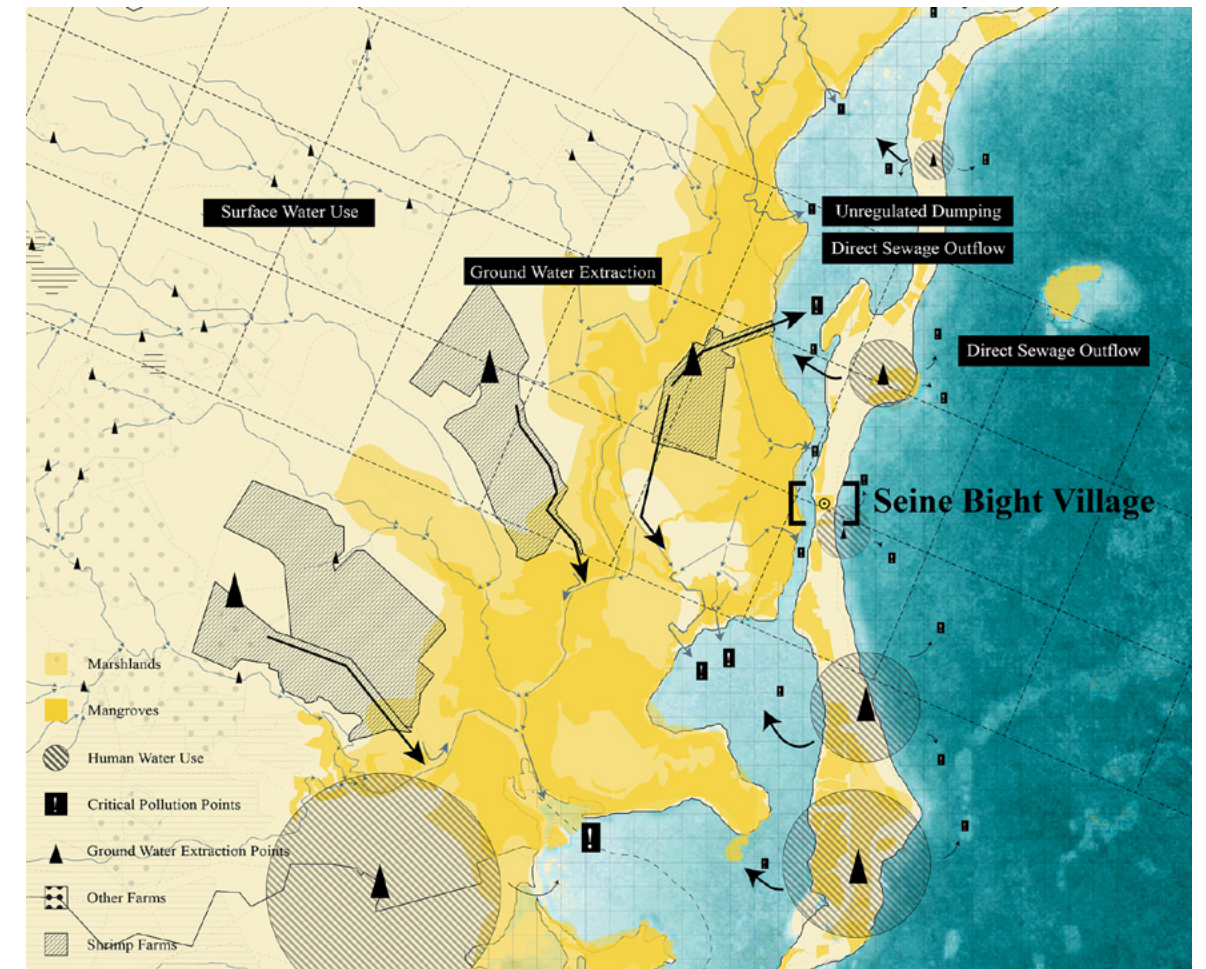
Farming
80% Domestic Exports

Garifuna
17,000 Garinagu

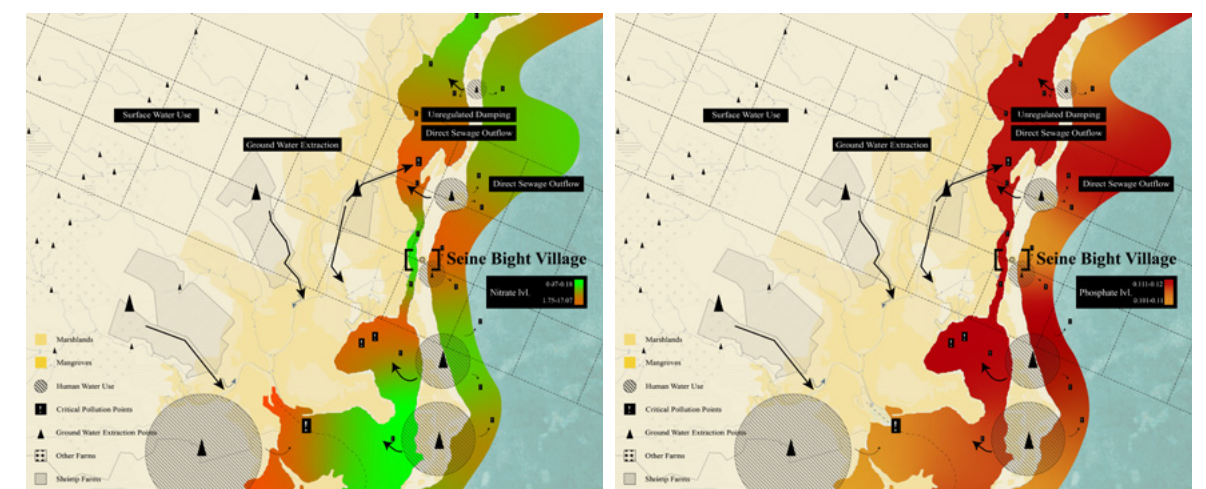
Tourism
34% Employment

Critical Issues

Due to agriculture, ongoing development, and uncontrolled tourism industries, The Mangocreek is suffered from poor housing, water pollution, coral bleaching, and inequitable economic issues. There are three distinctive sectors on our site. Ridge, corresponding to farming activities inland. Reef, indicating the Seine Bight community on the Placencia peninsula and Reef, relating to tourism activities that significantly impact environmental health.



Impact of Water



Nitrate and Phosphate level in the water



Three Design Strategies

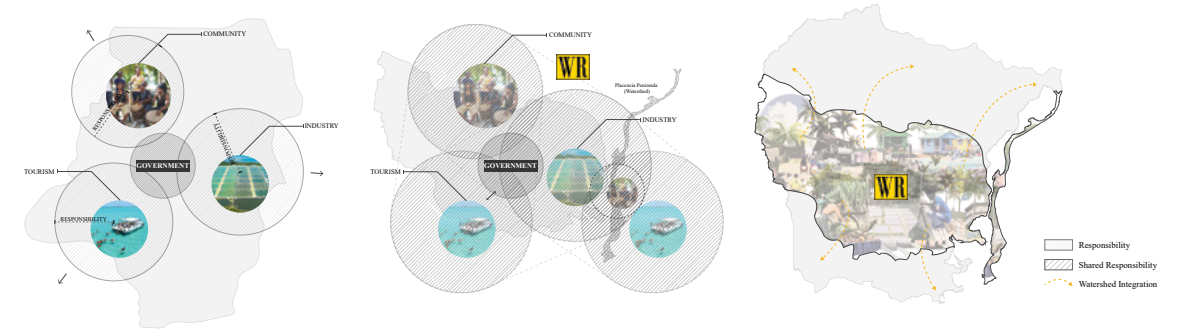


Water Rangers

The Water Ranger Program aims to foster a team made of local citizens, corporate representatives, volunteers, and local industry students to monitor pollution, develop plans for future watershed growth, and enforce existing water protection policies.

How Do We Support Existing Systems?

Our overall design strategies are to monitor and filter the current watershed and to mitigate for future threats of our site. The Water Ranger is a resident-based program developed to facilitate, manage and operate how their community develops in the watershed. Made up by experts the residents within the watershed and Belize



Currently, each sector interacts with the government policies independently with little effort in developing congruently.

Water Ranger program developed alongside ICWZM provides a model for unifying the sectors with a coalition.

The Stann Creek district boundary is slowly transforming into the watershed boundary as the root of solutions.



Jose (Pepe) Garcia
Water Ranger - Leader

"The major source of waste to the lagoon is human waste."

"Shrimp farm filtration system exist, but the head of the shrimp and the filters, where do they go?"

Kalene Eck
Water Ranger - Mitigation Officer
Resilience Officer

[Belize]
Belize Coastal Zone Management Authority & Institute (CZMAI)

John
Water Ranger - Volunteer
Surveyor

[Seine Bight]
Belize University
Bachelor of Marine Biology

Josué Aké
Water Ranger - Quality Control

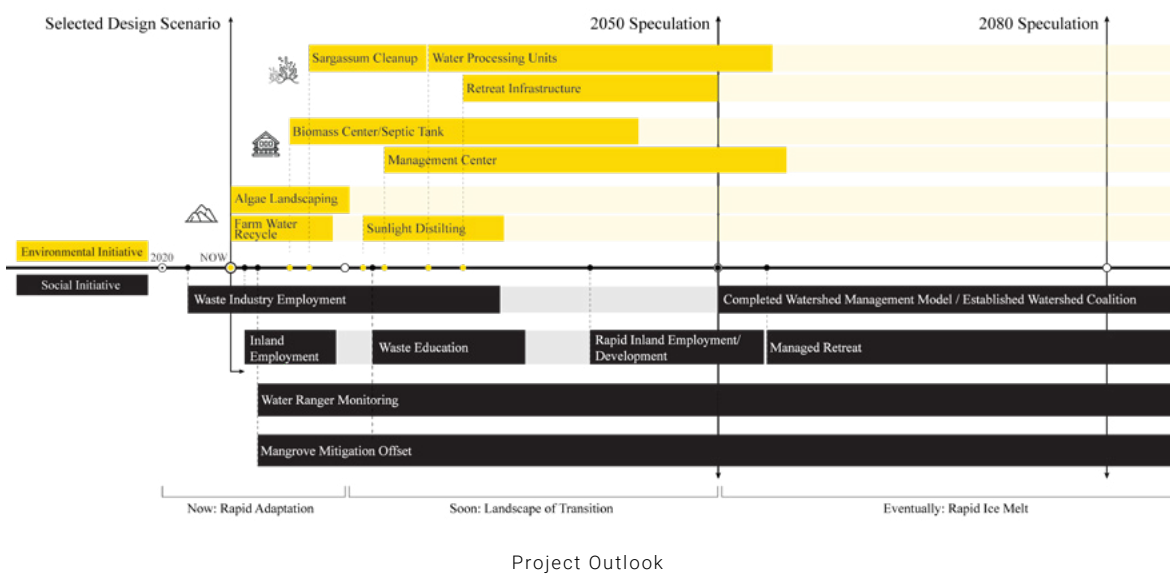
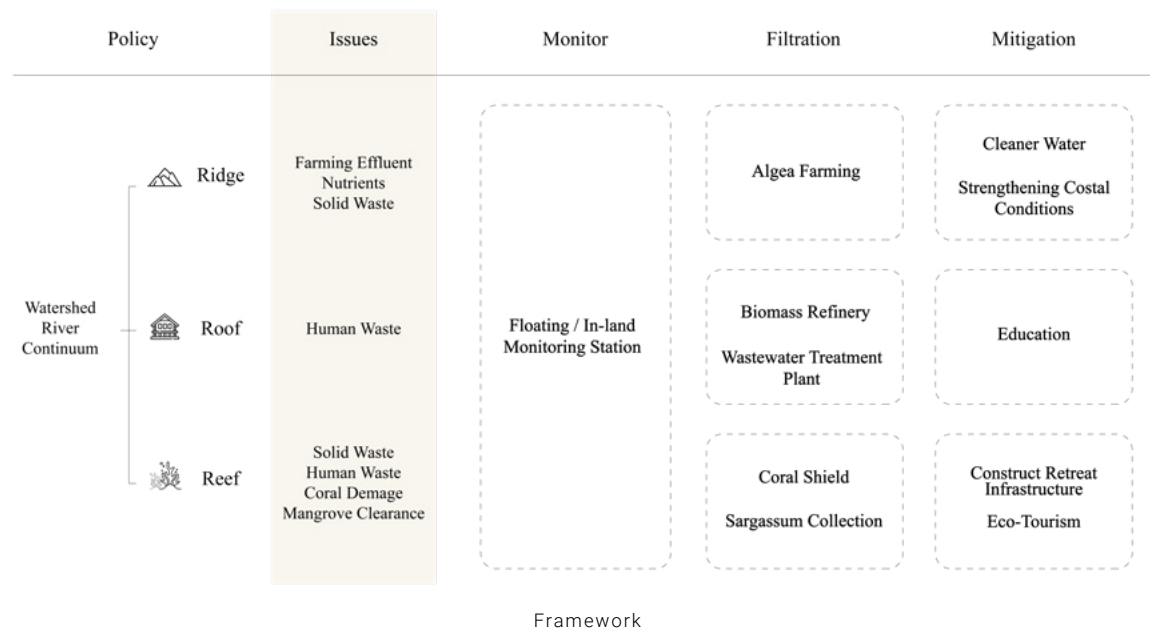
[Belize]
Science Department, Faculty of Science & Technology, University of Belize, Natural Resource Management Program

Theresa
Water Ranger - Compliance Officer

[Belmopan]
King Mayan Shrimp Farm Director

Water Rangers

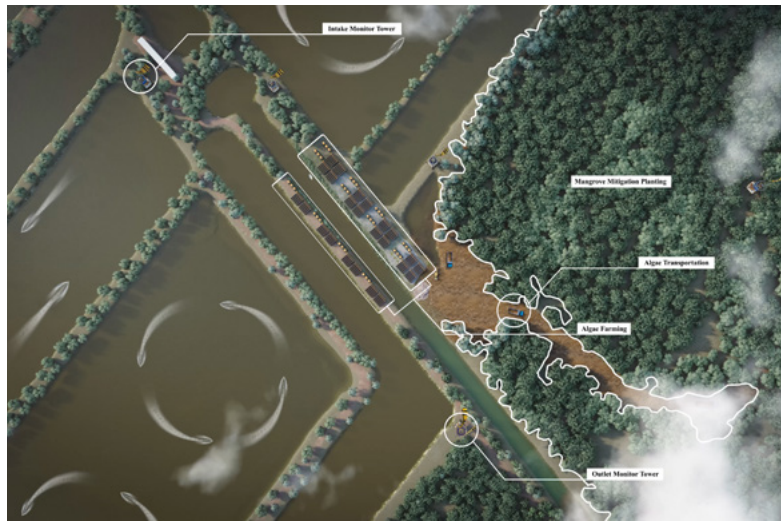
The Water Ranger program will be led by someone with ample knowledge, such as Mr. Pepe Garcia. We can foster a team made of local citizens, corporate representatives, volunteers, and local industry students to monitor pollution, develop plans for future watershed growth, and enforce existing water protection policies.



How Does It Work?

Our designed support structure splits into three parts, monitoring locates the source of the problem and enforces policy, filtration actively tries to solve the problem, and mitigation sets up infrastructure for future. The water rangers are integrated throughout the design applications, with specific personelles targeting each sectors. Our design timeline shows an example of supportive design in this instance, with a proposed long-term plan that addresses long term concerns. During the lifespan of this project, two speculations are made for 2050 and 2080.





Ridge - Shrimp Farm

An algae farm that filtrates nitrate and salinity issues created by fertilizer is introduced. Algae collected on-site will be transported to Seine Bight for bio-fuel.

Monitoring towers will also be located at the inlet and outlet of the farm.



Roof - Seine Bight Community

The design intends to build biofuel facilities along-side continuous education for residents.

Locally, septic tanks are built connecting to biomass refinery. Wastewater treatment plant will integrate with the community and education center.



Reef - Coral Reef

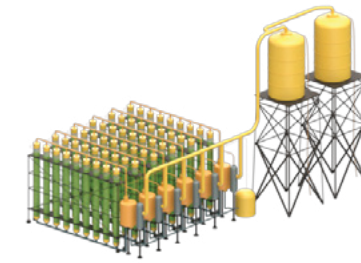
The coral shield are installed to block sargassum.

Floating water monitoring stations indicate water contamination and alerts rangers.



Monitoring Tower (Land)

collects water samples and tracking pollutions



Algae Farm

Vertical algae farms absorbs salinity of the water and convert it into the energy source



Tetrapod

provides mangroves with a solid base to help them grow easily, protect coastline from the wave at the same time.



Monitoring Tower (Water)

collects water samples from the ocean, and tracking pollutions.



Biorefinery

convert sargassum, algae and organic waste into biogas



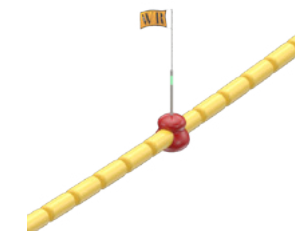
Rectrapod

provides mangroves and corals with a solid base to help them grow easily.



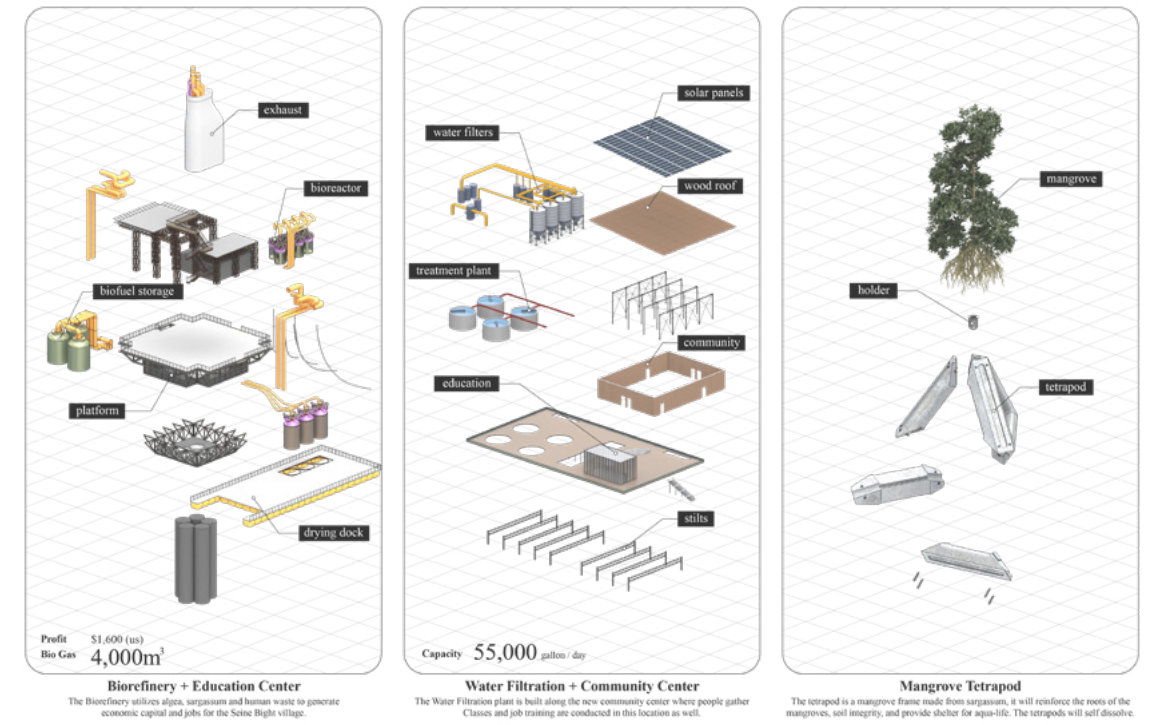
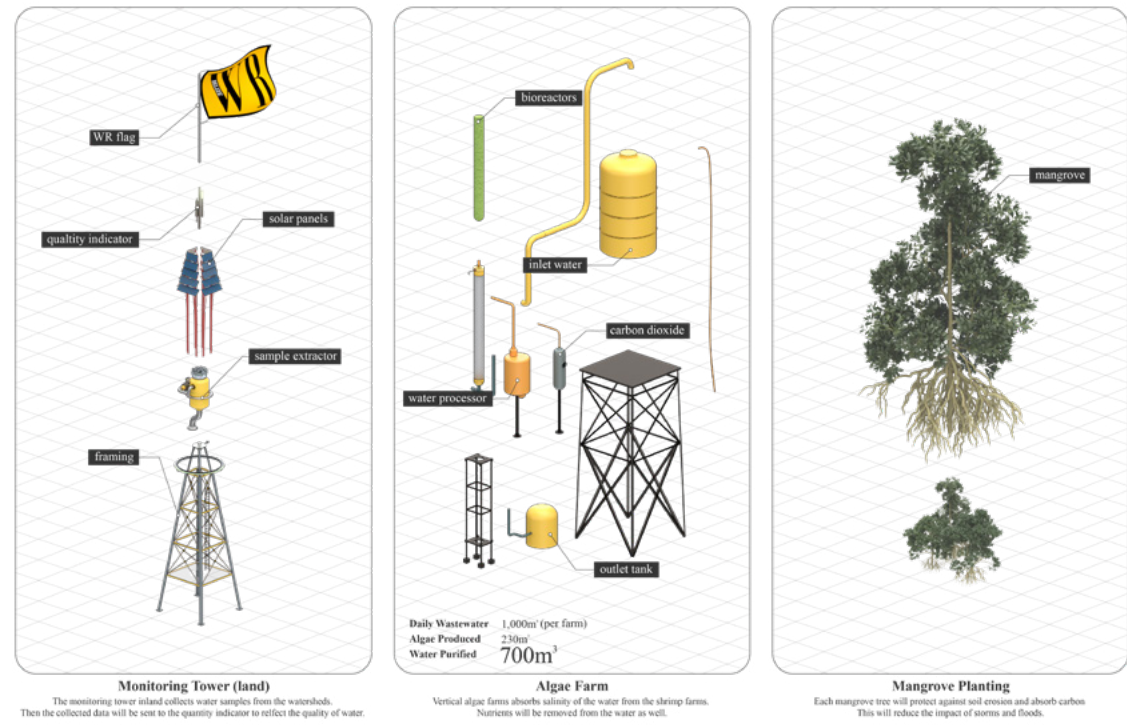
Water Filtration and Community Center

filters waste water from the community, and provide a community space for education and cultural programs.



Coral Shield

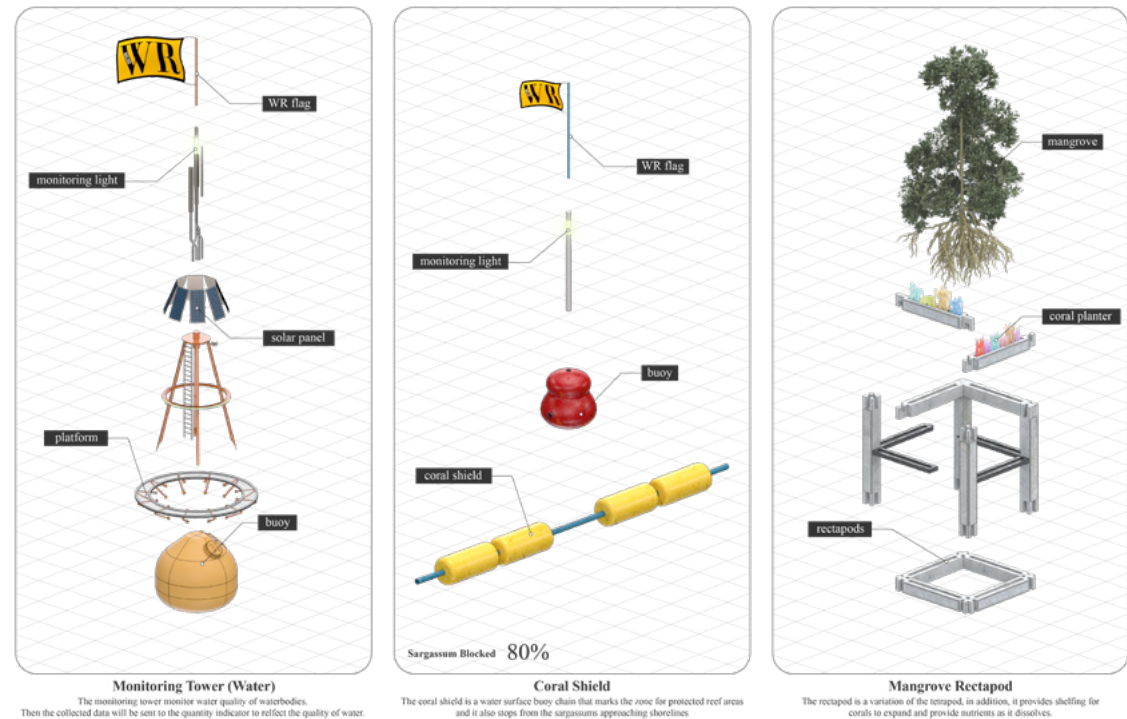
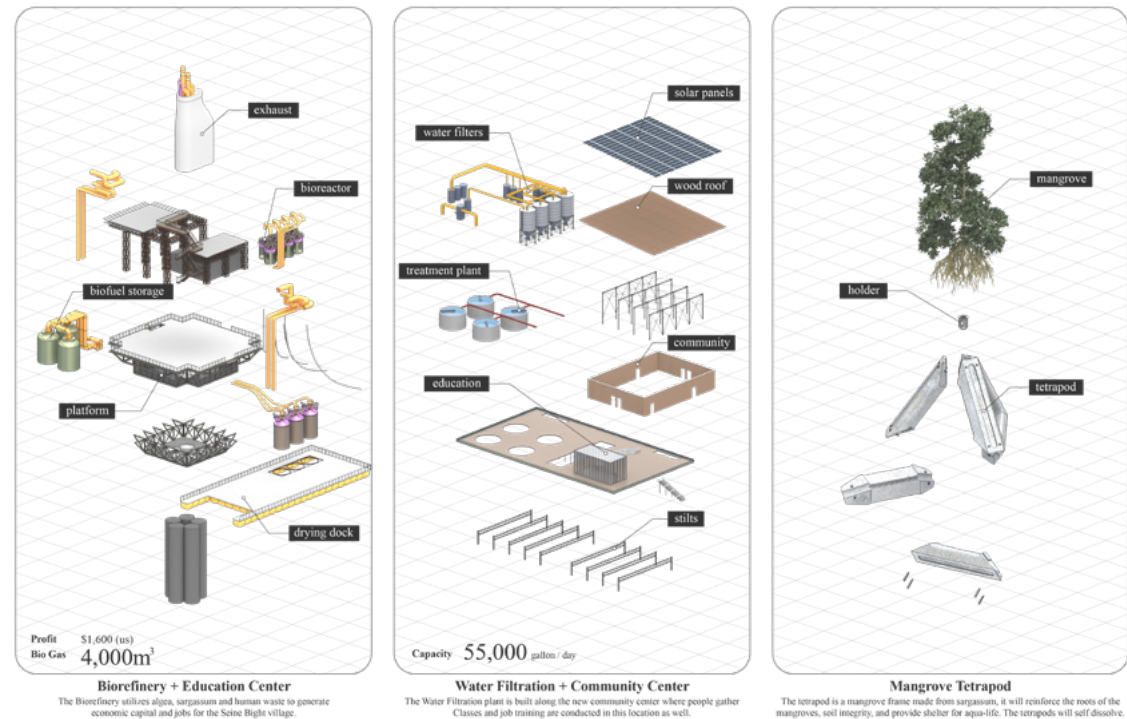
blocks sargassum not to cover the coral reef and wash ashore. Also it controls the tourism near the reef.



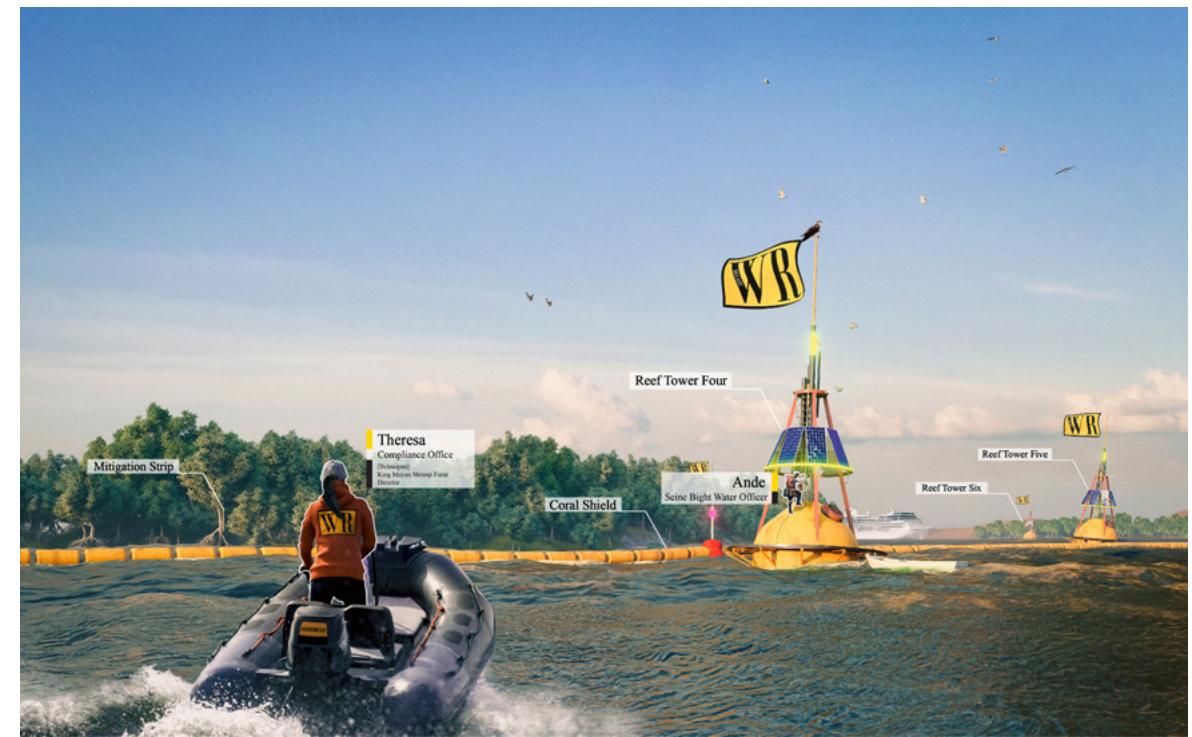
Implementations on Ridge



Implementations on Roof



Implementations on Roof



Implementations on Reef

Ridge in 2030

Algae farming modules and monitoring towers are immediately installed and start functioning.



Ridge in 2050

As the community builds economic and social wealth, a long-term managed retreat can take place where roads and housing plots are being prepared in conjunction with government plans.

Housing Construction Preparation

Mangrove Mitigation Planting



Sea Level
+ 0.6 m

Ridge in 2050

As the sea level rises, inland migration begins, but this time, sectors plans and develop corresponding to conservation rather than extractive value.



Ridge in 2080

As the sea level rises and endangers the current Seine Bight Village, the upland will grow together in residents, more incorporated tourism activities, and diversified job opportunities.



Ridge in 2080

As the sea level rises and endangers the current Seine Bight Village, the upland will grow together in residents, more incorporated tourism activities, and diversified job opportunities.



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