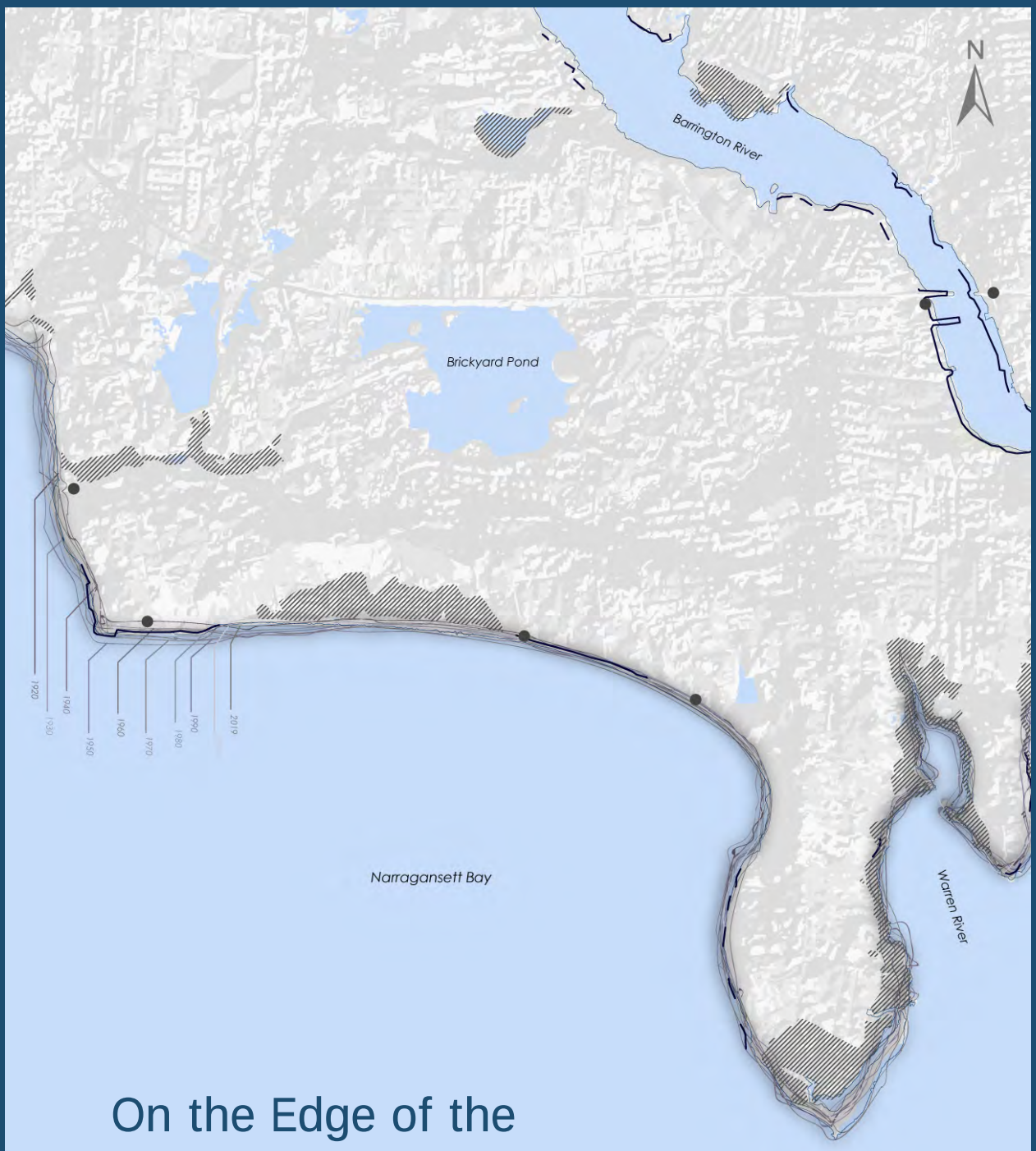


On the Edge of the "Er-Ocean" State

Mariesa Travers | RISD Architecture Thesis

This thesis will explore how hard coastal infrastructure methods can be redesigned by softening the coastal edge to support the ecosystem and enhance public access to the beach. By referencing and arguing against techniques used by the U.S. Army Corps of Engineers (USACE) as a solution to deal with coastal erosion, this process will propose a regenerated design system. Through a series of material experiments, this research works with natural processes and flows, to create transitory systems that erode and ebb with the coast.

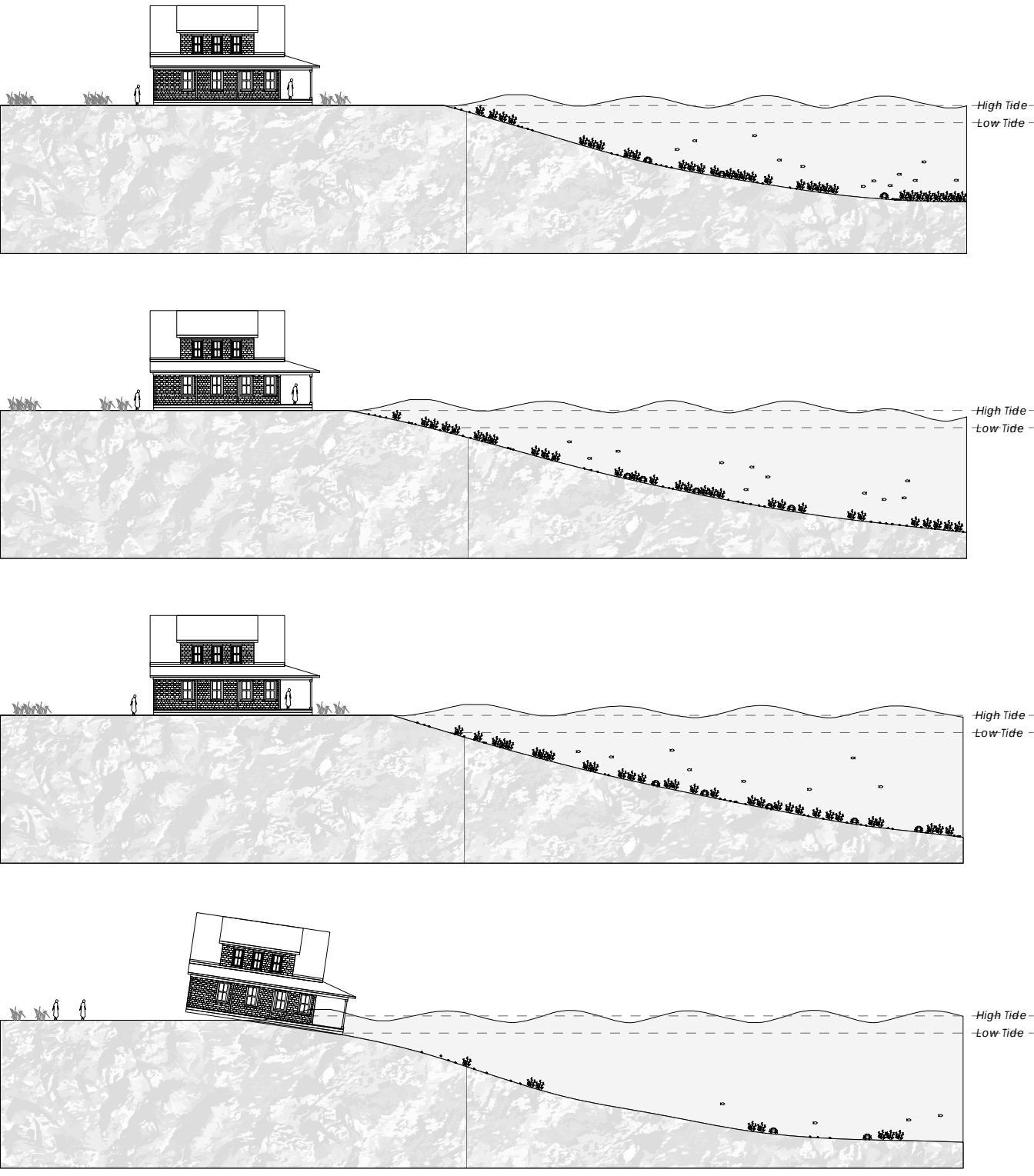
Shoreline Armoring
Defense Infrastructure to Coastal Erosion

Erosion is a natural process where sand is moved away from the coastal edge through wind, waves, and tidal energy. All beaches experience erosion, but this process is often sped up through Anthropogenic means, as well as climate change, and sea level rise.

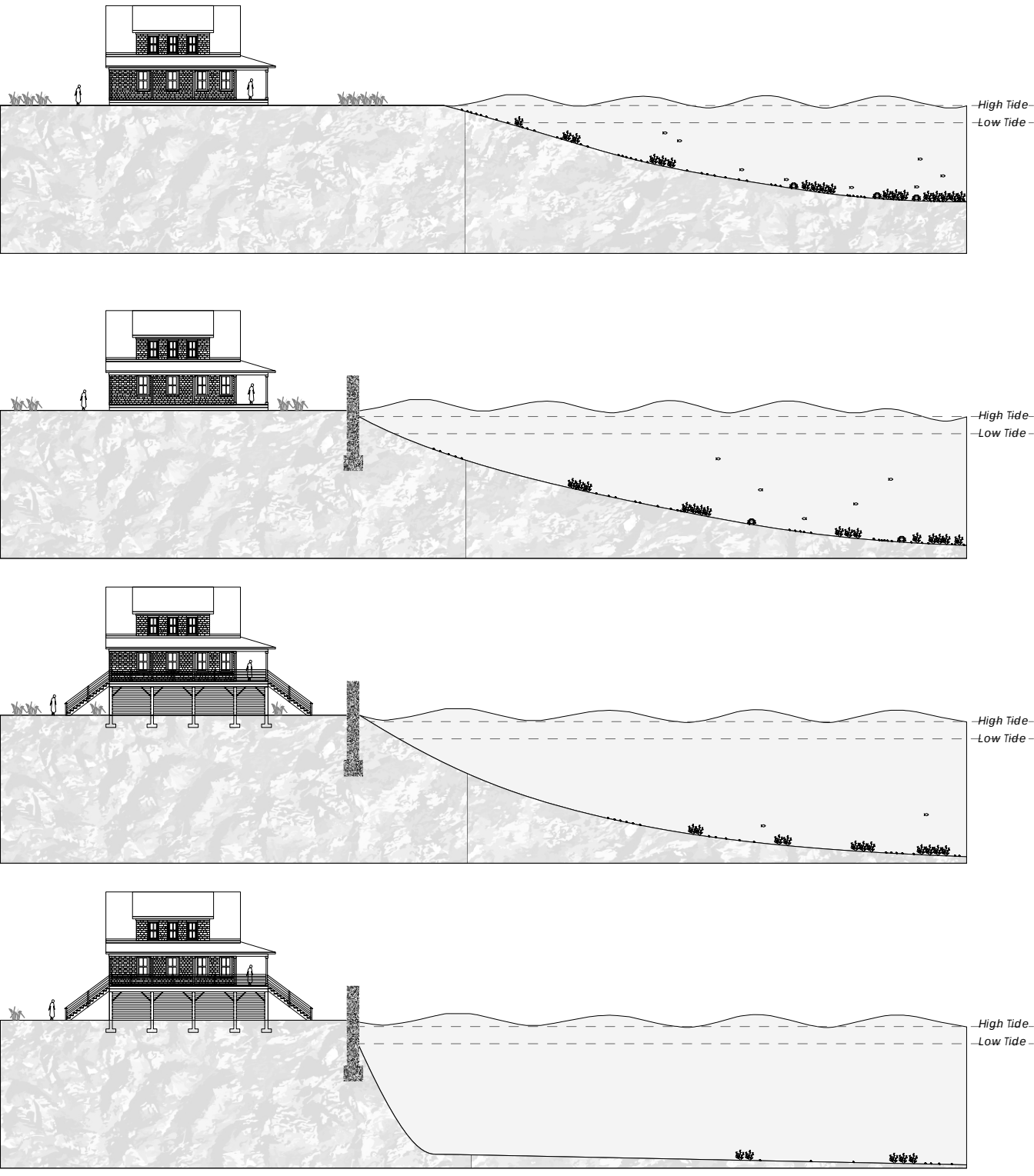
As the coast becomes an important source for infrastructure and economic development, it therefore must be armed and protected against the natural forces. Otherwise, nature wins and property is lost in the process.

USACE deals with erosion by armoring the shore edge with hard, impervious surfaces. One favored method is seawalls. They are mostly made from concrete, costly in construction and maintenance, and oftentimes fail. Seawalls often block access and obstruct views to the shore. Eventually seawalls, erode the sand by the wall, and their construction leads to habitat loss.

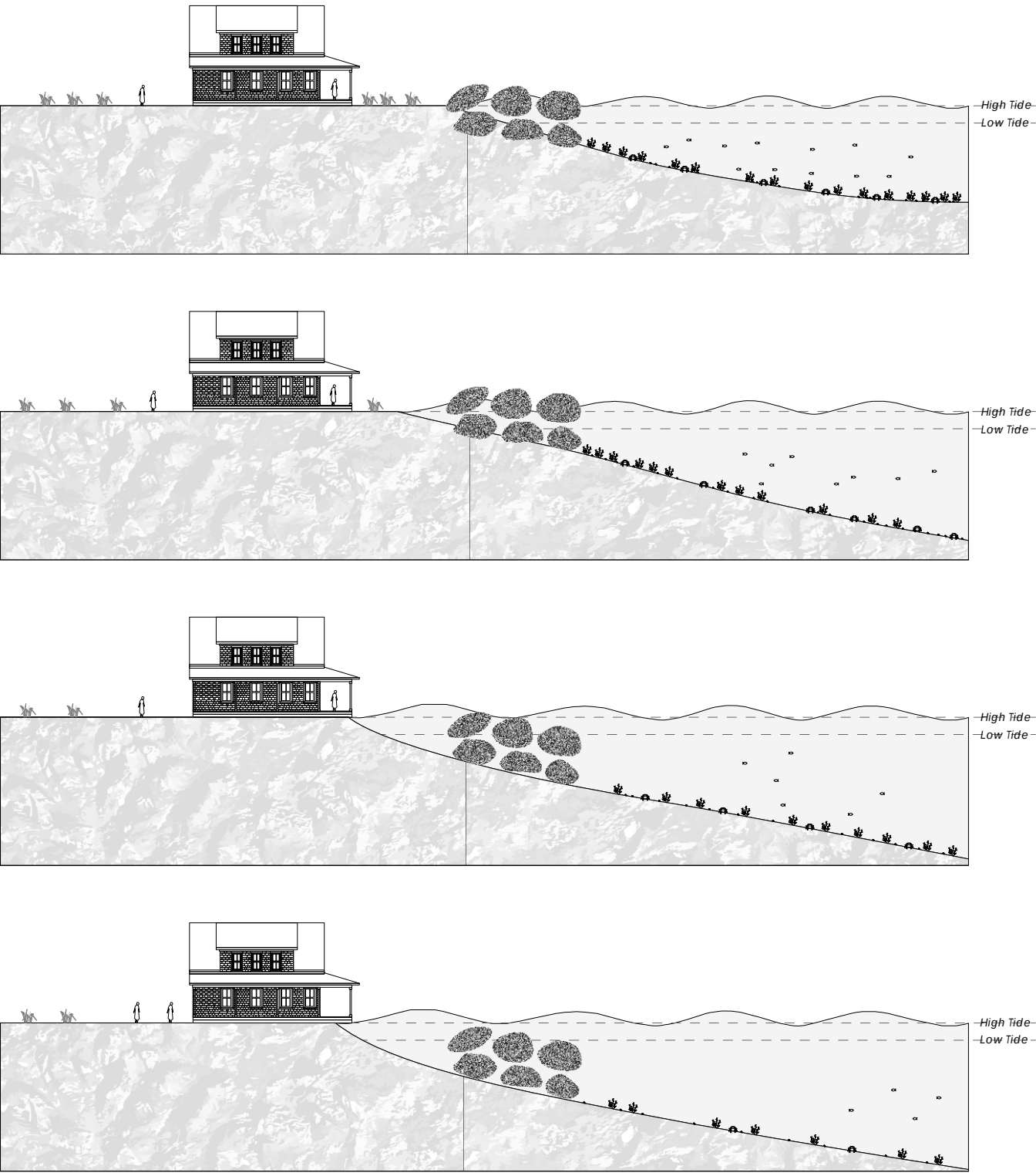
Jetties, groins, and rock revetments are similar to seawalls and are used to dissipate wave energy before it breaks on shore. They are also made of stone or concrete. These are temporary fixes disguised as permanent solutions. Even though erosion seems “fixed” in one area, these solutions can sometimes cause erosion further elsewhere along the shore.



Coastal erosion elevation series without any interventions.

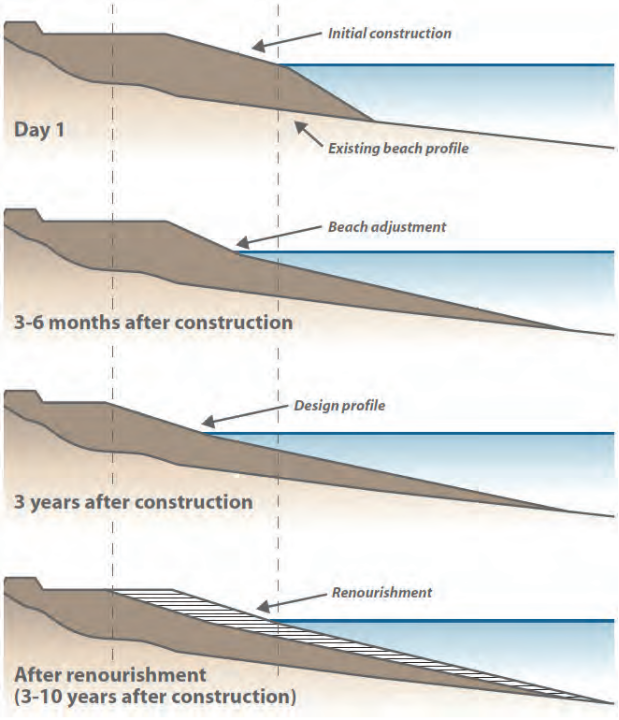


Coastal erosion elevation series with seawall intervention.



Coastal erosion elevation series with jetties/groin intervention.

USACE

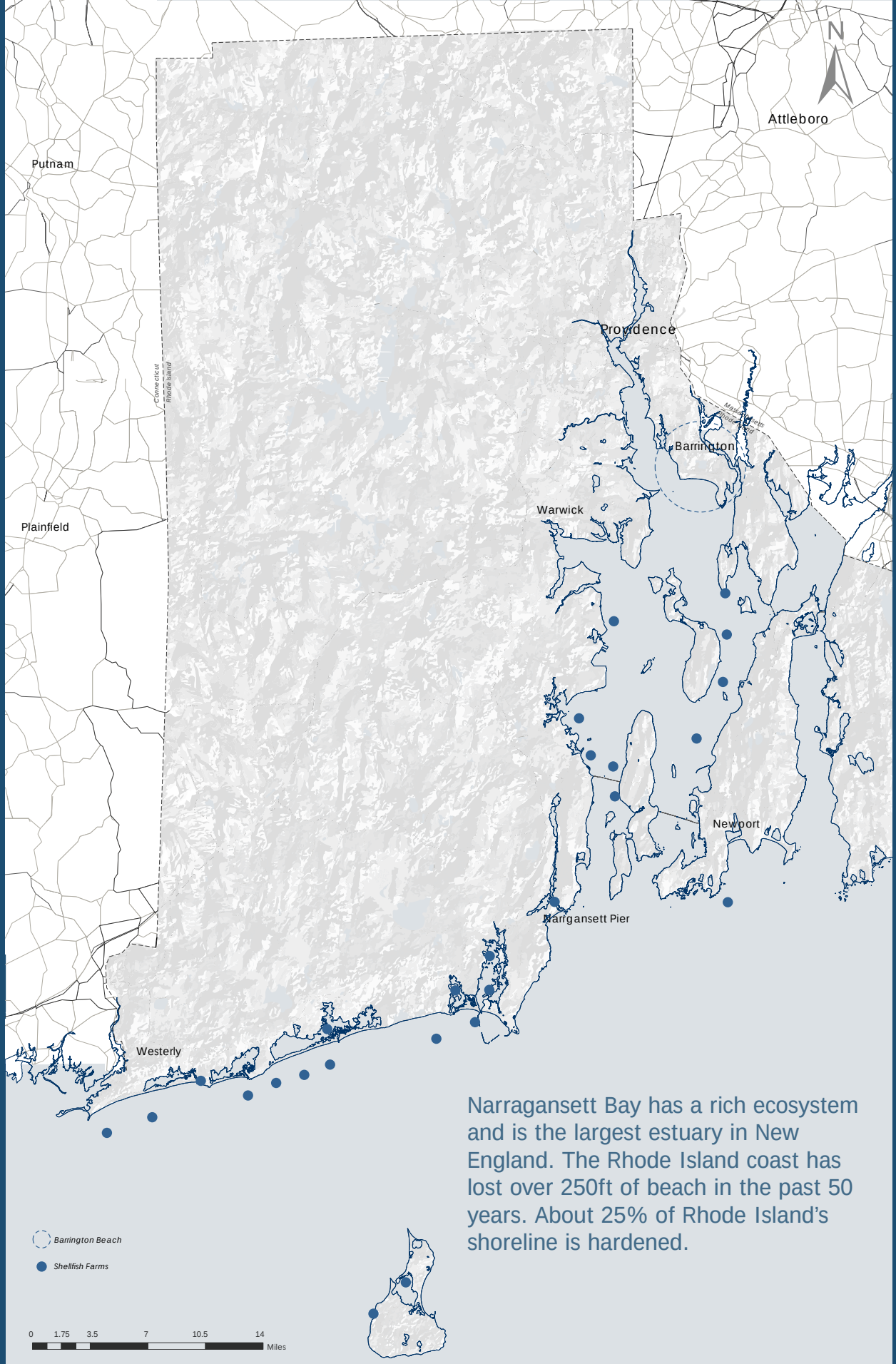


USACE

Duke University Nicholas School of the Enviornment

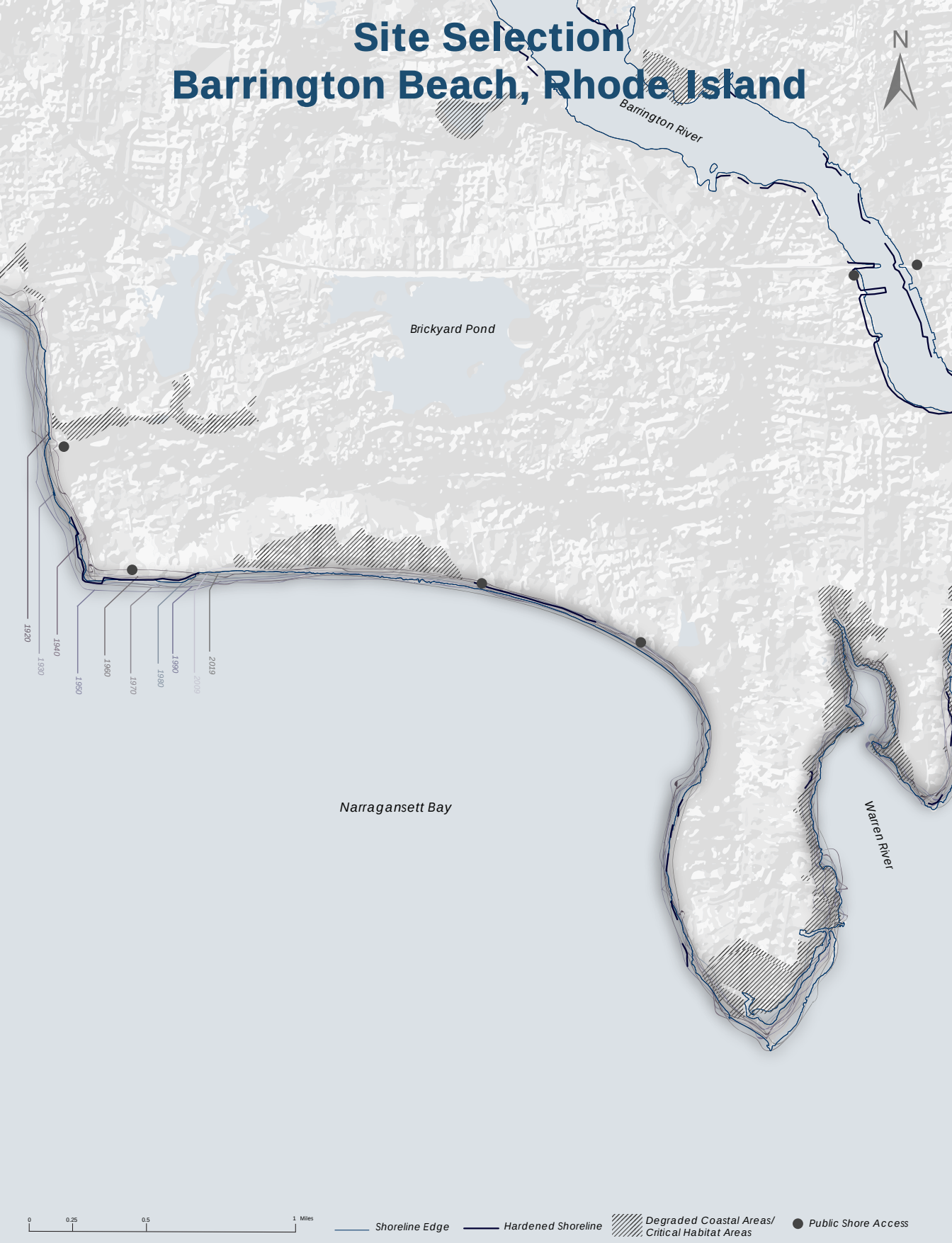
Beach nourishment is considered a soft engineering method, where sand is trucked or pumped from somewhere else, regardless if it is the same sand present on the beach.

Once a beach as been “replenished,” this processs will need to continue in a few years. Sand is a finite resource and this method disrupts coastal habitats. Beaches that are the most viable economically, get replenished, not the areas that are experience high erosion rates. Annually, Congress budgets around $150 million per year for shoreline control measures.



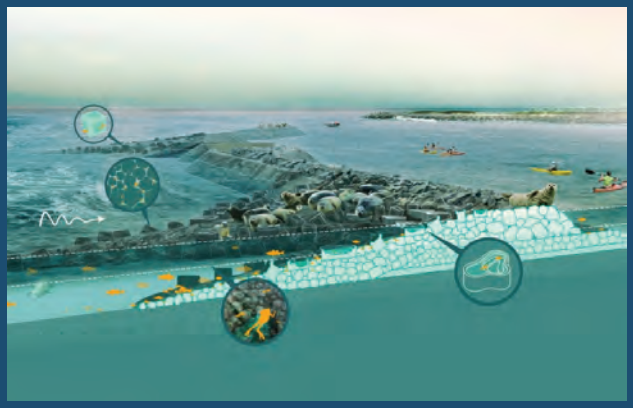
Narragansett Bay has a rich ecosystem and is the largest estuary in New England. The Rhode Island coast has lost over 250ft of beach in the past 50 years. About 25% of Rhode Island's shoreline is hardened.

Site Selection
Barrington Beach, Rhode Island

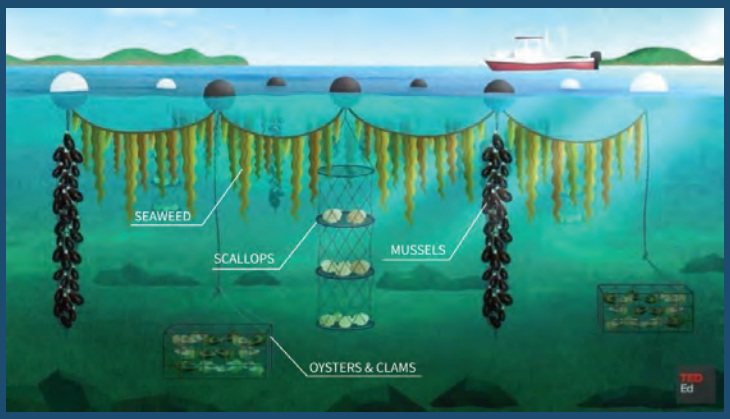


What other assemblies can be applied other than hard infrastructure?

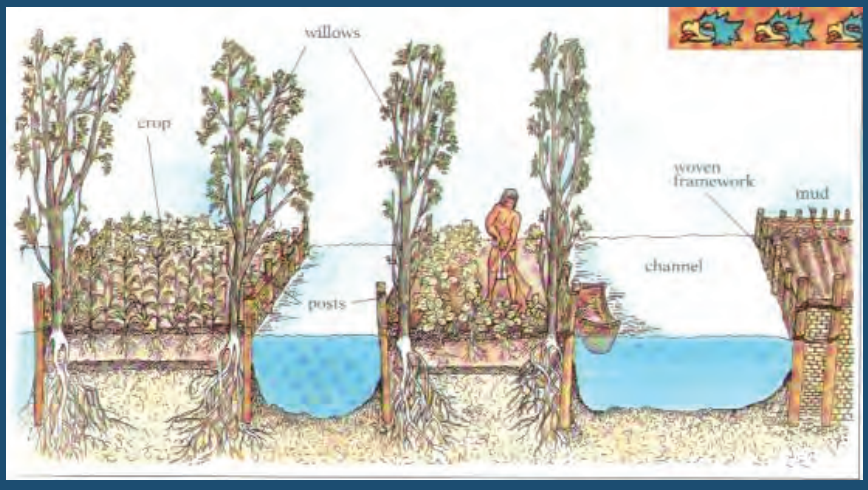
Nature is resilient and working with natural flows can provide insight into softer methods. Some examples include “oyster-tecture” by SCAPE, floating wetlands or gardens, similar to the chinampas in Mexico, and looking at methods used by sustainable green ocean farming.



SCAPE



GreenWave Ocean Farming



Midwest Permaculture, Chinampas

Material Tests and Assemblies

1. Oyster Bar
2. On the Half Shell
3. Lobster Bisque
4. Crab Rangoon

5. I Can't Kelp Myself
6. Green Tide Monster
7. Everything but the Kitchen Sink
8. The World's Your Oyster

1) Oyster Bar
1/4 cup oyster
1 tsp sodium alginate
1/3 cup of water
drizzle of fish glue

2) On the Half Shell
1/4 cup oyster
1/3 cup of water
1 tsp gelatin
1 tsp glycerin
pinch of sand

3) Lobster Bisque
1/4 lobster/crab shell
1/3 cup of water
1 tsp gelatin
1 tsp glycerin
1 tbsp sand

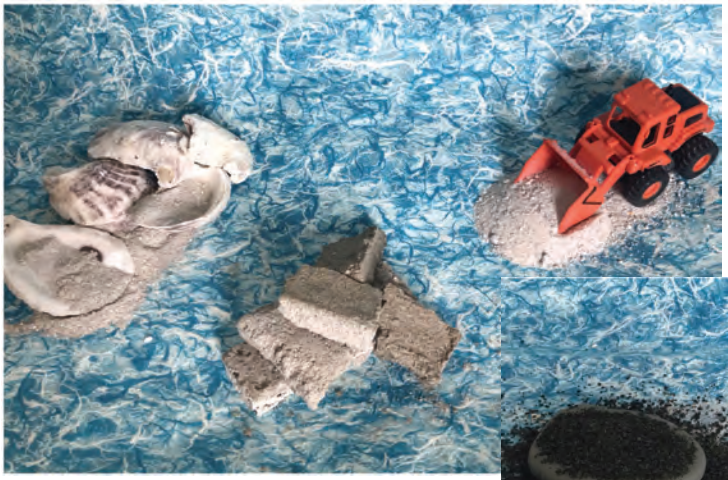
4) Crab Rangoon
1/4 lobster/crab shell
1/3 cup of water
1 tsp sodium alginate
drizzle of fish glue

5) I Can't Kelp Myself
1/4 cup kelp
1/3 cup of water
1 tsp gelatin
1 tsp glycerin

6) Green Tide Monster
1/4 cup kelp
1/3 cup of water
1 tbsp sand
1 tbsp sodium alginate
drizzle of fish glue

7) Everything but the Kitchen Sink
1 tsp oyster shell
1 tsp lobster/crab shell
1 tsp kelp
1 tsp sand
1 tsp sodium alginate
1 tsp gelatin
1 tsp glycerin
1/3 cup water

8) The World's Your Oyster
3 tbsp sand
1/4 cup oyster shell
1/3 cup water

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2012


2015
2018
2019
2021

Source: Biomatrix Water

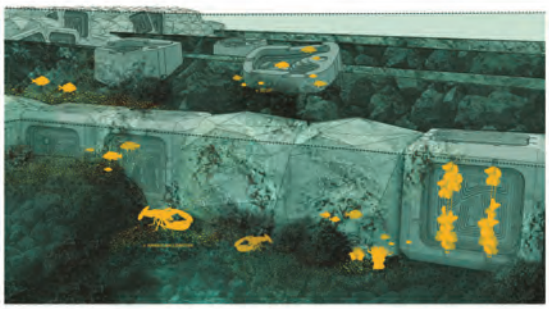
Natural Floatable Materials - Wood-based; Cork

Biodegradable Geotextiles - Coir Fibers

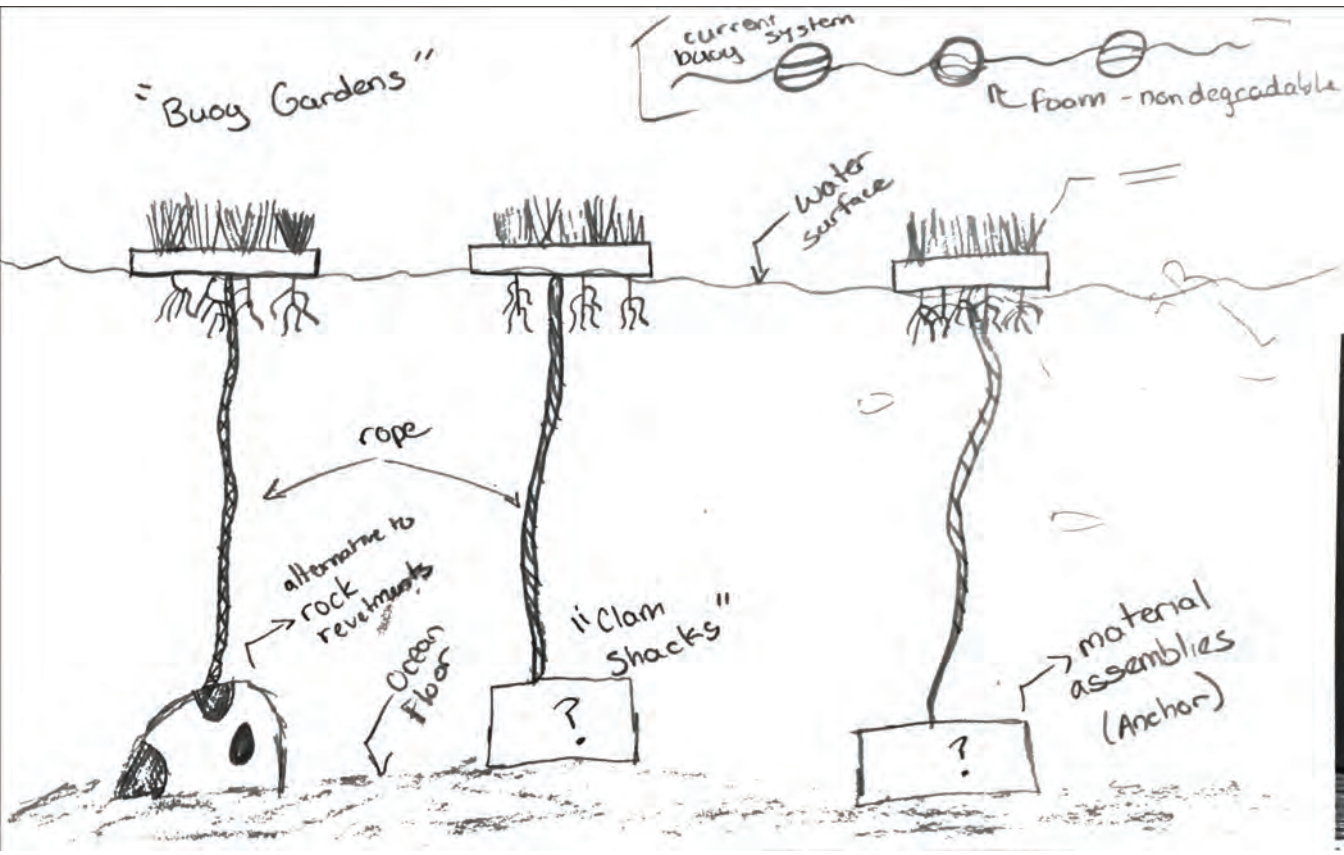
Recycled Materials - Plastic, Boat/Ship

Woven Basket/Coir Fibers/Other Plant Materials/Twine

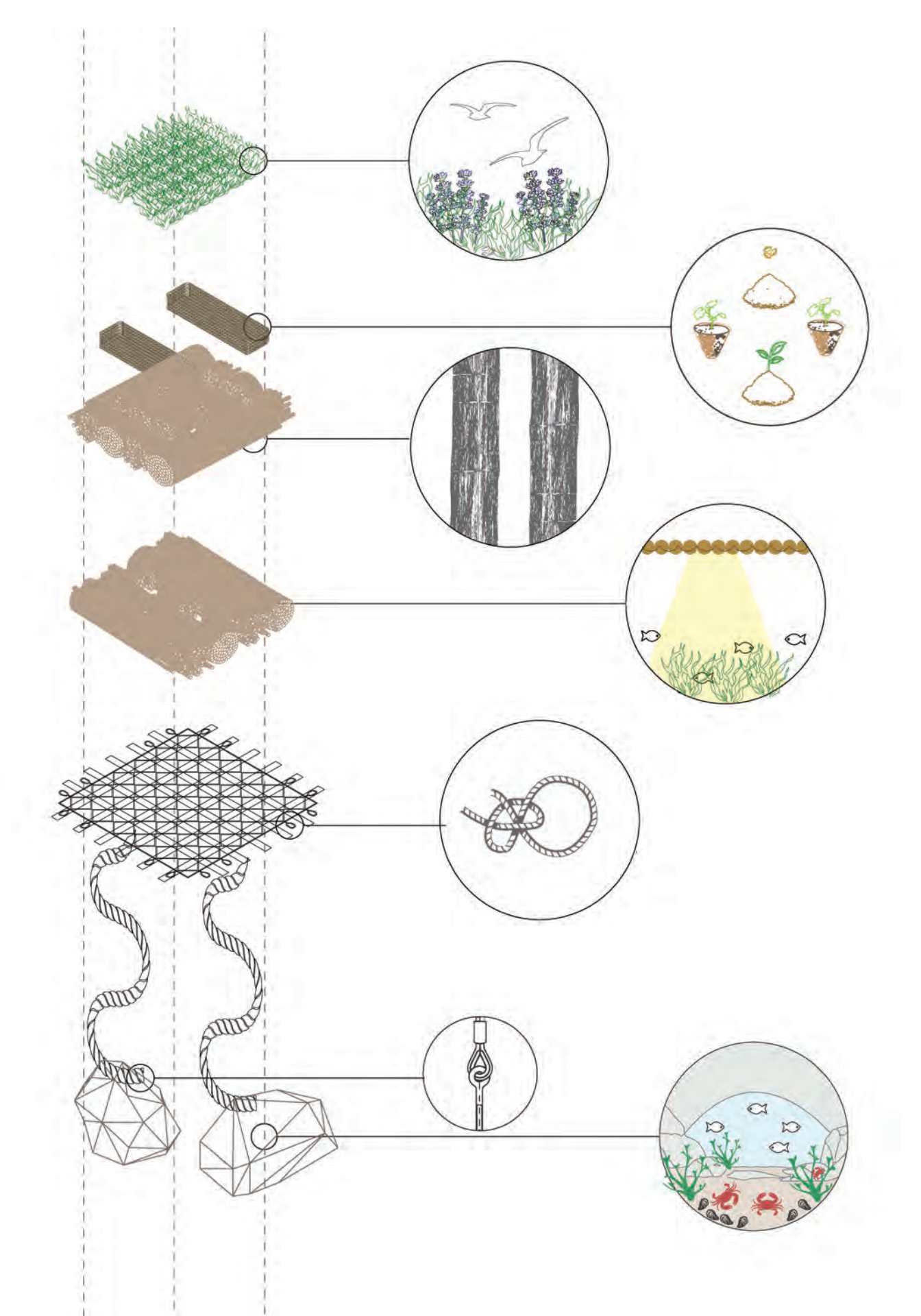
Anchoring System - Materials?; Rope

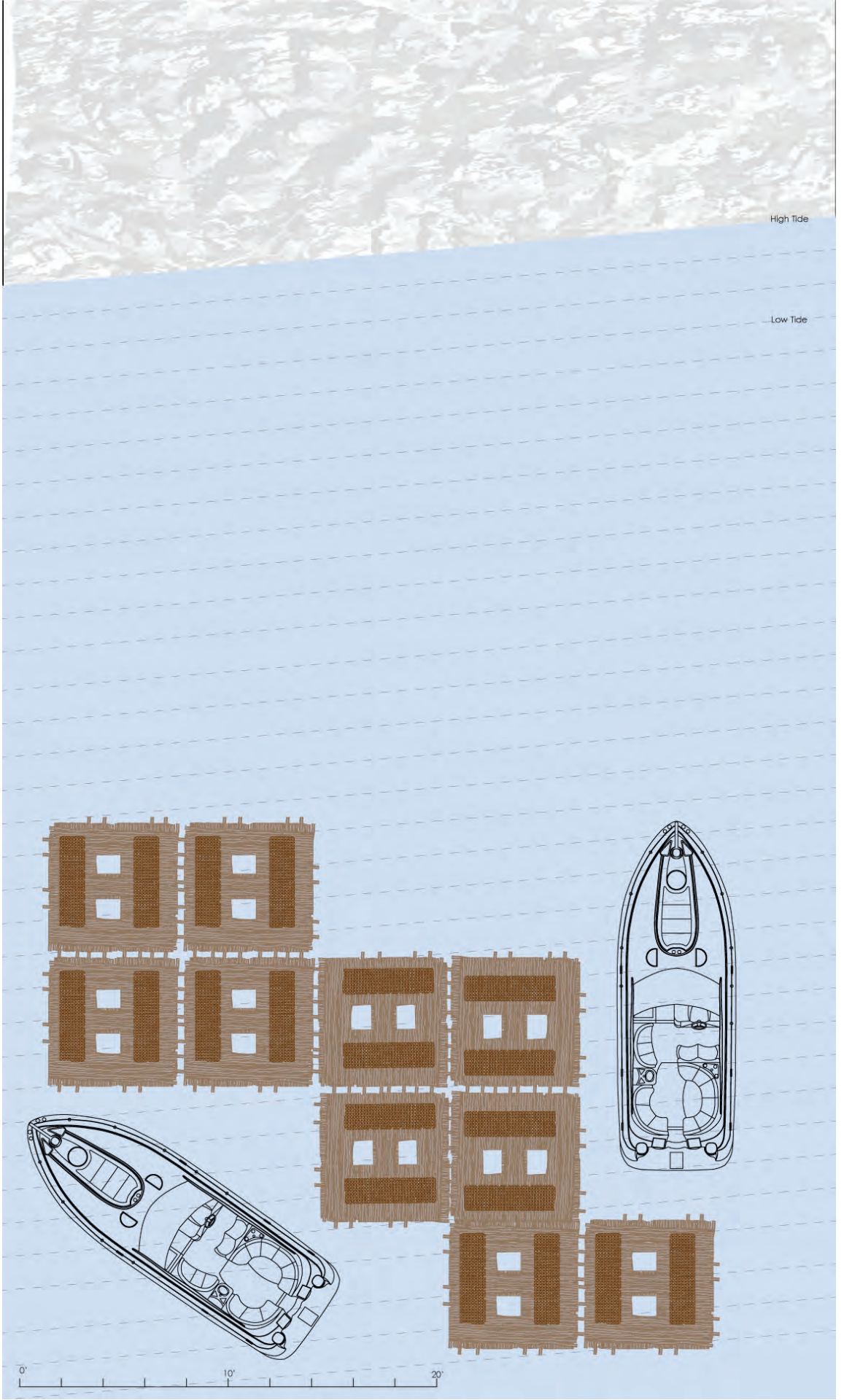


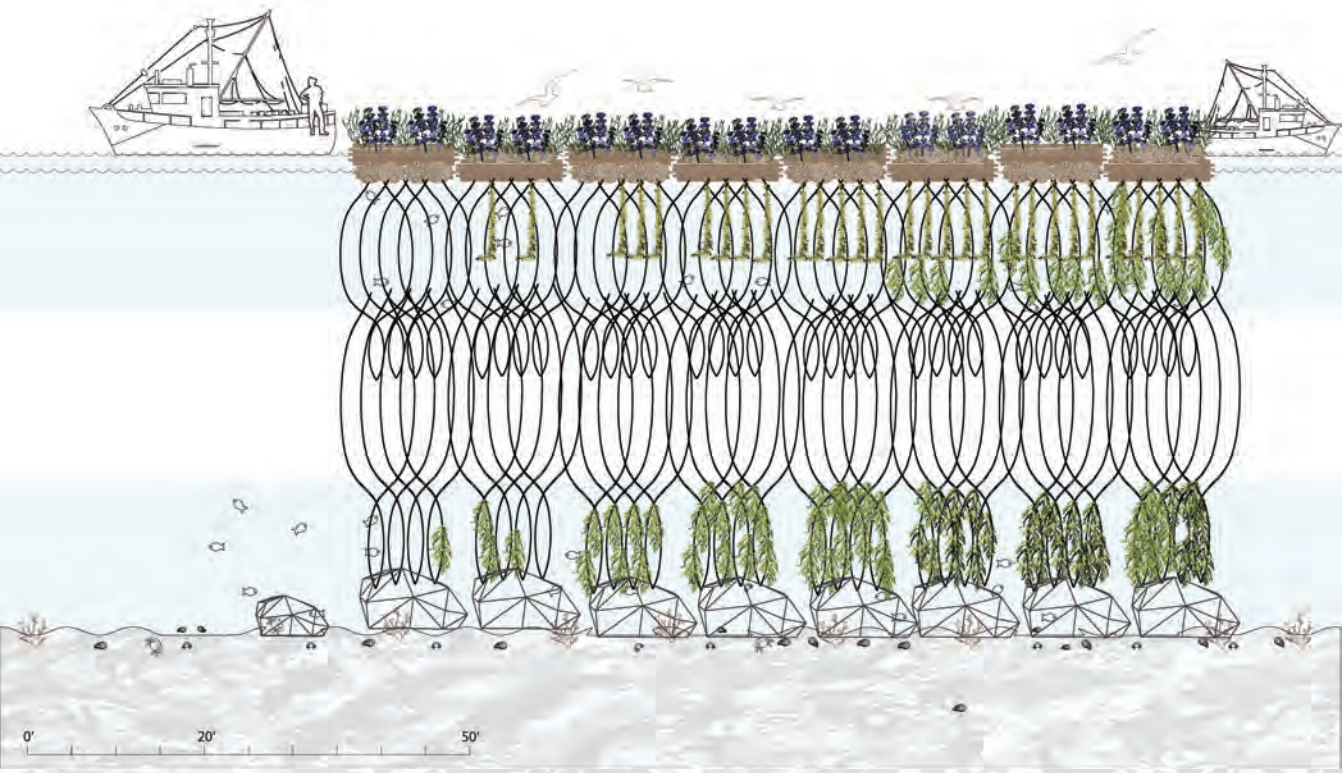
Source: SCAPE and EcoConcrete



initial concept sketch




High Tide
Low Tide
0'
10'
20'


0'
20'
50'