AQUATIC ARCHITECTURE

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Aquatic Architecture

FOR COASTAL CITIES DUE TO RAISING SEA LEVELS
Site: Tybee Island, Ga

Thesis Proposal is Presented to the
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AQUATIC ARCHITECTURE FOR COASTAL CITIES DUE TO RAISING SEA LEVELS
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DEDICATIONS

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CH/01

DESIGN THEOREM

Abstract

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Sea Level Rise

Fall 2021

CH/02

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DESIGN THEORM
Abstract

For centuries, mankind has been building their architectural cities near or around water. It has its advantages such as transportation, convenience for the trade routes and water survival. As the earth gets hotter every year and the ice glaciers continue to melt, the ocean sea levels will continue to rise.

Assuming that the projected sea water levels for 2050 are correct, 95% of coastal cities around the world are at risk from rising sea levels and unpredictable storm surges. The coastal cities are going to have to adapt and change its way of thinking with the encroachment of the sea. Rather than simply build higher seawalls to hold back the floodwaters, some architects and urban planners are turning to floating and amphibious architecture and finding ways to adapt buildings to this new reality. In the United States, almost 40 percent of the population lives in relatively high populated-density coastal areas. By the year 2050 it is predicted that the entire eastern coast of the United States will be almost underwater.

Thesis Statement

This thesis will explore a model of a self-reliant, modular sustainable floating home which will enable people to survive the rising sea levels. This proposal is for the coastal city of Tybee Island in Georgia. With the models of the projected sea levels for 2050, it will put this entire area underwater. This thesis design is not just a solution for sustainable living on the water but also by duplicating its concept, and strategic placement, you can create a floating community that can still function regardless of water levels. In an inevitable future of rising sea levels and the climate changing, it is a form of an adaptation strategy for urban coastal areas that would allow communities to continue in what we call Salty Urbanism.
Floating structures have been around for a long time. People have been living on houseboats for centuries in cities like Amsterdam, while in Hong Kong, thousands of people lived in massive floating villages as recently as the 1970s. Even today, the flying eaves and sultry neon of that city’s Jumbo Floating Restaurant evoke a particular kind of romance. Water has always promised a sort of freedom, too. A libertarian organisation called the Seasteading Institute is currently working on plans for autonomous floating cities that would roam international waters, allowing them to experiment with new forms of governance. In a world beset by rising sea levels, where technology and human behaviour seems to be changing faster than ever, a growing number of architects believe floating architecture could change the way we live. The global history of floating houses is very complex. The technique and architecture of these buildings all over the world depend on the climate boundary conditions, the culture and the raw materials that were available at the different local places. In Europe the historical situation is relatively simple: At the beginning there were houseboats, which in many cases were originally used as barges.
PRECEDENTS
I choose this precedent because the Dutch who have been faced with rising sea levels have been designing and building floating homes for decades. The floating communities in the Netherlands have served as proof that the concept of floating architecture can withstand climate change. Living on water is normal for them.
Little Island

Location: New York City
Project Date: May 2021
Type: Floating

This precedent even though it’s a commercial project, clearly demonstrates how a building can be structurally supported being constructed on water. It exists on 2.3 acres on the Hudson river west of Manhattan in New York City. It consists of 132 pot-shaped structure called Tulips suspended above the water that stands on 280 concrete pilings extending into the river bed. They call it a Floating Oasis.
Another project by the Dutch in the Netherlands demonstrates how they have design buildings to float. The basements are constructed with a light weigh concrete material with hollow walls, with Buoyant concrete tubes filled with Styrofoam, that allows the structure to float.
MAKOKO FLOATING SCHOOL

Location: Lagos, Nigeria
Project Date: May 2013
Type: Floating

This precedent was chosen to demonstrate how a building can float on barrels. It’s a floating school, constructed using different triangular shapes.
PROGRAM DISTRIBUTION

1. Flotation Platform
2. Services Area
3. Accessibility
4. Open Green Space
5. Planting Areas
6. Toilet
7. Classrooms
8. Open Air Classrooms
SITE SELECTION
History of Site

Most historians believe “Tybee” derives from the Native American Euchee Indian word for “salt” which was one of many natural resources found on Tybee. Spanish explorers searching for riches in the New World in 1520, laid claim to Tybee Island as part of Spain’s “La Florida”, an area that extended from the Bahamas to Nova Scotia.

In 1605, the French came to Tybee in search of Sassafras roots, which were considered to be a miracle cure at that time. The Spanish fought the French in a naval battle just off shore of Tybee to regain control over the area and for many decades later, pirates visited the island in search of a safe haven and hiding place for treasure.

Tybee was extremely important because of its location at the mouth of the Savannah River. In 1736, Oglethorpe had a lighthouse and small fort constructed here to ensure control of river access. During the Revolutionary War, Tybee was the staging area for French Admiral D’Estaing’s ill-fated 1779 “Siege of Savannah”, when combined multinational forces attempted to defeat the British held Savannah. During the War of 1812, the Tybee Island Lighthouse was used to signal Savannah of possible attack by the British. Though no such attack took place, a “Martello Tower” was constructed on Tybee to provide protection in guarding the Savannah River. By the outbreak of the American Civil War, Tybee would again play an important military role in U.S. history. First Confederates soldiers occupied the Island. In December of 1861, the Rebel forces would withdraw to Fort Pulaski under orders from Robert E. Lee to defend Savannah and the Savannah River. Union forces under the Command of Quincy Adams Gilmore took control of Tybee and began constructing cannon batteries on the west side of Tybee facing Fort Pulaski about one mile away. On April 11th, 1862, those cannon batteries would fire a new weapon called “Rifled Cannon” at Fort Pulaski and change forever the way the world protected its coastal areas. Within 30 hours, the rifled guns had such a devastating effect on the brick fort that it was surrendered and all forts like Pulaski were considered obsolete.

After the Civil War, Tybee began to grow as a resort area for local Savannah residents who wanted to escape the heat of downtown for the cooling breezes of Tybee Island. There were very few years around residents before the 1870’s but by the 1890’s there were over 400 beach cottages and other buildings built for the “summer” residents.

In 1855, Fort Screven was ordered built on the North end of Tybee to provide a more modern system of seacoast defenses. Six poured concrete low profile gun batteries and a minefield were ordered for Tybee along with hundreds of other military buildings. Gun Batteries, such as Battery Garland would be named to honor America’s war heroes. From 1897 to 1947, Fort Screven would be an integral part of America’s Coastal Defense system. Troops would train and stand guard on Tybee through the Spanish American War of 1898, World War I, and World War II. In 1947, the Fort was closed and sold to the Town of Tybee and Tourism returned as a major part of Tybee history.
Tybee Island Water Levels
SITE ANALYSIS

FIGURE GROUND

MAJOR ROADS
Propose Model

This is the sustainable modular architectural model described in the thesis statement. It is designed and constructed using the technology that we get from the Dutch in the Netherlands. It consists of two sections, the water flotation device (which is actually the basement level of the unit) and the housing section.

The materiality of the model also consists of two different sections. The lower level that sits and floats in the water is constructed of a light weight buoyant concrete material, where its walls are hollowed and filled with tubes of Styrofoam. The upper levels are made of multi-layers of extra strength fiberglass, wood and glass walls.

The units are modular, so they can be constructed according to specifications. They can be design with just one level, two or three levels depending on the sizes of the family in need. They then can be duplicated and strategically placed to form a close shaped floating community with its own municipal buildings and hospital. Then the entire floating city can be recreated over and over.
1. Photovaltaic
2. Roof Garden
3. Rain Water Collection
4. Food Garden
5. Floatation Device
6. Sea Farming
Tybee Island

Flotation Device

Floating Device

Farm-
Purpose Future Floating City

1 Medical Center
2 Food Market
3 Entertainment
4 Water Desalination System
5 School
6 Library/Media Center
7 Waste Treatment
Annotated Bibliography

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