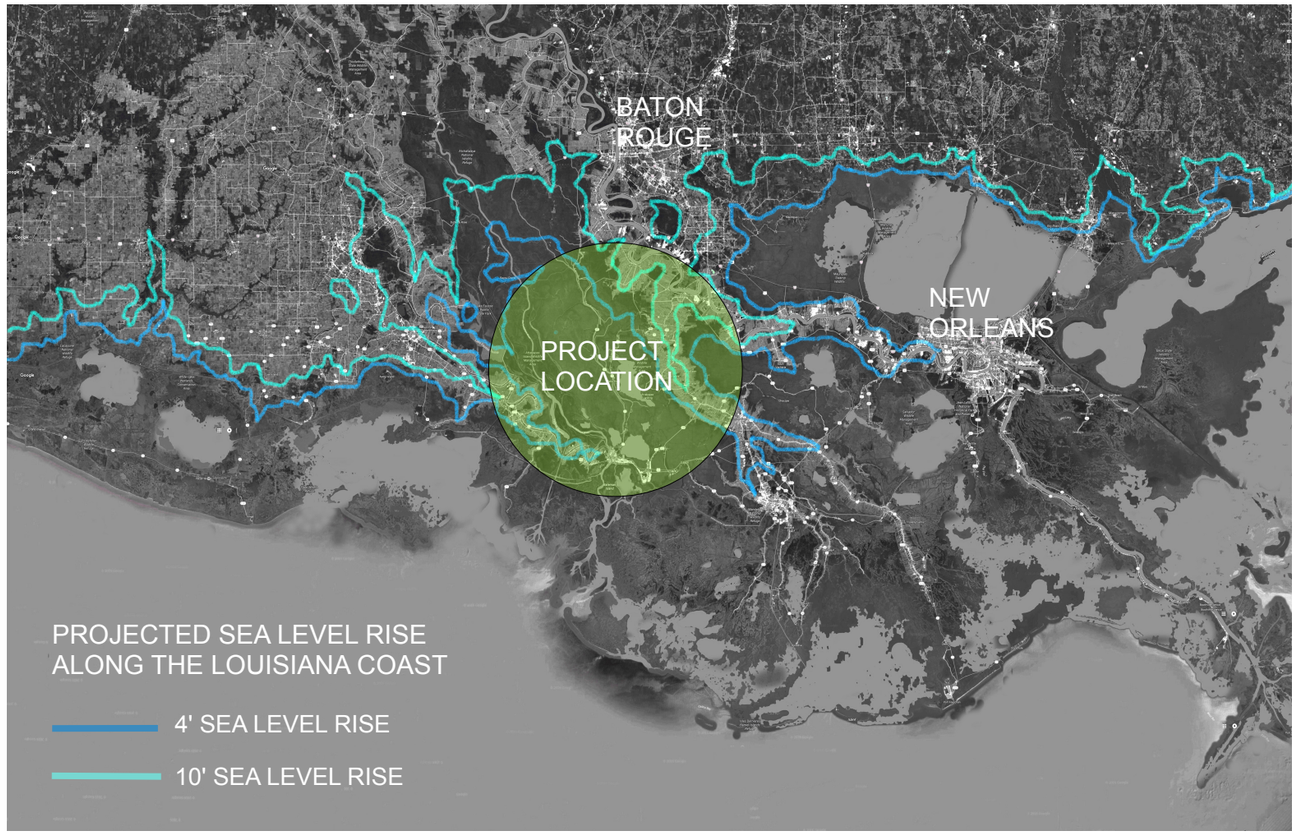


THE PROBLEM

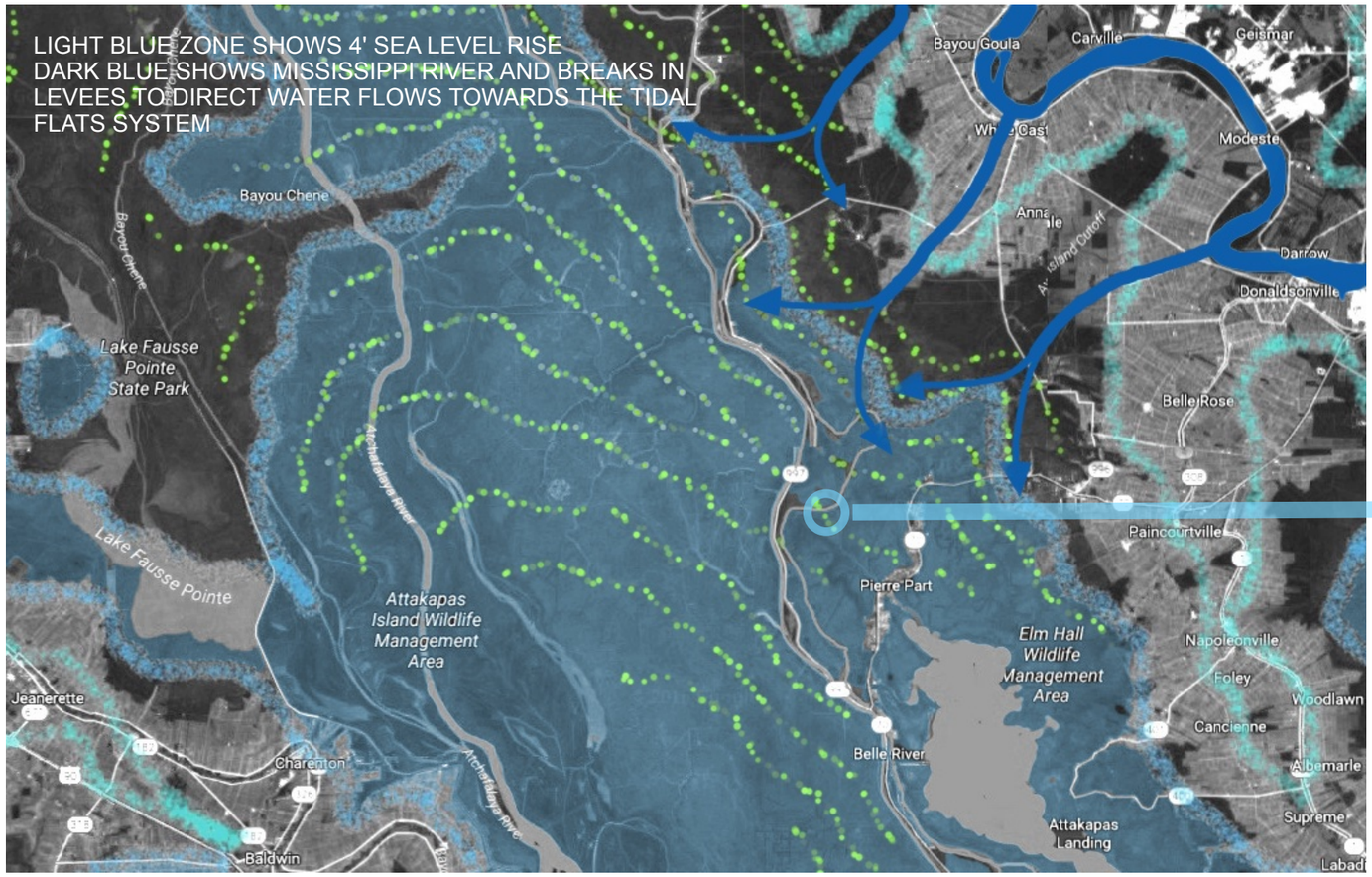
A large percent of the coastal wetlands in the United States are found in the Mississippi River Delta of Louisiana. Since the 1930s, the state has lost about 25% of its coastal wetlands. The blame is twofold: the climate and humans.

The warming climate is causing more extreme hurricanes that cause greater flooding and erosion. It is causing rising sea levels that submerging the wetlands. Humans, on the other hand, have been excessively engineering the Mississippi River and its floodplain, specifically the region west of Baton Rouge and New Orleans (shown on aerial map) with channels and levees since the 1930s. As a result, sediment loads from the Mississippi have not been allowed to accumulate across the floodplain to offset erosion and build up the land to slow the advance of rising sea levels. Compounding the problems matters worse, wetlands continue to be drained to create more dry land.

Besides losing its land, there is a greater problem. As sea levels rise, estuaries of the coatal wetlands that serve as the buffer between ocean waters and inland waters and as the nursery for countless species of aquatic and bird species will be submerged. If inland wetlands back up these estuaries, then a relatively effortless transition to new estuaries should occur. As the inland wetlands become estuaries, then the naturally occuring, adjacent braided or anastomosing rivers should transition into new inland wetlands. However, if the hydrogical systems have been manipulated by humans with channels and levees, then complete transitions may not only be delayed, they may not even happen, especially if humans continue to fight the changes. Regions and associated cities will lose the productiveness of their estuaries and suffer from increased flooding and erosion.

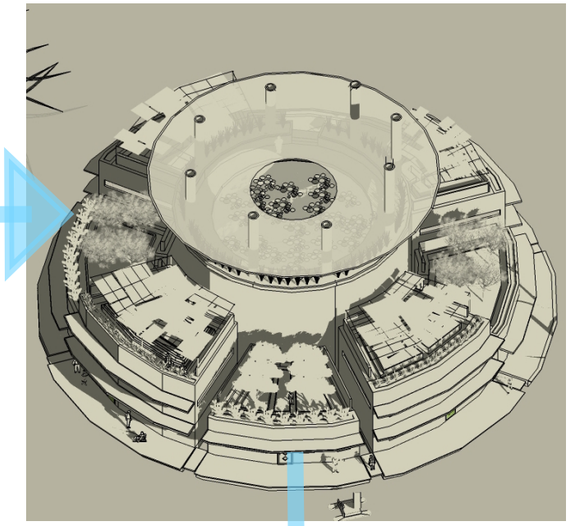
The 2012 Coastal Master Plan for the Louisiana coast plans to preserve and expand existing coastal wetlands by fighting rising sea levels. According to the Environmental Defense Fund, "One of the principal guidelines for restoration under the Coastal Master Plan is to address the root causes of land loss by using the natural power of the Mississippi River to build land at a large scale." Although this plan will be effective for the first foot or two of sea level rise and will surely strength the coastal region, by the time the levels rise to 4', 10' and possibly 23', the current coastal wetlands and their accompanying estuaries will be underwater. Making matters worse, tens of thousands of coastal people will be displaced. Almost half of the population of Louisiana lives along the coast and most are tied farming the sea and coast. Tidal Flats is a solution that will adapt to changing coastal wetlands as well as accomodate the coastal people of Louisiana.

"We need to stop slicing and dicing coastal wetlands with canals and industrial infrastructure. We need to set up a structure of state and federal agencies with the authority to end the bureaucratic turf wars that have left some restoration efforts in limbo for years." the Audubon Society



THE CONCEPT

The Tidal Flats System will solve the multitude of problems that will result when sea levels rise with a low cost, low impact approach that allows the land to regenerate itself and adapt to the natural progression of ecosystem changes that will occur. An integral part of this system is a series of Tidal Flats that will provide live-work communities for displace coastal people that will become stewards of the new coastal wetlands.



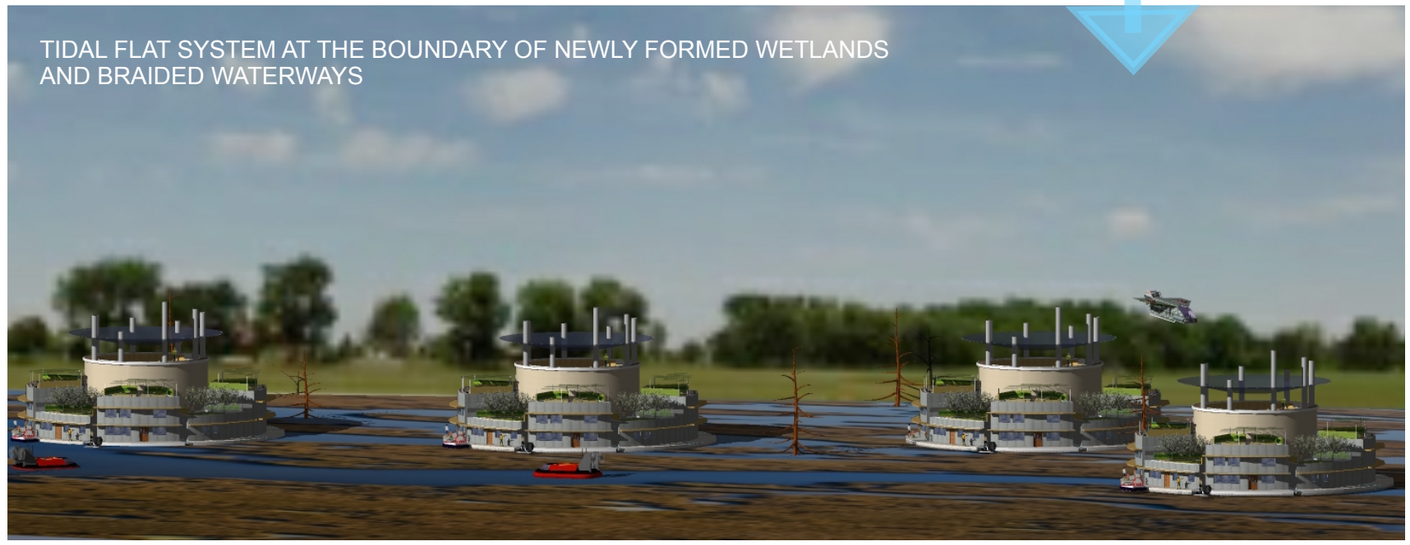
"Contour brush filters spread concentrated flow like the veins of a leaf spread water from the mid rib out to the entire leaf landscape...to help the properties regenerate for decades to come." Bryan Hummel, aquifer recharge specialist in San Antonio, Texas

THE CONTOUR SOLUTION

Although current efforts are focused on spreading sediments along the coast, the Tidal Flats system will be installed further inland to prepare the inlands and coastal peopple for the rising sea levels. The aerial map shows the system near the 4' contour.

The Tidal Flats are communal, adaptable, low cost live-work units. They will be installed following existing contours, starting at about 3' above current sea level. At least 40' will be allocated between each unit. This gap will be filled with low berms backed with shallow swales on contour using earth or cut brush. Often called "beaver dams" these contour berms will mimic at a large scale what beavers do at the small scale. The incorporated Tidal Flats will add strength to the berms.

Deeper depressions will be constructed to connect existing channels and increase the infiltration potential. When contour sections of the Tidal Flats system are complete, breaks will be cut in the Mississippi River levees to direct sediment ladened waters towards the Tidal Flats System. As overland flood waters reach the system, sediments will disperse and drop as the waters will fan out to form new wetlands and braided rivers.

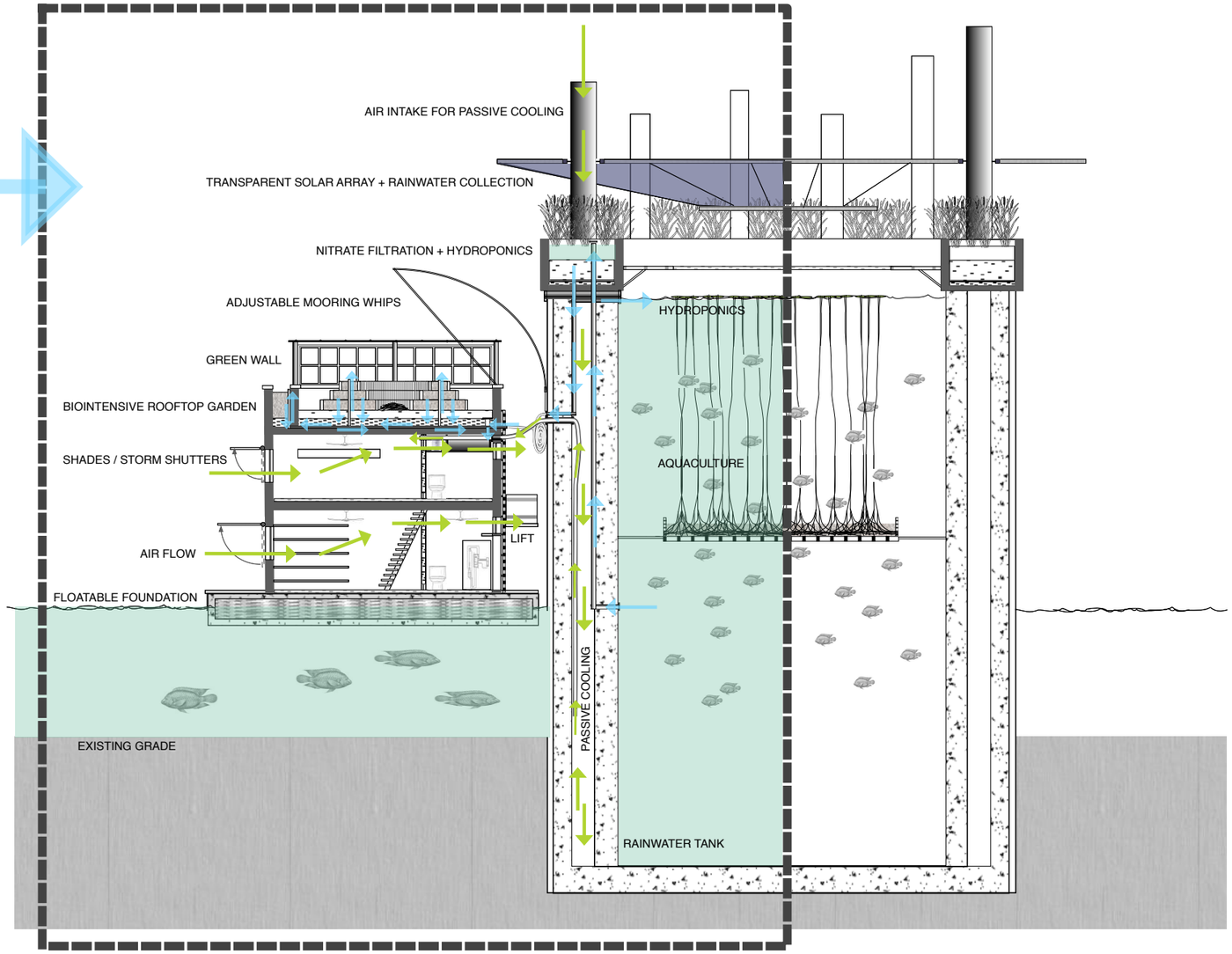


FLATS FUNCTION

To reduce reliance on land resources, flats were designed to be self-sustaining and multi-functional.

Structural Form : The intent was to design a form that was modular and simple so as to keep the project affordable and to continue the life of simplicity most farm people embrace. To deflect the impacts of storm surges and high winds, the design used convex surfaces. The awnings that provide shade to the windows and perimeter walkway were designed to be closed during storms to protect the windows and occupants.

Building Materials: Each flat will be prefabricated using autoclaved, aerated concrete for lightness, energy efficiency, resiliency and reduction of construction materials and labor. To further increase energy efficiency, each flat will get electric tankless water heaters and Einstein–Szilard absorption refrigerators. Each flat will be secured to a modular, recycled plastic dock to create a floatable foundationthat will start on dry land, then allow the Tidal Flats to rise and fall with tidal flows, storm surges and rising sea levels. The flats will be linked to one another around a central rainwater tank and attached to the tank with height adjustable mooring whips. The central rainwater tank will be constructed of a double hull concrete tank with a protective, exterior fiberglass skin. Around the top of each tank, a series of stainless steel pipes will provide air intake and support the solar array/rainwater collection system.



System Layout
The transparent solar array was designed as a funnel to capture rainwater and direct it into the central tank. The water will support aquaponics, rooftop garden irrigation and household use. For the aquaponics, freshwater fish will be raised in the tank. A covering of pond lilies will reduce evaporation and remove nitrates. The water will be circulated through the rim planters, planted with edible, water loving plants, around the tank to further filter and aerate the water. Filtered water will return to the tank or be diverted for rooftop farm irrigation or household use through flexible industrial grade tubing. As water percolates through the rooftop garden, it will be ozone oxidized for household use. Unused water will be stored in a small household tank and a tankless water heater will eliminate the need for maintenance of heated water. Gray water will be recirculated for cleansing and reuse.

Since the Tidal Flats will ultimately be surrounded with water, it was vital to manage biosolids on site. Toilets that sanitize and reduce the waste eliminate the chance for contamination and operational issues. Tidal Flats can be altered to support composting centers where sanitized biosolids can be collected for proper processing and reuse.

When temperatures are cool, air will be directed through the windows, through the interior walls openings and out through the back windows. When the temperatures are hotter, fresh air will be pulled in through the large pipes that support the solar array. The air will move through the space between the double concrete tanks to passively cool the air before it is directed through industrial grade, flexible tubing into the flats. The tubing will slide in and out of this interspace, sealed with silicon membranes, to allow for the rise and fall of water levels. The flats will be kept warm in winter via an in floor heating system.