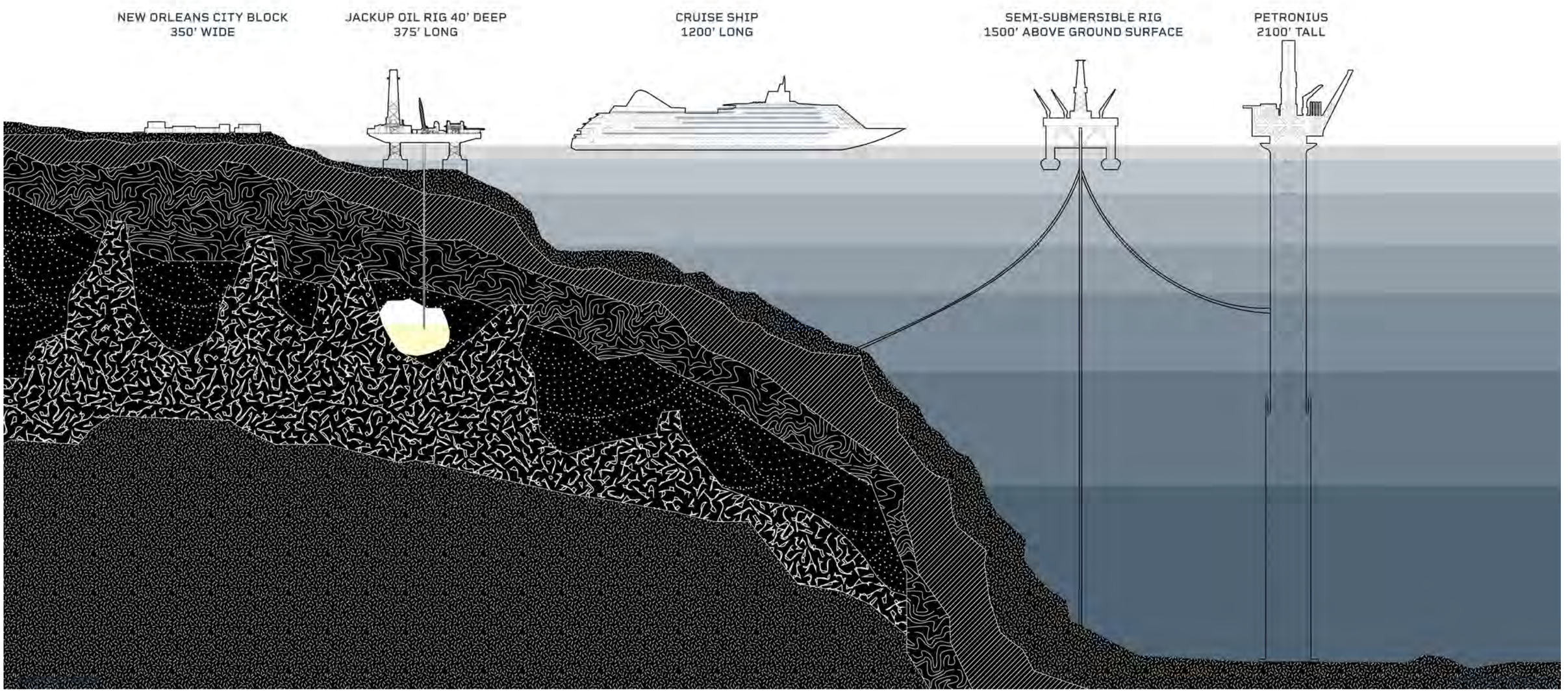
UNDERSTANDING THE SCALE



Country /City Cocodrie, Louisiana

University / School Tulane University School of Architecture

Academic year 2022-2023

Title of the project Towards Horizontality: Selective Re-purposing of Rig Infrastructure to Support Gulf Coast Fishing Cultures

Authors Karan Sharma '23

TECHNICAL DOSSIER

Title of the project Towards Horizontality: Selective Re-purposing of Rig Infrastructure to Support Gulf Coast Fishing Cultures

Authors Karan Sharma '23

Title of the course Gulf Design Research Studio Pilot: Climate Futures

Academic year 2022-2023

Teaching Staff Prof. Margarita Jover and Prof. Liz Camuti

Department / Section / Program of belonging Landscape Architecture Department / School of Architecture

University / School Tulane University School of Architecture

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Written statement, short description of the project in English, no more than 250 words

The fishing communities of Louisiana have occupied the rivers, marshes, swamps, and open waters of the Gulf of Mexico for multiple generations. However, in recent decades, these rivers have become unfit for fishing because of human occupation and the introduction of chemicals. Meanwhile, the levee infrastructure designed to protect the mainland has prevented sediment deposits to the barrier islands, resulting in soil erosion, the loss of these barrier islands, and saltwater intrusion. As such, the struggles of the already difficult and dangerous profession of fishing are further exacerbated by the uncertainty of climate change. With the discovery of oil and gas, the marshes and swamps were torn apart to make room for oil pipelines and navigation channels. In the wake of climate change and the general acceptance of new forms of energy, we can move away from the reliance on the oil and gas industry. The existing oil and gas infrastructure can thus be repurposed to create and maintain artificial fish reefs, offer a space of refuge and congregation for fishermen, and provide emergency shelter during hurricanes and storms. An area spanning from Cocodrie to 50 miles south in the Gulf of Mexico is examined to test the feasibility of repurposing the existing oil rig infrastructure. The design aims to create spaces that improve the safety of the fishermen, cultivate areas of fish concentration, and provide opportunities for the restoration of the Gulf coast.

For further information

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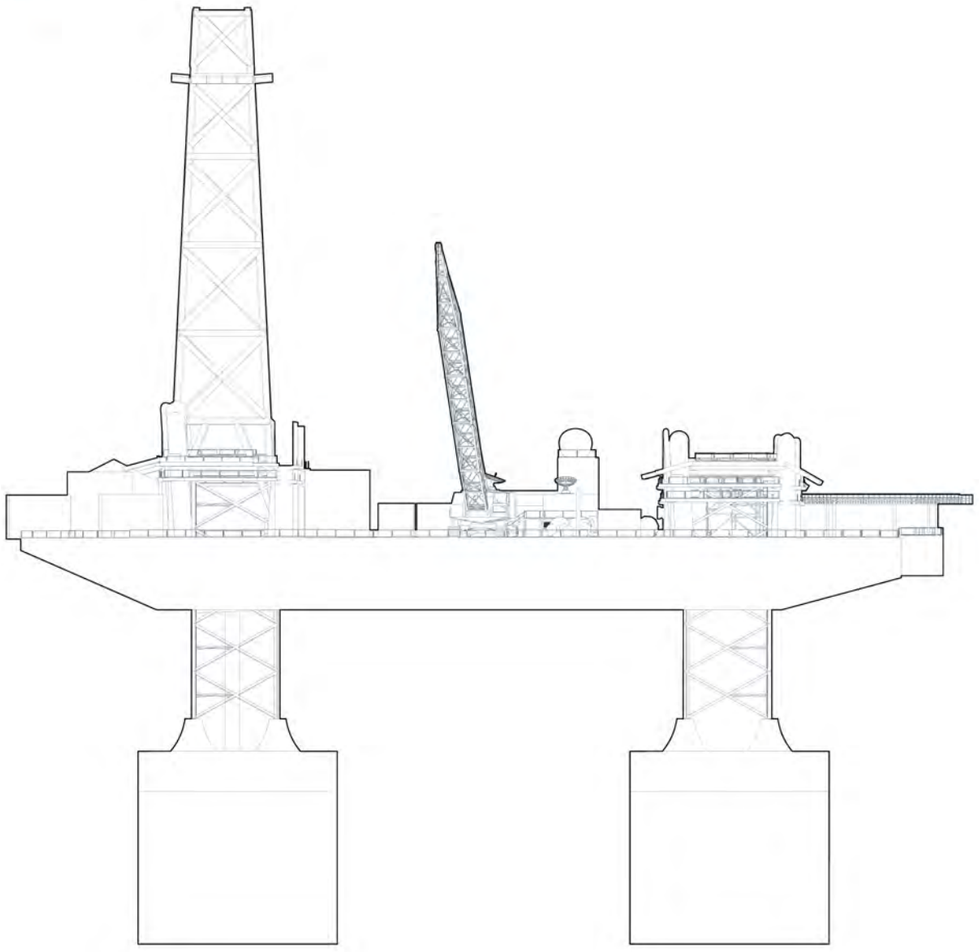
12th International Biennal Landscape Barcelona

Barcelona **November 2023**

SCHOOL PRIZE



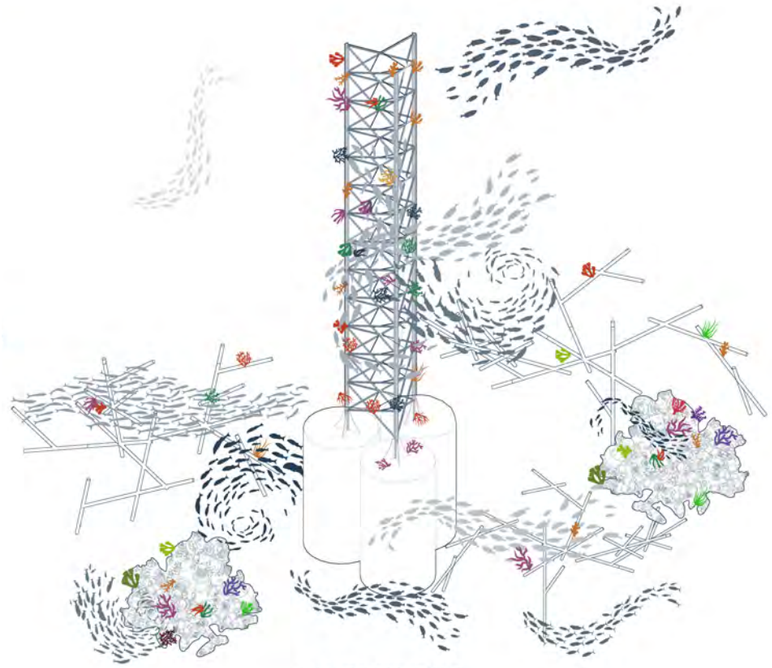
DRILL BITS
MULTIPLE DRILL BITS CAN BE FOUND IN AN OIL RIG, THESE BITS ARE CONSTANTLY BREAKING AND COME IN VARIOUS SHAPES, TYPES, AND FORM. THEY PROVIDE AN EXCELLENT COMBINATION OF DIFFERENT VOLUMES AND HAVE A HUGE POTENTIAL FOR BEING USED IN THE CONSTRUCTION OF A REEF.

DRILLING AND OIL PIPES
OIL RIGS ARE FULL OF PIPES, VARYING FROM A SIZE OF 18' TO UP TO 31' LONG. THE PIPES CAN BE SALVAGED AND RE-USED FOR REEF CONSTRUCTION.

METAL SHEETS AND MESHES
EXTERIOR FLOOR SURFACES ON AN OIL RIG ARE CONSTRUCTED USING METAL MESH AND SHEETS. THESE SURFACES CAN BE RE-PURPOSED FOR NEW CONSTRUCTION OR FOR CREATING THE CONTAINING STRUCTURE FOR REEF WALLS.

STRUCTURAL SECTIONS
DRILLING STRUCTURES CAN BE SALVAGED TO GAIN STRUCTURAL SECTIONS AND MEMBERS WHICH CAN BE RE-PURPOSED ON THE SAME/ DIFFERENT SITE.

CONSTRUCTION MATERIAL
PLYWOOD, PRE-BUILT BEDROOMS, COMMON SPACES, ETC. CAN BE RE-PURPOSED FROM THE EXISTING OIL RIGS.



A NEW REEF IS FORMED

ARTIFICIAL REEFS AND THEIR PLACEMENT- GUIDELINE

AS CORAL REEFS ARE DESTROYED THE COMMUNITIES LIVING IN THE COASTAL AREA SUFFER FIRST FROM DEPLETION OF FISH STOCKS. THE SHORELINES,WHERE THEIR HOUSES AND BUSINESSES ARE AND WHERE BOATS ARE MOORED, ALSO SUFFER, AS THEY ARE NO LONGER PROTECTED FROM THE SEA BY THE REEF. ONE PART OF A SOLUTION COULD BE FOR THE COMMUNITY TO BUILD ARTIFICIAL REEFS. IT TAKES MANY YEARS FOR THE CORAL THAT MAKES UP THE STRUCTURE OF A REEF TO GROW, BUT USING A COMBINATION OF TECHNIQUES THIS PROCESS CAN BE MADE MUCH MORE EFFECTIVE.

GATHERING MATERIALS
↓
DESIGN
↓
CONSTRUCTION
↓
PLACEMENT
↓
ARTIFICIAL REEF

DESIGN AND CONSTRUCTION

VARIETY

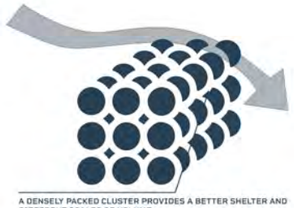
IT IS IMPORTANT WHEN CONSTRUCTING THE REEF TO PROVIDE AS MUCH DIVERSITY OF HABITAT AS POSSIBLE, AS THIS ENCOURAGES THE GREATEST DIVERSITY OF SPECIES. THE GREATER THE BIODIVERSITY LIVING ON THE REEF, THE HEALTHIER THE REEF WILL BE. USE MANY DIFFERENT TYPES OF MODULES, OF VARIOUS SCALES, VOLUMES, MATERIALS, AND TEXTURES.

A VARIETY OF SHAPES AND FORMS RESULT IN A VARIETY OF VOLUMES BEING FORMED. MAKING A MORE DIVERSE ENVIRONMENT.

CLUSTERS

IT IS IMPORTANT TO CLUSTER PLENTY OF MATERIAL TOGETHER DENSELY; THE MORE THE BETTER. VERY DISPERSED MATERIALS WILL NOT BE COLONIZED SUCCESSFULLY, AND WILL ONLY BE WASTED.

ORIENTATION OF THE CLUSTERS IS ALSO IMPORTANT. LINE STRUCTURES OR CLUSTERS SHOULD BE PLACED SO THAT THEY ARE ACROSS THE CURRENT. THIS PROVIDES A SHELTERED ENVIRONMENT FOR SMALLER FISH, AND A 'STANDING WAVE' ABOVE THE REEF, WHICH THROWS UP FOOD FOR A VARIETY OF SPECIES.



A DENSELY PACKED CLUSTER PROVIDES A BETTER SHELTER AND DIFFERENT SCALES OF VOLUME.

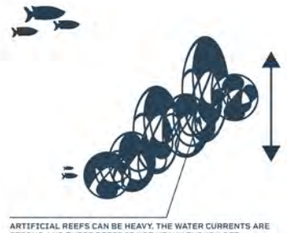
CREVICES

ENSURE THAT THE REEF THAT YOU ARE CREATING HAS PLENTY OF HOLES AND CREVICES TO PROVIDE REFUGE AND SHELTER FROM PREDATORS AND CURRENTS. VARIETY OF SIZE, DENSITY, AND ORIENTATION OF THE CREVICES IS IMPORTANT, AS THEY WILL SHELTER A WIDER VARIETY OF CREATURES.

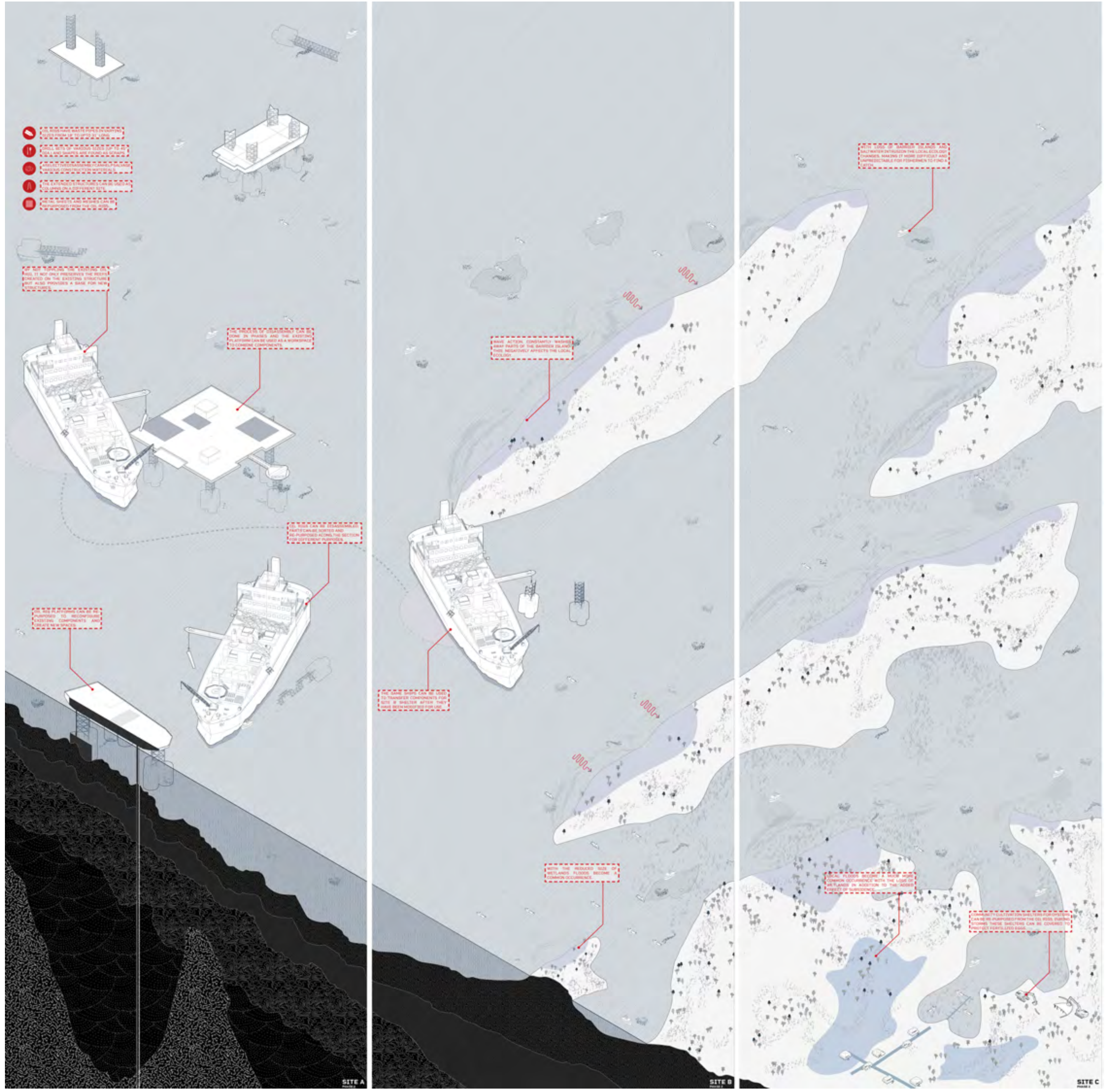
ATTACHING NATURAL OR SYNTHETIC FIBERS TO THE REEF MODULES CAN BE BENEFICIAL. THEY MAKE A VERY ATTRACTIVE SUBSTRATE FOR THE SMALLEST OF CREATURES AND ARE IDEAL PLACES FOR CUTTLEFISH TO LAY THEIR EGGS.

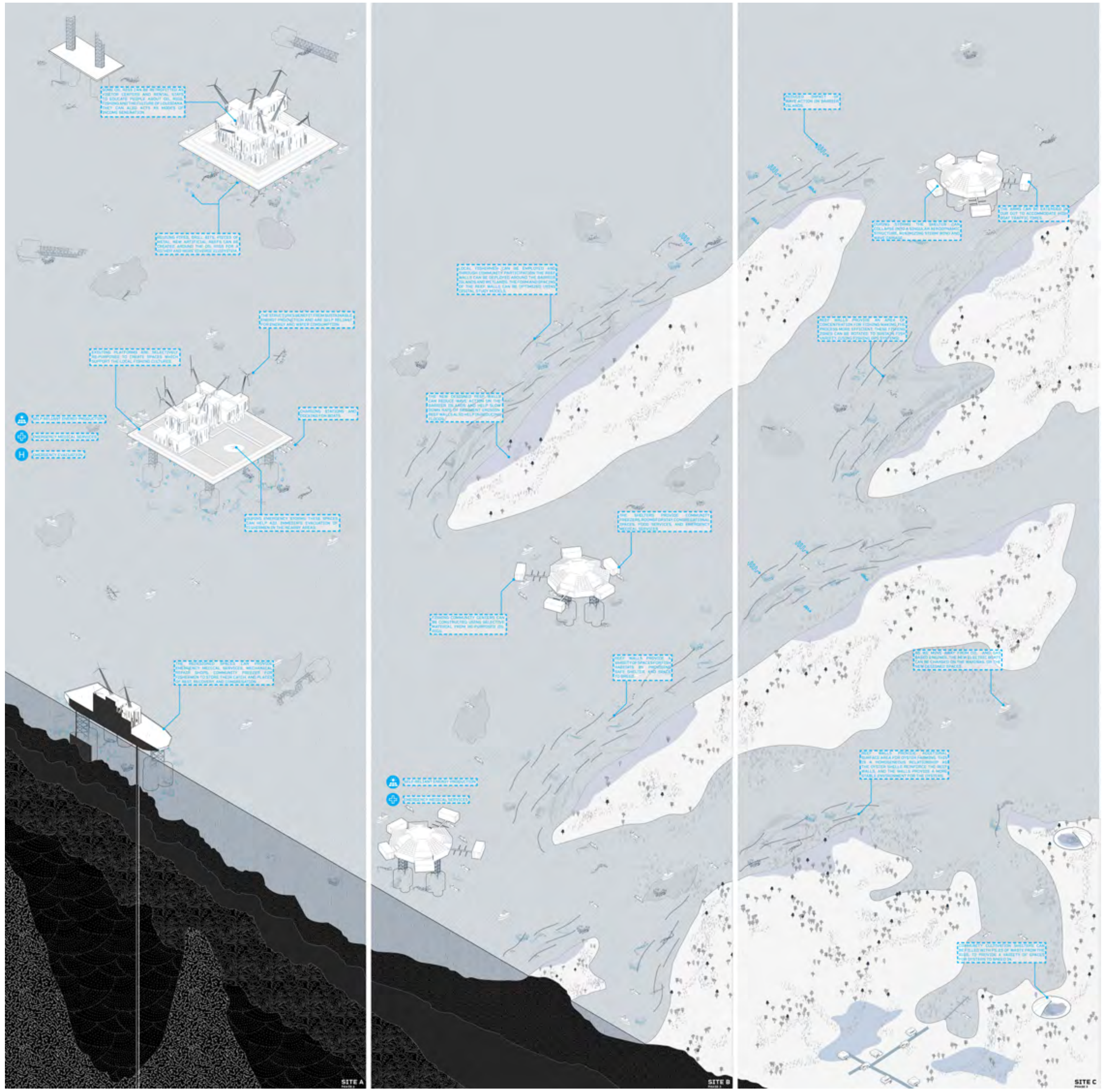
HEIGHT

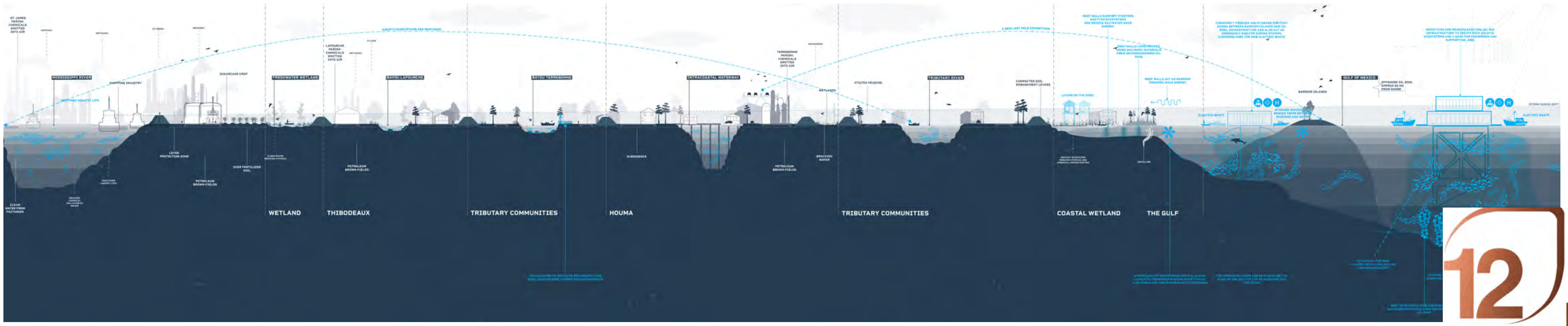
VARIATION IN HEIGHT CAN HELP ACHIEVE A GREATER BIODIVERSITY. THE TALLER OBJECTS ACT AS BEACON FOR FISHES AND PREDATORS ALIKE, AND IN TIMES OF SEDIMENT SHIFT AND STORMS, THE ACT AS MARKERS FOR FISH TO TAKE REFUGE IN.

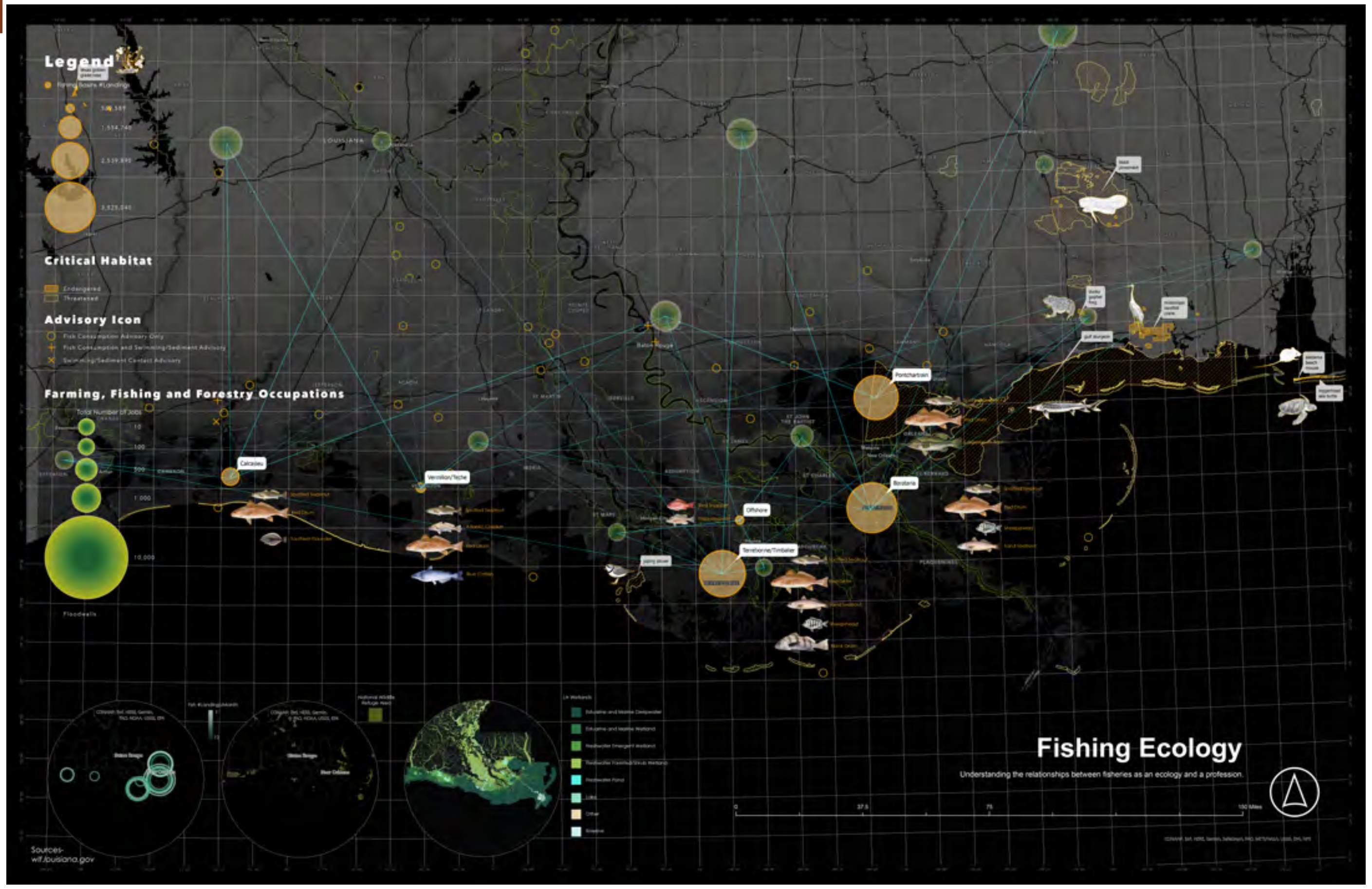


ARTIFICIAL REEFS CAN BE HEAVY. THE WATER CURRENTS ARE STRONG AND THESE REEFS IF NOT HEAVY ENOUGH GET DISPLACED.


SITE A
SITE B
SITE C


SITE A
SITE B
SITE C


MISSISSIPPI RIVER
FRESHWATER WETLAND
BAYOU LAFOURCHE
BAYOU TERREBONNE
INTRACOASTAL WATERWAY
TRIBUTARY RIVER
GULF OF MEXICO
WETLAND
THIBODEAUX
TRIBUTARY COMMUNITIES
HOUMA
TRIBUTARY COMMUNITIES
COASTAL WETLAND
THE GULF



SMALL SCALE

CREATING COMMUNITY CULTIVATION SHELTERS FROM SELECTIVE RE-PURPOSING OF OIL RIGS. THE SHELTERS CAN BE USED DURING STORMS TO SHELTER OYSTERS AND FISH. *shelters can be provided along the coast to supplement various oyster and fish farmers.

REEF WALLS HELP INCREASE THE SURFACE AREA FOR OYSTER FARMING. THE WALLS DISSIPATE WAVE ENERGY AND SLOW DOWN THE PROCESS OF COASTAL EROSION. *the location and design of reef walls should be done with the study of digital model analysis, to provide the best protection to the coast.

MEDIUM SCALE

FISHING COMMUNITY CENTERS CAN BE CONSTRUCTED USING SELECTIVE MATERIALS FROM RE-PURPOSED OIL RIGS. THE CENTERS ACT AS HUBS FOR FISHERMEN TO CONGREGATE, REST AND RECOVER, TAKE SHELTER DURING STORMS, AND ATTAIN EMERGENCY MEDICAL SERVICES. THE SHELTERS CAN BE FITTED WITH COMMUNITY FREEZERS OR FISHERMEN TO STORE THEIR CATCH IN. THE CENTERS ALSO PROVIDE A DOCKING AND CHARGING SPACE FOR MODERN ELECTRIC BOATS. THE SPACE CAN ALSO ACT AS A HUB FOR RECREATIONAL FISHERMEN TO CONGREGATE WITH PROFESSIONALS. *the community centers can be located every 10 miles before the barrier islands, the actual number can be decided upon with fishing community engagement.

LARGE SCALE

THE GROUP OF DECOMMISSIONED OIL RIGS AS A SYSTEM CAN BE DESIGNED TO PROVIDE SHELTERS FOR PROFESSIONAL AND RECREATIONAL FISHERMEN, TOURIST ATTRACTIONS, ARTIFICIAL REEFS, AND PROVIDE JOBS FOR THE OIL RIG WORKERS. *existing navigation channels to be avoided.

SMALL SCALE

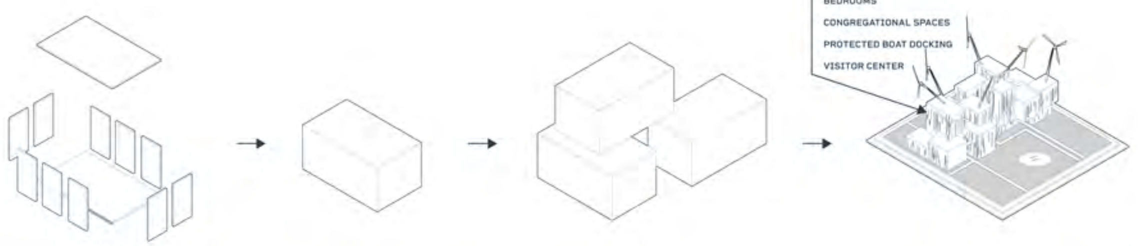
SELECTIVE RE-PURPOSING OF RIG INFRASTRUCTURE CAN PROVIDE INFRASTRUCTURE FOR FISHING COMMUNITIES IN THE DEEPER GULF COAST. THE SPACES PROVIDE SHELTER TO PEOPLE AND FISH. ACT AS HUBS FOR THE COMMUNITY, EMERGENCY MEDICAL SUPPORT, EVACUATION CENTERS DURING STORMS, AND CHARGING AND REPAIR STATIONS FOR ELECTRIC BOATS. *the selection of oil rigs can be based on the status of lease, and in coordination with the oil company. policies can be made to mandate the donation of oil rigs.

SITE A- RE-PURPOSED OIL PLATFORMS

CONSTRUCTION MATERIALS LIKE METAL SHEETS, PLYWOOD, ETC CAN BE SALVAGED AND RESTORED FROM THE RIG INFRASTRUCTURE. THE SHEETS CAN THEN BE RE-PURPOSED TO CREATE MODULES FOR THE NEWLY DESIGNED SPACES.

FACILITIES

- FREEZER/ STORAGE SPACES
- SELF RELIANT ENERGY PRODUCTION
- BOAT CHARING AND DOCKING STATION
- EMERGENCY MEDICAL SERVICE
- EMERGENCY EVACUATION
- CAFETERIA/ RESTAURANT
- BEDROOMS
- CONGREGATIONAL SPACES
- PROTECTED BOAT DOCKING
- VISITOR CENTER



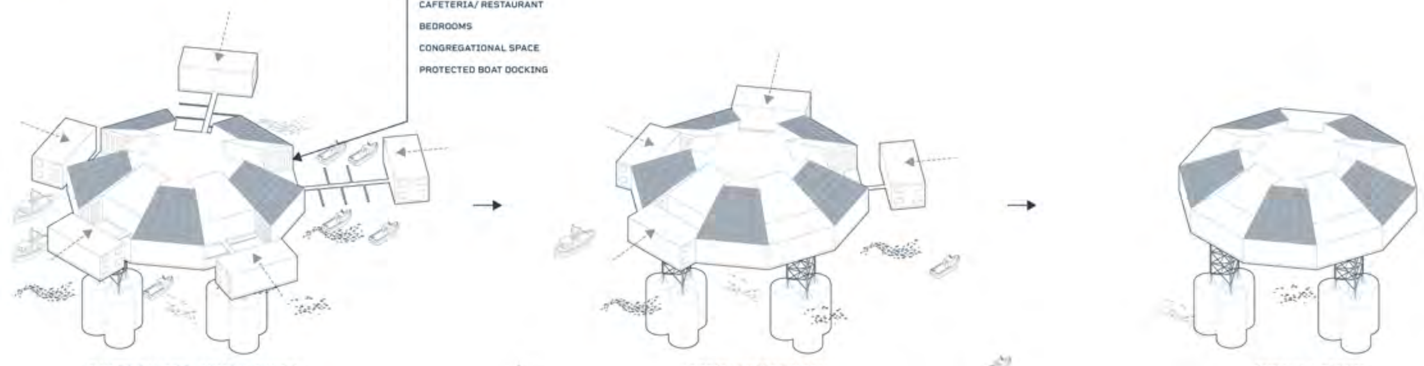
SALVAGED MATERIAL — DESIGNED MODULES/ PRE-BUILT MODULES — COMPOSITION OF MODULES TO CREATE SPACES — RE-PURPOSED OIL RIG PLATFORM

SITE B- FISHING COMMUNITY CENTERS

CONSTRUCTED USING THE REMAINING SALVAGED MATERIALS FROM THE OIL PLATFORM THIS MODULE CAN BE DESIGNED TO WITHSTAND STORMS AND PROVIDE SHELTER TO LOCAL FISHERMEN/ PEOPLE WHO ARE STUCK OUTSIDE THE LEVEE SYSTEM.

FACILITIES

- FREEZER/ STORAGE SPACES
- SELF RELIANT ENERGY PRODUCTION
- BOAT CHARING AND DOCKING STATION
- EMERGENCY MEDICAL SERVICE
- CAFETERIA/ RESTAURANT
- BEDROOMS
- CONGREGATIONAL SPACE
- PROTECTED BOAT DOCKING

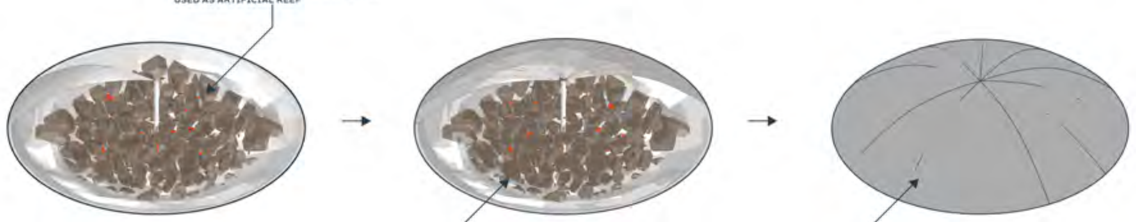


DAY TO DAY USE- ARMS EXPANDS DEPENDING ON TRAFFIC — STORM PREPARATION — DURING A STORM

SITE C- COMMUNITY CULTIVATION CENTERS

THE COMMUNITY CULTIVATION CENTERS CAN BE MADE USING THE EXTRA SALVAGE METAL SHEETS FROM OIL PLATFORMS, WASTE MATERIALS TO USE AS MINI REEFS. THE SHELTERS CAN BE CREATED IN LAND OR IN THE WETLANDS. THE IDEA IS TO PROTECT THE OYSTERS AND FISH THAT ARE BEING CULTIVATED DURING A STORM.

PILE OF WASTE FROM OIL RIG PLATFORMS, USED AS ARTIFICIAL REEF



OYSTER FARMING AND FISH CULTIVATION CAN OCCUR IN THESE PROTECTED COMMUNITY SPACES.

AS THE STORM APPROACHES THE ENTIRE SYSTEM CAN BE CLOSED USING THE SALVAGED METAL SHEETS FROM OIL RIG PLATFORMS

STORM

REEF WALLS

LOCAL FISHERMEN CAN BE EMPLOYED FOR THE PLACEMENT OF REEF WALLS. THE SYSTEM AND DESIGN ITSELF CAN BE DESIGNED USING CLIMATE MODELING SOFTWARE TO STUDY THE EFFICIENCY OF DIFFERENT REEF WALL PATTERNS TO PREVENT LOSS OF SEDIMENT BY WAVE ACTION. IN ADDITION TO PROVIDING PROTECTION AGAINST WAVES AND FLOODS REEF WALLS ALSO INCREASE THE AVAILABLE SURFACE AREA FOR OYSTER CULTIVATION, AND SAFE HABITATS FOR FISH. REEF WALLS PROVIDE AN AREA OF CONCENTRATION FOR FISHING MAKING THE PROCESS OF FISHING MORE EFFICIENT. THESE FISHING ZONES CAN BE ROTATED TO SUSTAIN FISH VARIETY. (USING FISHING GPS SYSTEMS)

SALVAGED METAL MESH CAN BE LAID OUT FLAT AND FILLED WITH PILES OF WASTE FROM OIL RIGS.

THE MESH IS ROLLED TO CREATE A CAGE CONTAINING THE WASTE PARTS.

THE HEIGHT AND WIDTH OF THE ROLLED CAGE CAN BE DEFINED AND THE SAME CAN BE PRODUCED.

THE CAGE CAN BE BENT TO THE DESIRED FORM AND LANDSCAPE REQUIREMENT.

THE REEF WALL PREVENTS SEDIMENT EROSION BY DAMPENING WAVE ACTION AND ALSO PROVIDES A SHELTER FOR MARINE SPECIES TO STAY IN.