

Project location:
Biscayne Bay, Florida USA



Biscayne Bay: Turn the tide

An integrated landscape approach for coastal restoration in Biscayne Bay through spatial and ecological interventions

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MANGROVE PROBLEMATIQUE IN SOUTH FLORIDA

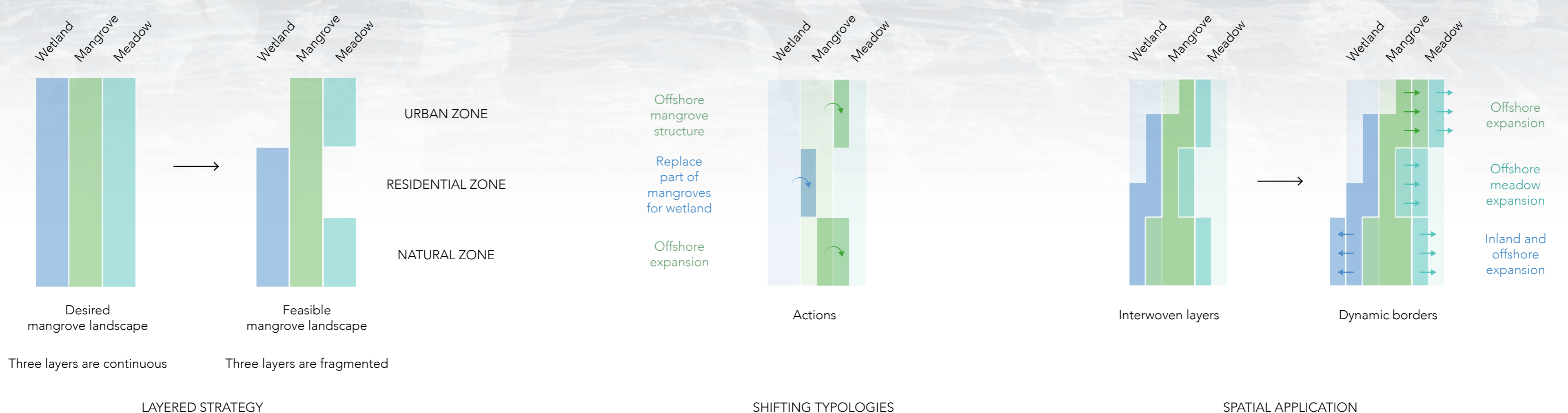
The coastline of South Florida has undergone a drastic change in the last century due to urbanization and this has had a major impact on flood safety and natural resources of its inhabitants. Natural coastlines supporting mangrove and wetland have been transformed into seawalls with buildings. It is estimated that in the last 100 years, 40 percent of the mangrove coast and significant parts of wetland, pine forest and sea grass have disappeared. We can learn from the past that this forest provides the land with a natural levee and protect against flooding. Also, this natural system has potential to adapt to the consequences of climate change that highly urbanized areas like Miami are already facing and which will increase rapidly in the future.

This research identifies and explores design strategies and principles for the mangrove landscape of Biscayne Bay in order to reduce the flood risk of Miami Metropolitan Area, as well as provides aesthetic, ecological and functional qualities that contributes to the identity and resilience of this coastal region. The result is a layered landscape strategy that contributes to the harmony of the natural coastal landscape of Biscayne Bay and thereby restores its functions and a landscape architectural design that adds an extra dimension to the mangrove landscape that will invite the residents of the Miami Metropolitan Area to experience through exposure to changes and value its aesthetic and ecological qualities and protective functions.

THE MANGROVE LANDSCAPE

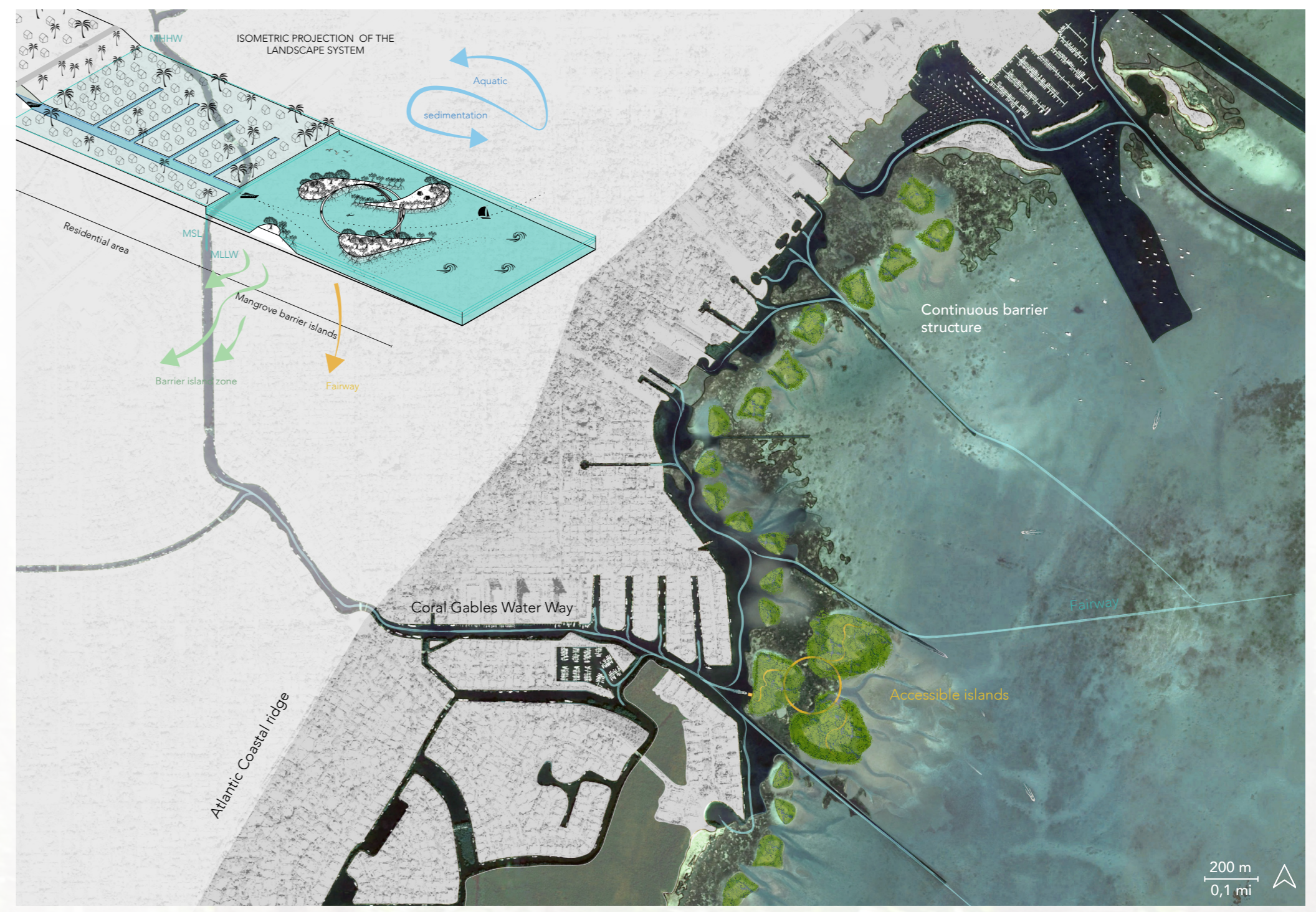
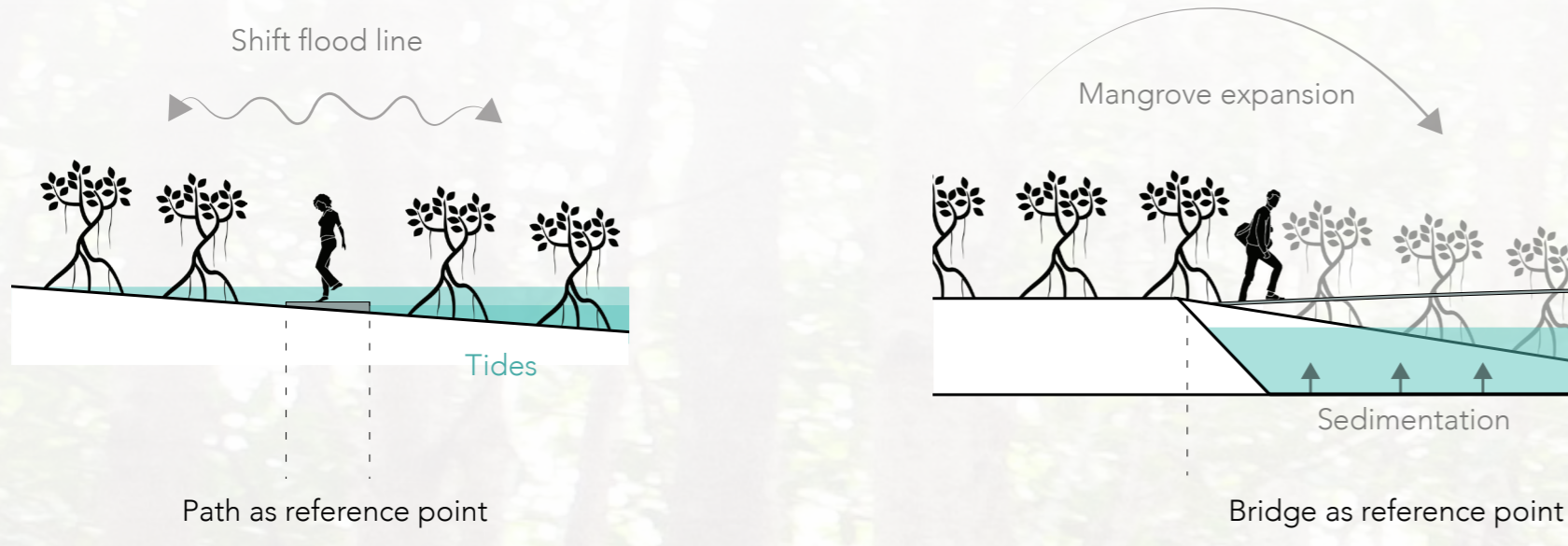
The desired coastline for Biscayne Bay is a continuous mangrove landscape, consisting of three layers: wetland, mangrove forest and sea grass meadow. In the current situation, the interrelation between the layers is interrupted by the spatial limitations of the built environment and the canalized water system. Dealing with this challenge, a feasible situation has been outlined. This is a fragmented but continuous mangrove landscape, which contains

at least one of the three layers. These existing layers and fragments offer the opportunity to restore the desired landscape. The strategy is therefore to preserve, restore and reintroduce the layers in a design for a continuous mangrove landscape with dynamic borders to enable expansion. If there is no space for one of the typologies in the original zone, which is defined by the topography of the landscape, it can be shifted to an adjacent zone and be interwoven with its context.



MANGROVE BARRIER ISLANDS

In the most northern part of the bay, the mangrove landscape barely exist anymore. Apart from a few small mangrove fragments and depleted meadow, there is no place for the landscape in this urbanized area. Shifting typologies of the mangrove landscape, forms the basis for the concept of this area. An island chain off the coast of Coral Gables offer space for the mangrove forest. This barrier structure can substantially lower the water level and the impact of waves of storm surges. The mangroves improve and hold sedimentation, but also add spatial quality and aesthetic value to the area. They create a new experience for the residents and local tourists. The shape of the islands and their vegetation is constantly changing due to sedimentation and erosion. The retreat and expansion of the vegetation, but also deviating high water levels can be seen from the programmatic route and will make the visitor aware of function of the mangrove landscape.

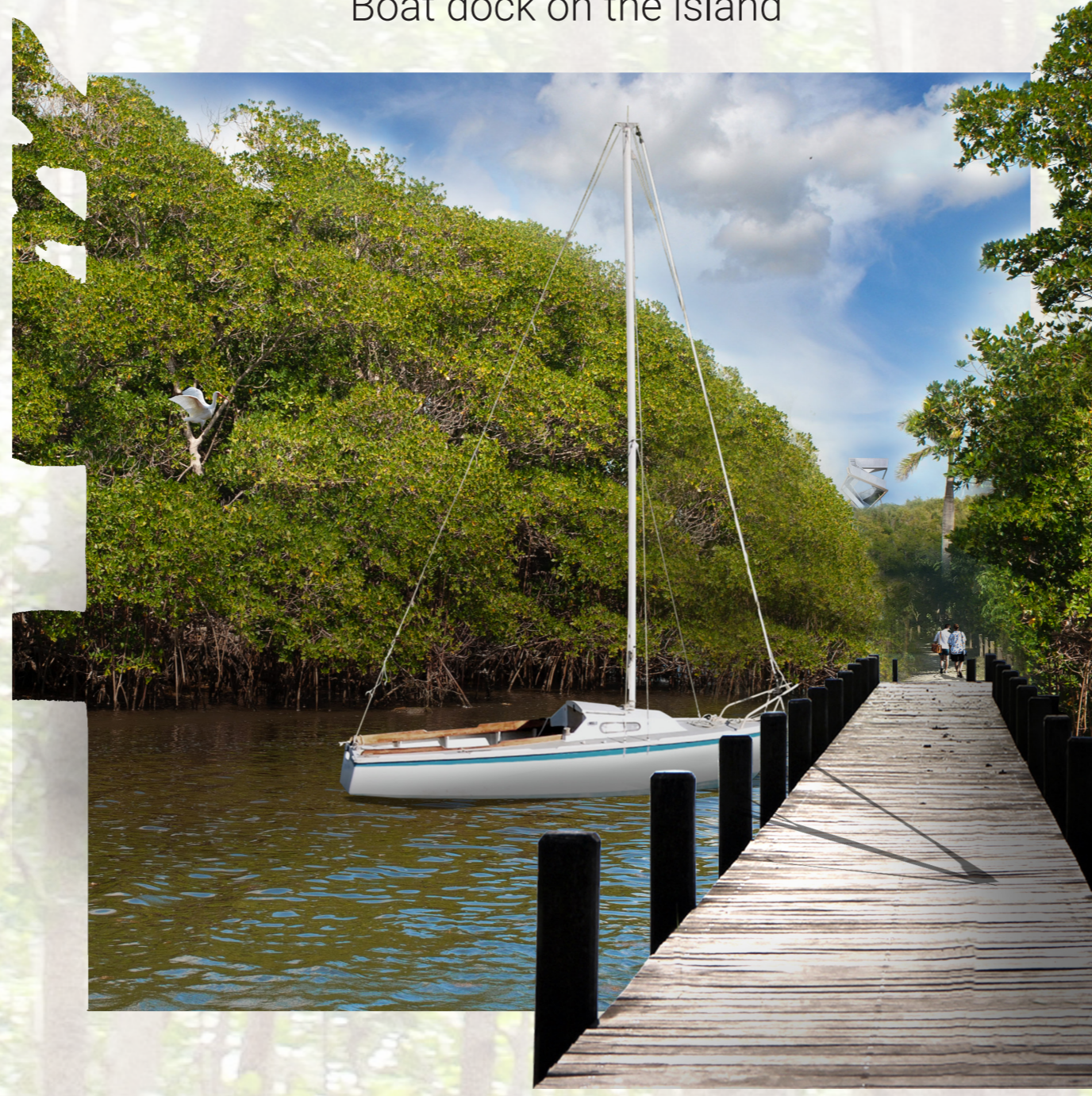


Barrier island coast line

Boat ride to the accessible mangrove islands



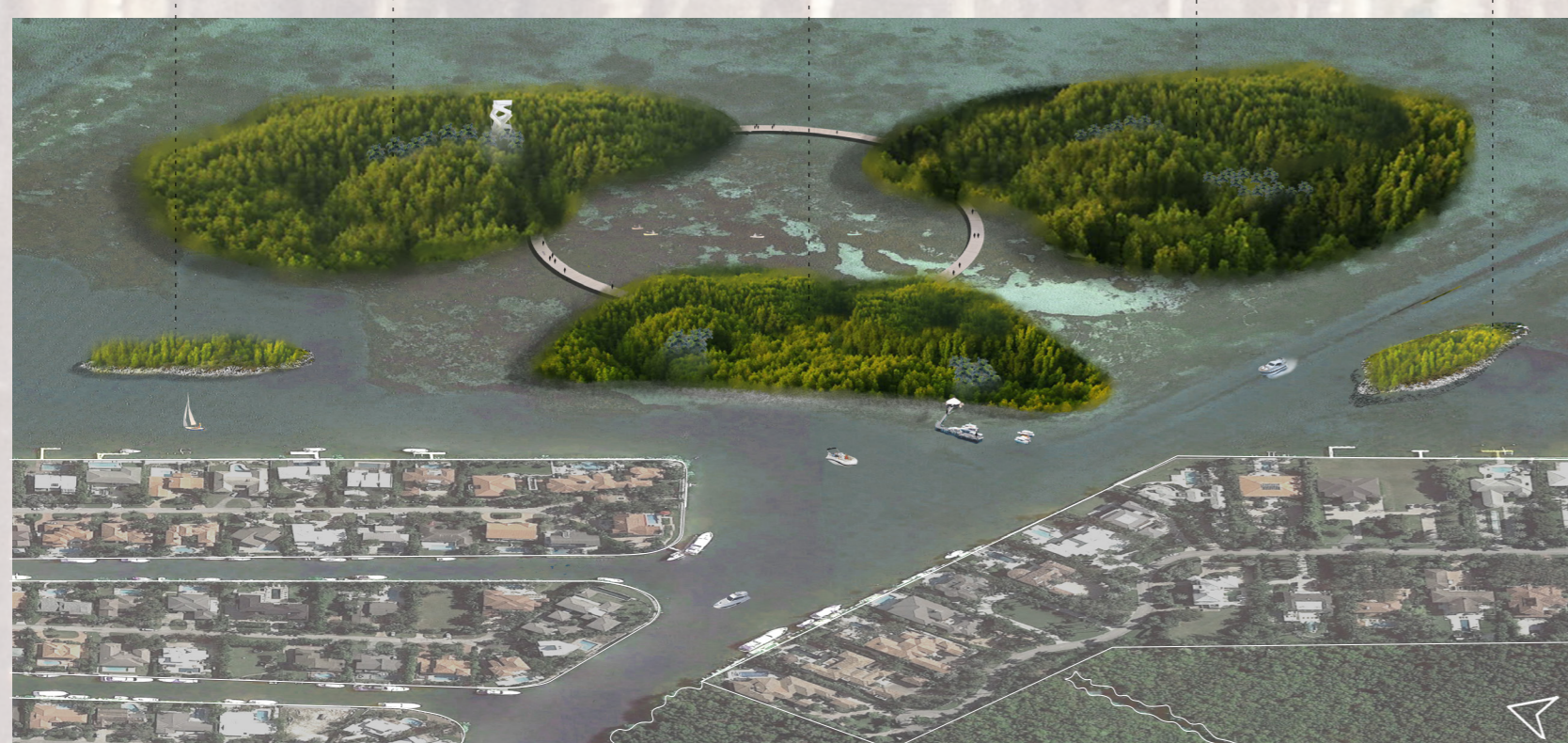
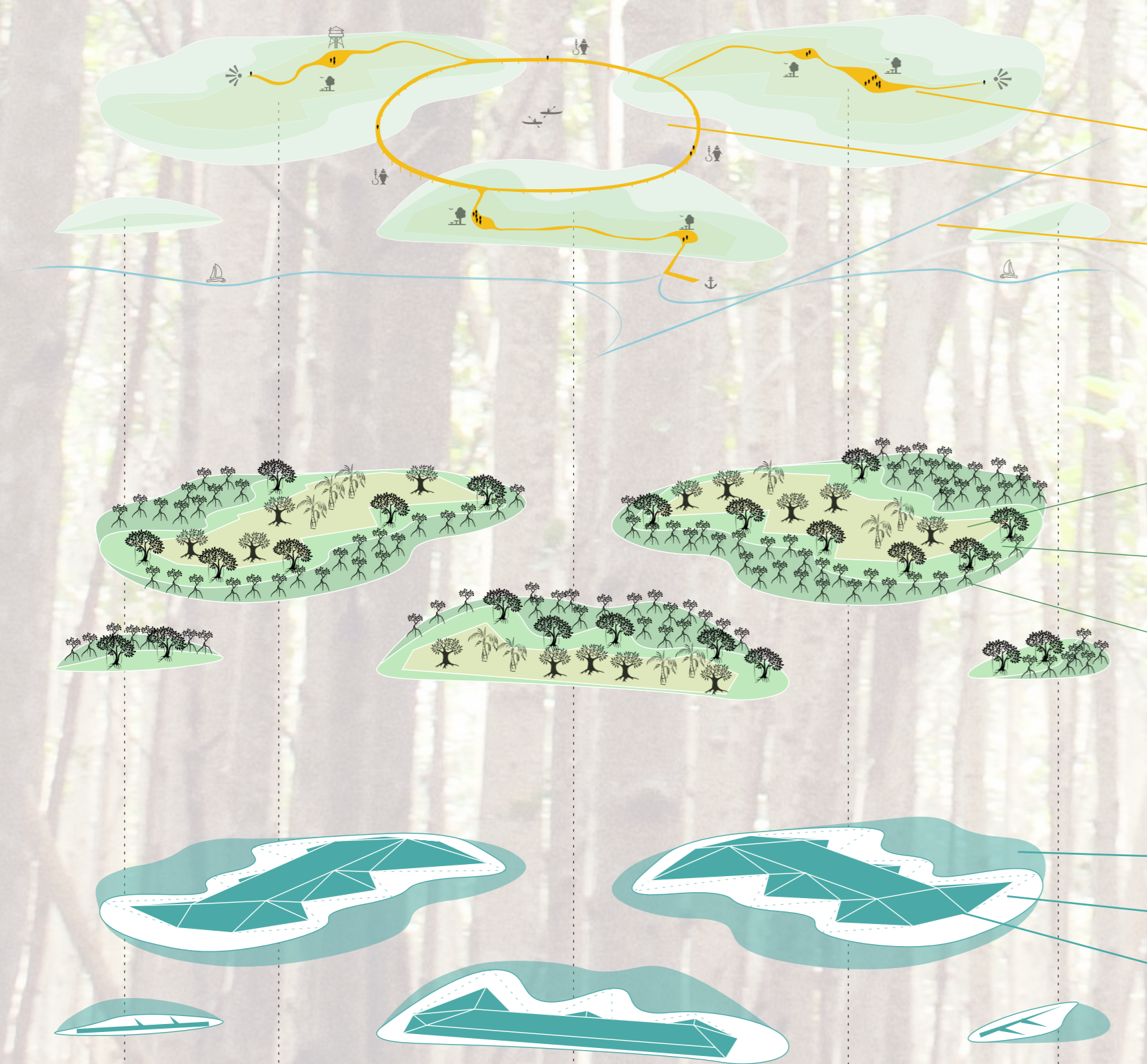
Boat dock on the island



Walk towards the other islands



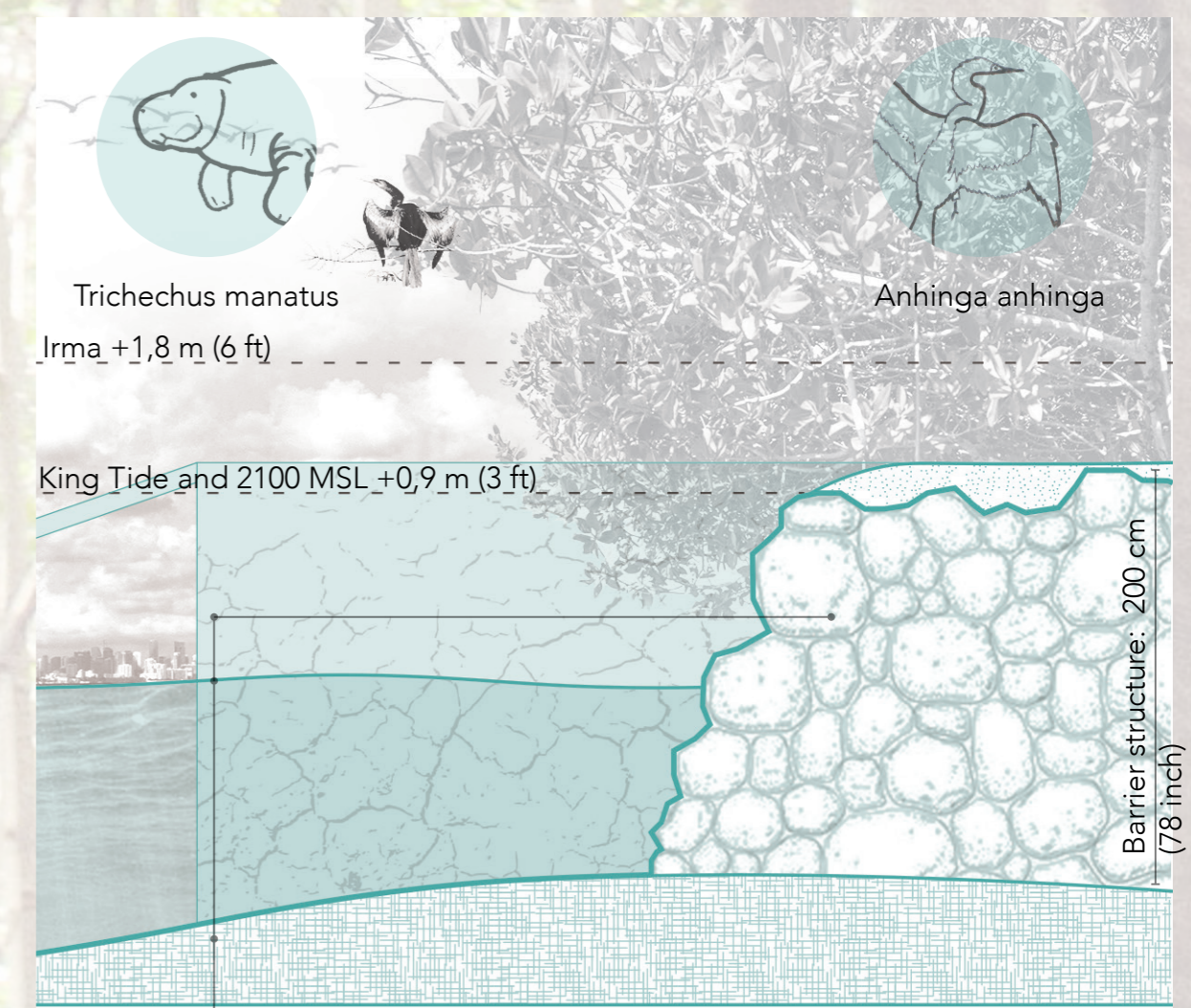
Exploded view



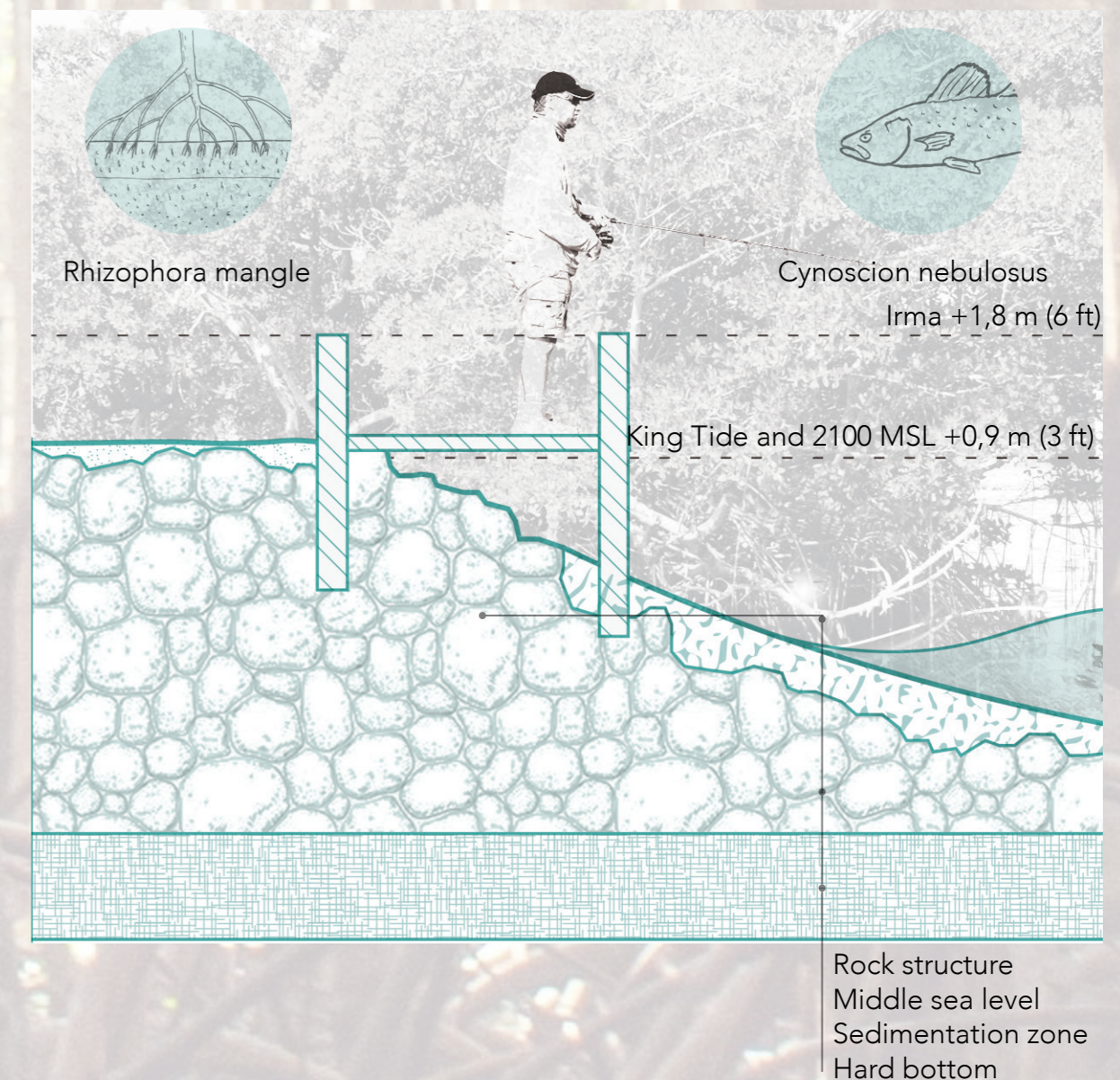
- A** Picnic place
 - C** View point
 - T** Observation tower
 - O** Kayak zone
 - R** Fishing spot
 - S** Boat dock
-
- P** *Laguncularia racemosa* and *Conocarpus erectus*
 - R** *Avicennia germinans*
 - O** *Rhizophora mangle*
-
- S** Basalt rock base
 - T** Silica sand and mud
 - R** Peat as top layer

All islands are built up from a basalt rock structure. Their specific shape enables sedimentation and supports mangrove expansion. Not only sedimentation, but also peat formation between the mangroves root system will cause growth of the islands. The bigger accessible islands have a wider base that allows elements of the program. This higher middle zone is mostly dry and vegetated by native tropical hardwood. Around it is a intertidal zone that, dependent on the water depth, dominated by different mangrove types.

Detail leeward side barrier island



Detail windward side barrier island



Elongated slope: 500 cm (196 inch)