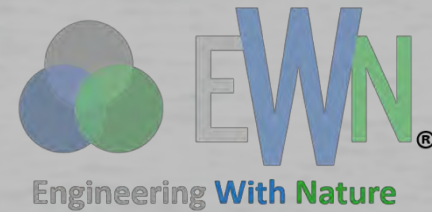




**US Army Corps  
of Engineers®**



# Site Evaluation and Design Considerations – Shorelines & Waterfronts

Jackie Brower, PhD, PE

September 13, 2022, ASBPA Short Course



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# Intros & Goals

- Experience – Dr. Brower, Major Brower, Miss Holiday
- Lesson 1: Listen to Mother Nature
- Lesson 2: Engineering Design vs Engineering Solution
- Lesson 3: Applied Resiliency: Elevate, Buffer, Redundancy
- Lesson 4: Living Shorelines – In Action

# Resiliency Zones: Where Land and Water Meet



## Resiliency Zones

### COASTAL HABITAT

- Ecosystem Restoration
- Living Shorelines
- Beach and Dune Restoration
- Endangered/Protected Species
- Water Quality
- Public Access

### RECREATION

- Marinas and Boating Access
- Clean Marina and Blue Flag Programs
- Parks, Greenways, and Blueways
- Human-Powered Watercraft
- Physically Challenged Access
- Youth Programs

### URBAN COMMUNITY

- Resiliency
- Pre-Disaster Mitigation
- Public Spaces
- Urban Greening
- Green/Grey Infrastructure
- Floodplain Management/Mitigation Planning

### TRANSPORTATION

- Multi-Modal Connections
- Metro and Light Rail
- Water Taxis and Ferries
- Transportation Corridor
- Bike Parking – Storage
- Electric Vehicle Charging

### PORTS

- Environmental Remediation
- Security
- Clean Air
- Green Ports
- Hazard Mitigation
- Navigational Improvements

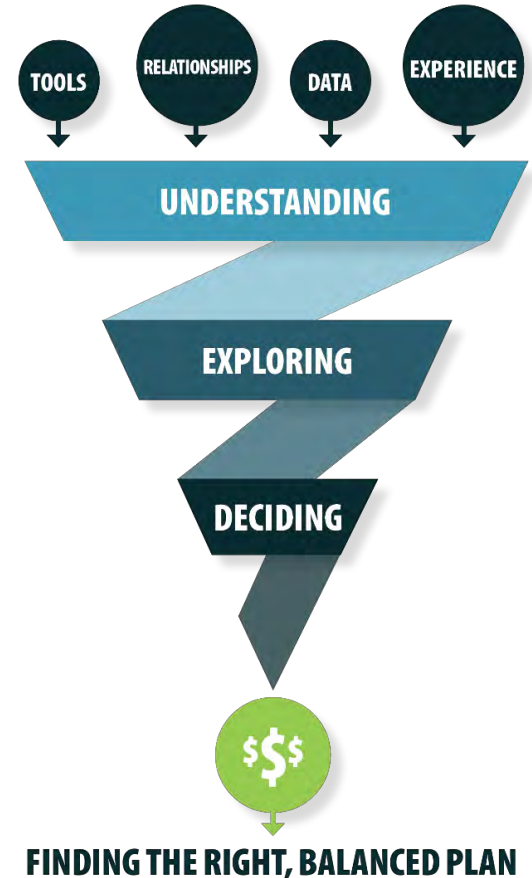
# Lesson 1: Listen to Mother Nature

Understand the Physics: Each project is a unique scientific investigation!

Coastal Issues that require  
Scientific Investigation to develop a  
Resilient Solution

# Site Evaluation & Design Considerations

- ✓ Defining the System & Site Conditions
  - Coastal Processes? Forcing Mechanisms?
- ✓ Identify Concept Design, Permitting, Costs
  - Intent? Operations? Experience? Ideas?
- ✓ Develop options (collaboration/out reach)
- ✓ Prioritize Design Elements
- ✓ Funding, Permitting, Champions
- ✓ Design, Construct, Monitor



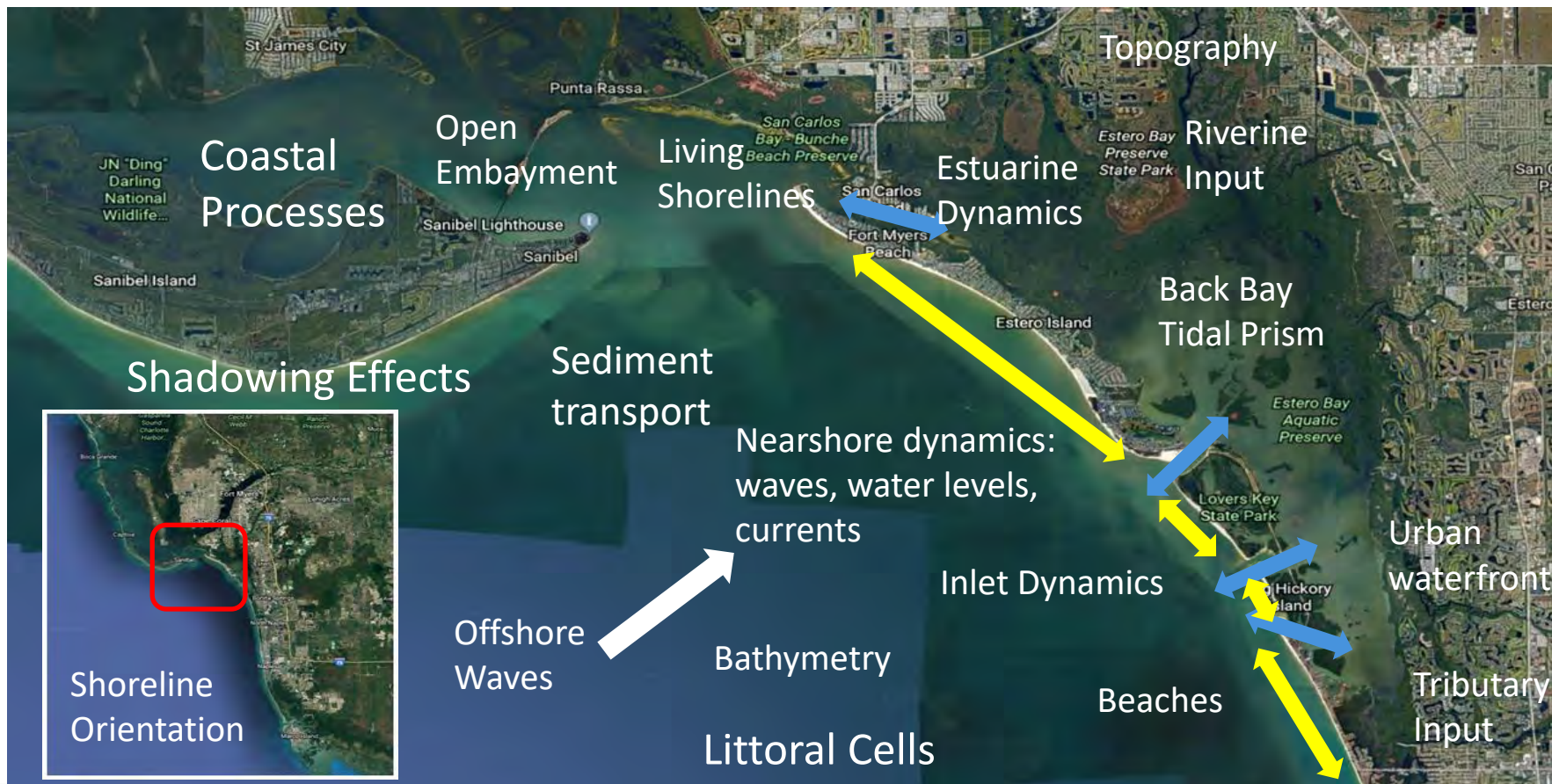
# Estero Regional Inlet Management Plan



# Defining the System – Channel your inner Scientist



# Defining the System

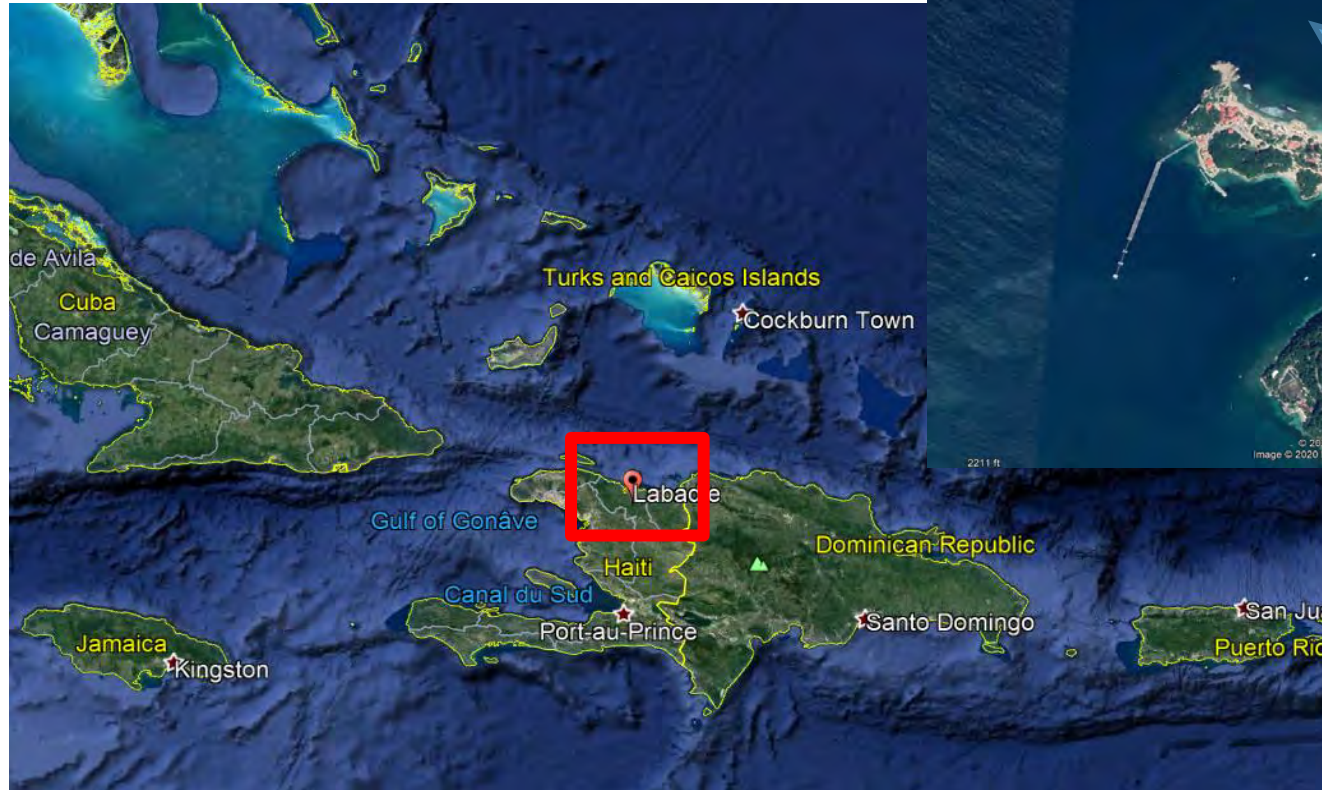


# Key Takeaways

Understanding (and applying) what Mother Nature wants results in:

- Secondary benefits
- Enhanced end-user experience
- Reduced maintenance costs
- More cost-effective (and the right) design

# Quick Story....

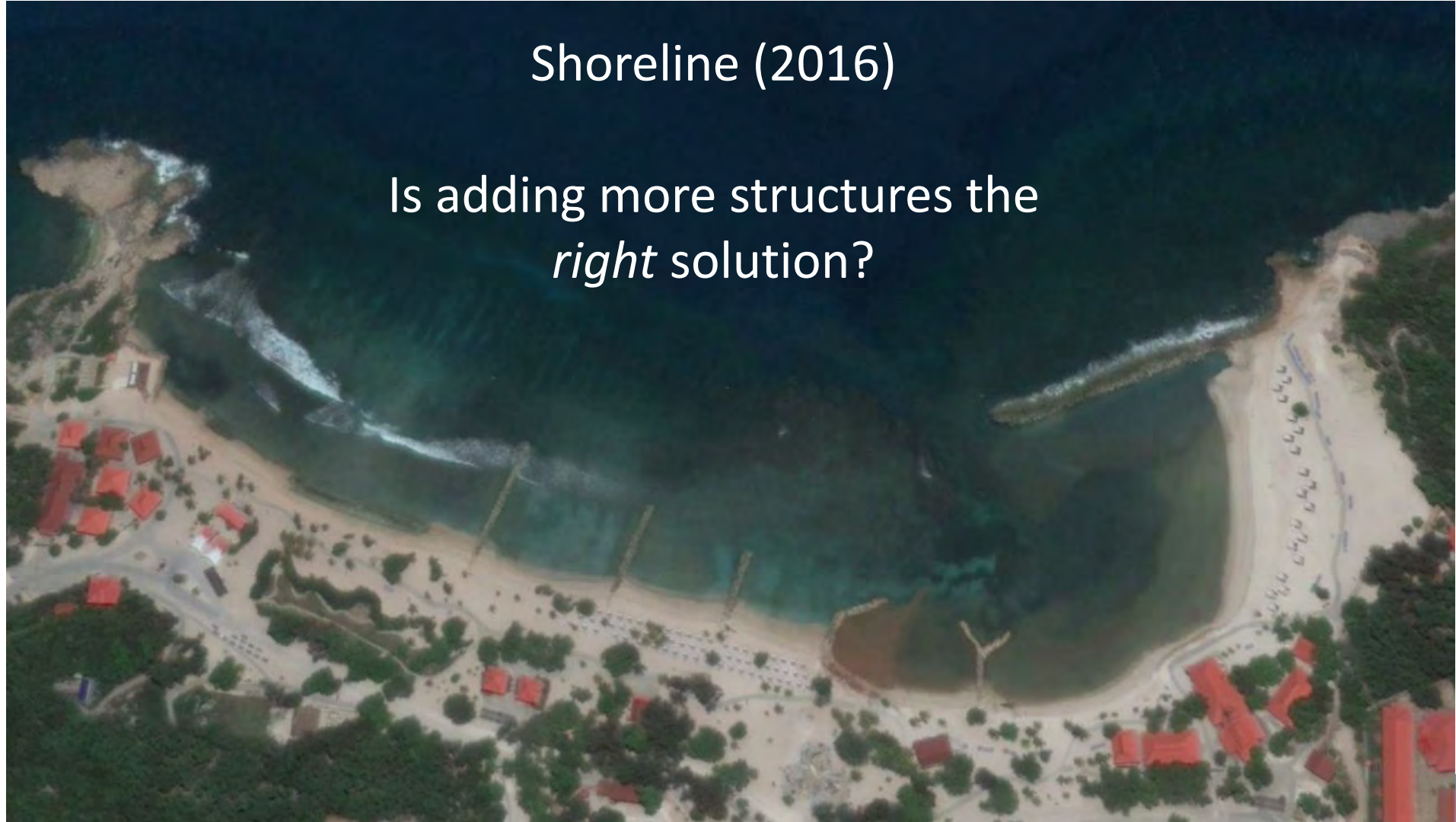


# Existing Shoreline (2015)



## Shoreline (2016)

Is adding more structures the  
*right* solution?

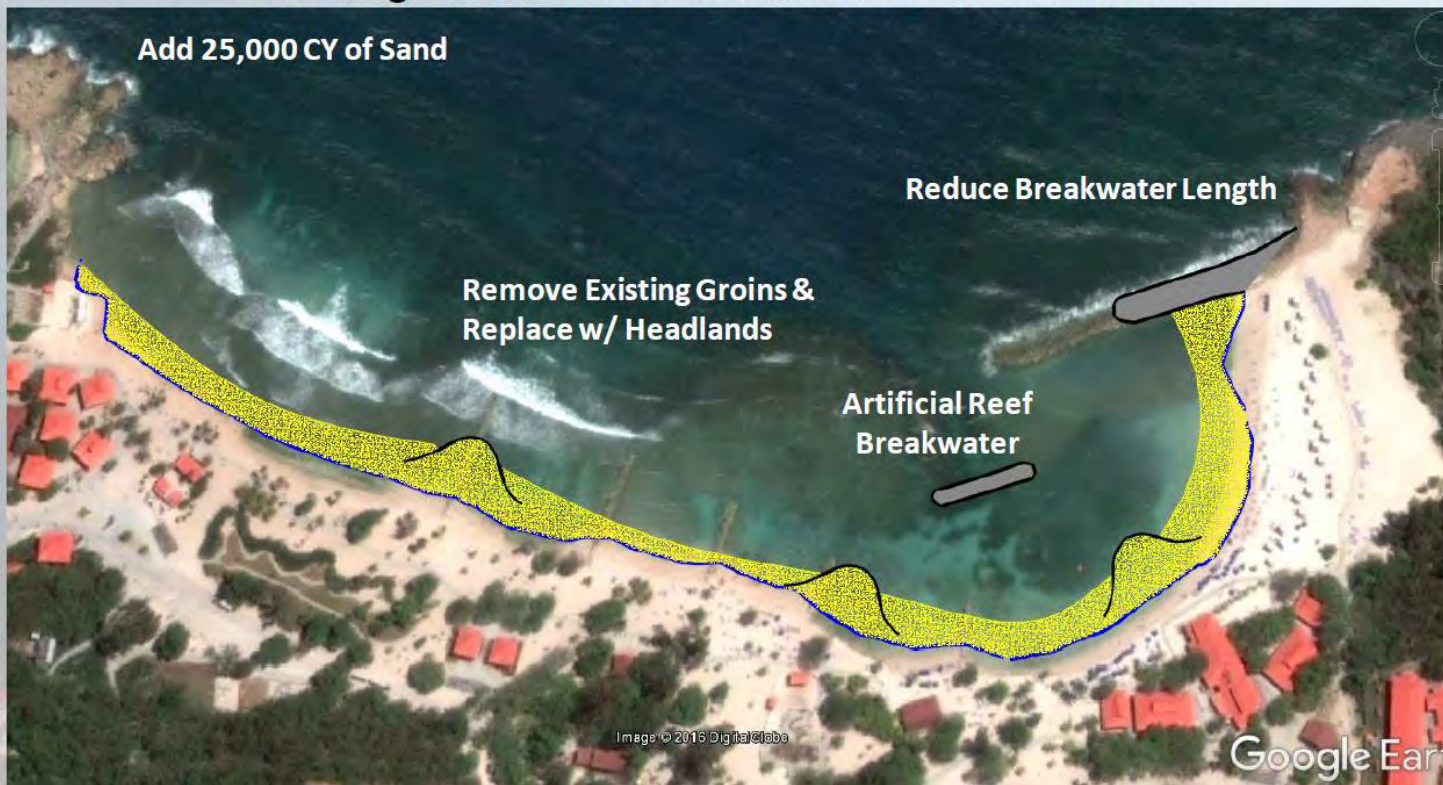


## Natural Conditions Prior to Groin Construction

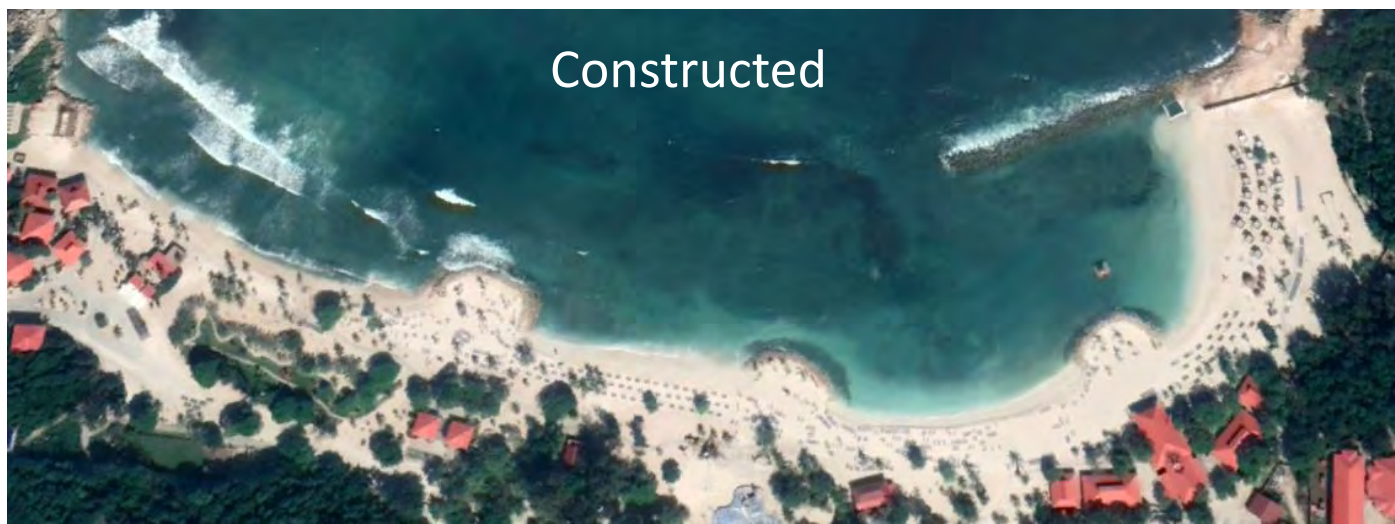


Option 5: Reduce Groin Length + Remove Groins + Headlands +  
Submerged Artificial Reef Breakwater + Nourishment

\$\$\$\$\$



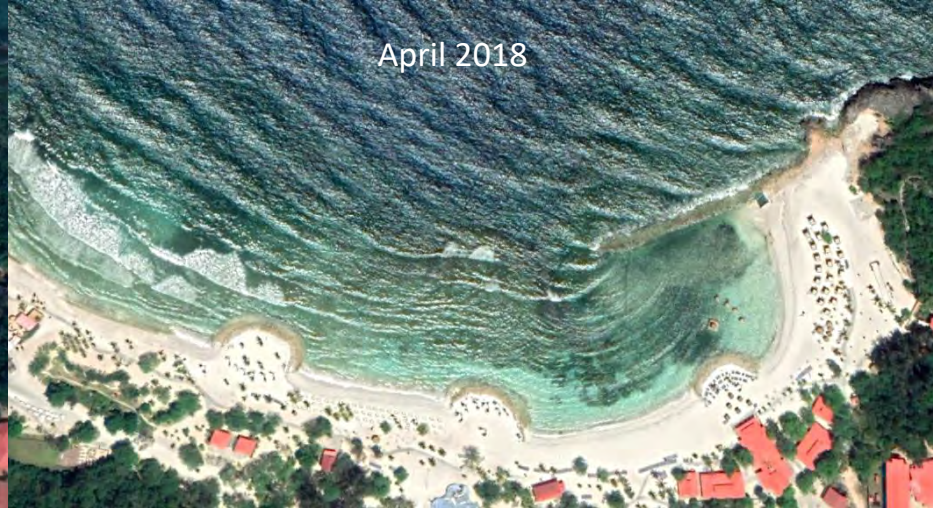
What it buys: Increased circulation behind east groin, allows more natural sand transport, holds the shoreline with aesthetically pleasing structures, protects erosional hotspot of channel focusing (Plus benefits of Option 1)



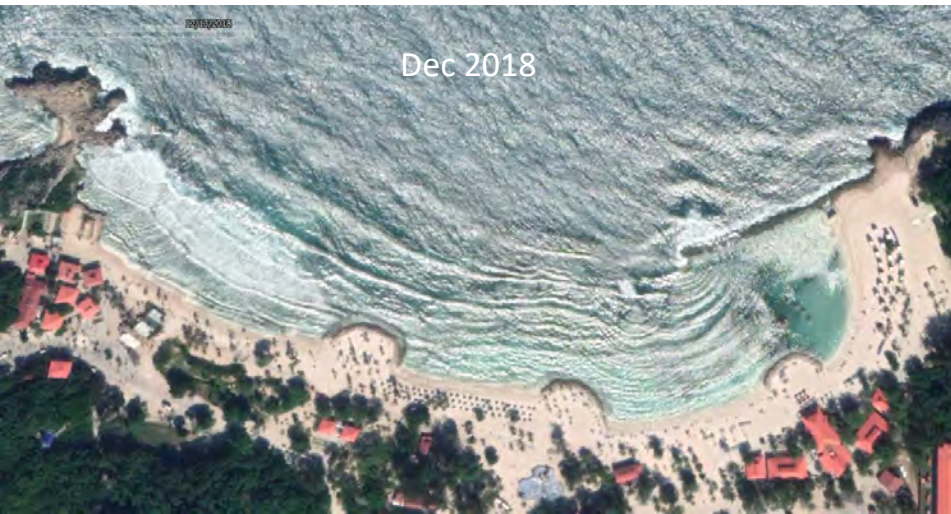
Dec 2017



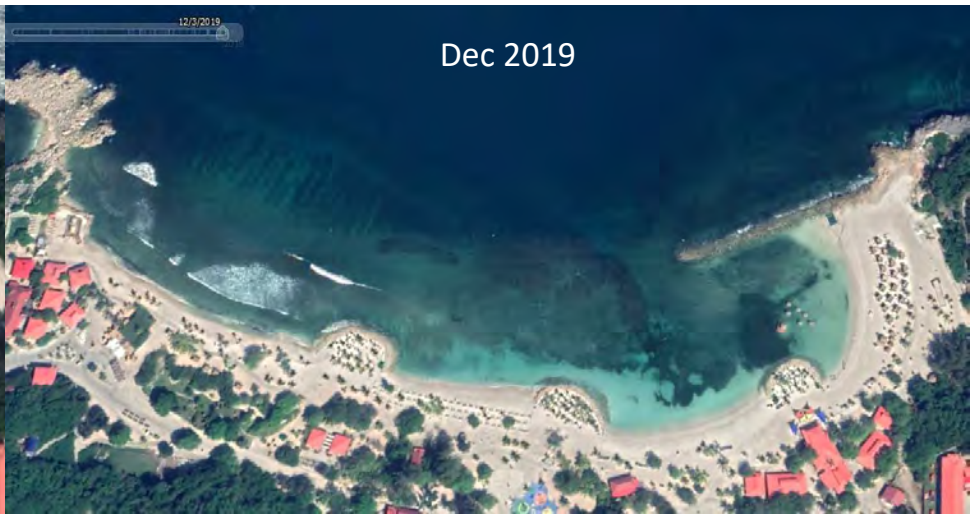
April 2018



Dec 2018



Dec 2019



# Before



# Today





**Lesson: Listen to Mother Nature**

# Lesson 2: Not all Engineering Designs are Solutions

How and where to apply shoreline treatments

# Engineering Tool Box – Gray and Green

## Strategies

+

## Engineer's Toolbox

1. Push the threat away

- Nourishment, Breakwaters, Groins, Headlands, Living Shorelines

2. Hold the Line

- Revetments, Seawalls, Groins, Living Shorelines

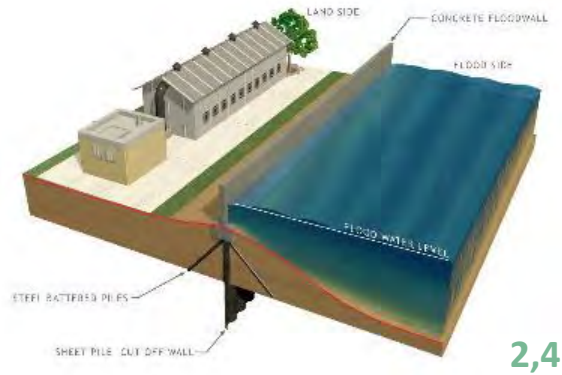
3. Move away from the threat

- Retreat (Sounds nice, but hard to do)

4. Coastal flooding protections

- Living Shorelines, Dunes, Drainage, Basins, Barriers

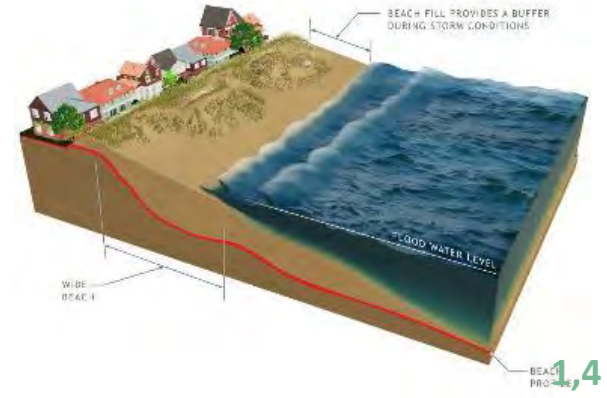
# Shoreline Applications – Guess the Strategy



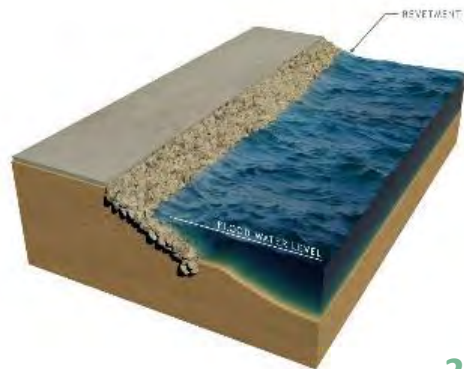
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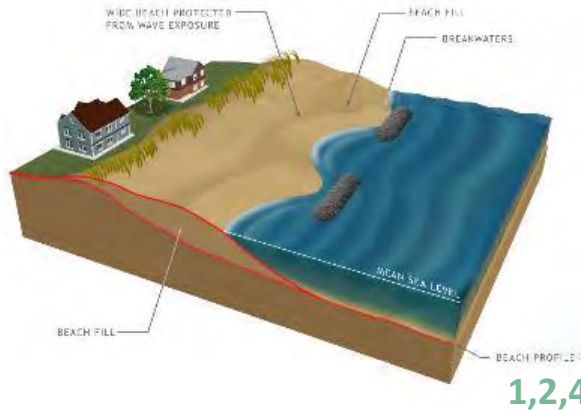
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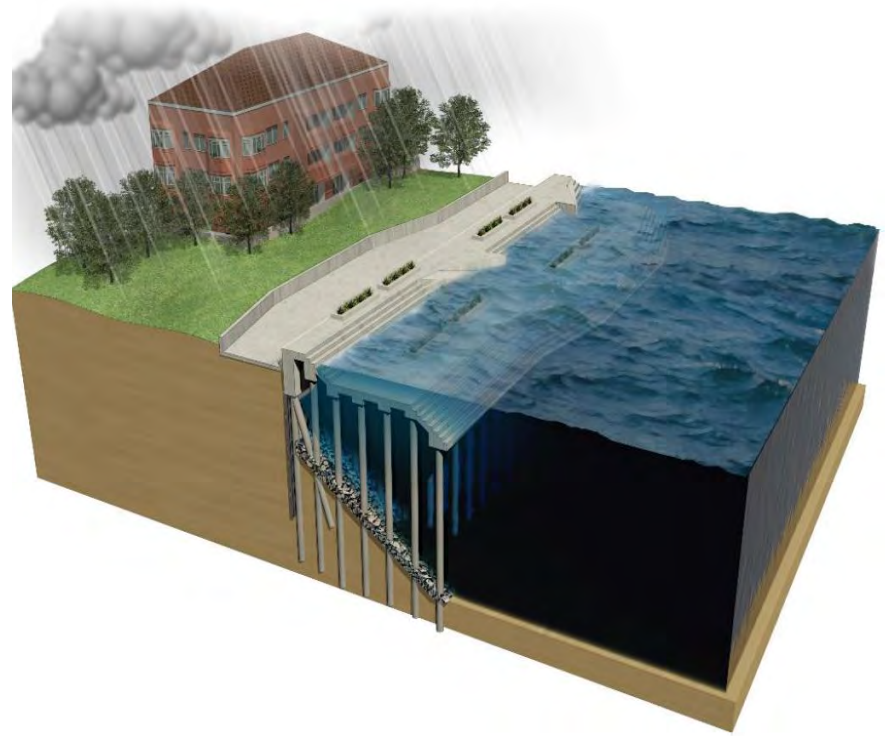
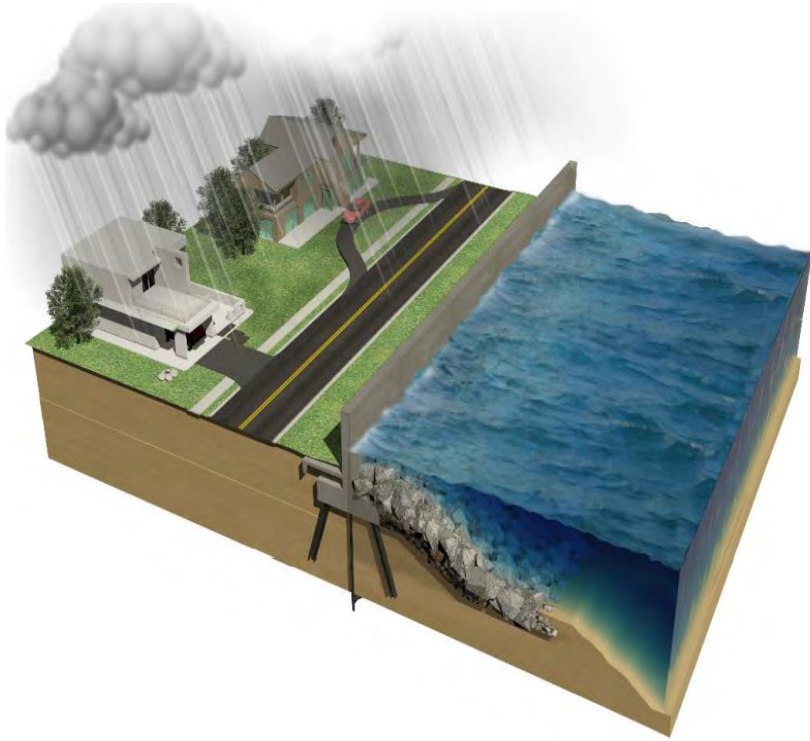
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# Lesson 3: Elevate, Buffer, add Redundancy

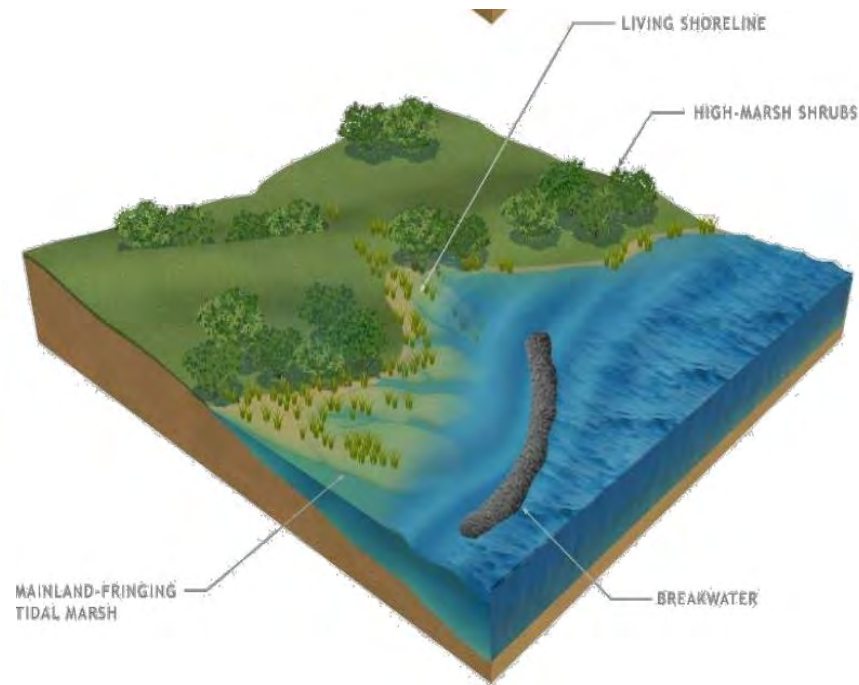
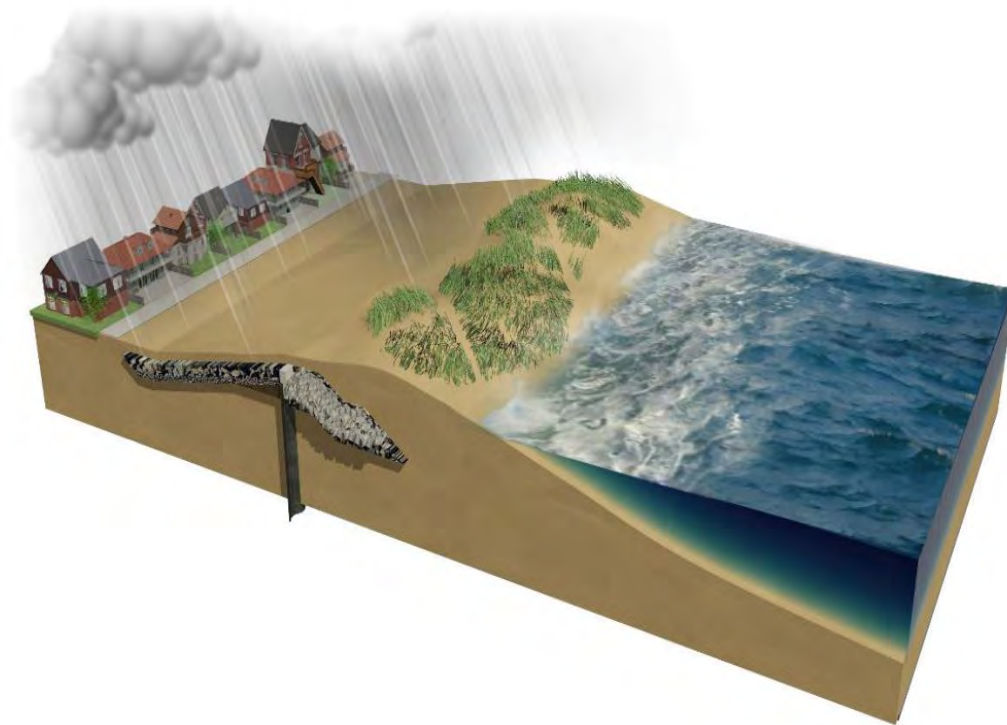
How do you stop the water, and what happens  
when you can't?



# Elevate, Buffer, Redundancy – Gray



# Elevate, Buffer, Redundancy – Green



# Dune Stabilization— In Action

## Broad Beach Restoration, Malibu, California



Pre-Project Conditions  
January 24, 2012 photo

# Vegetated Dune Systems

Bogue Banks, North Carolina

➔ Significant beach loss & property damage



Guess which ones had vegetated dunes?



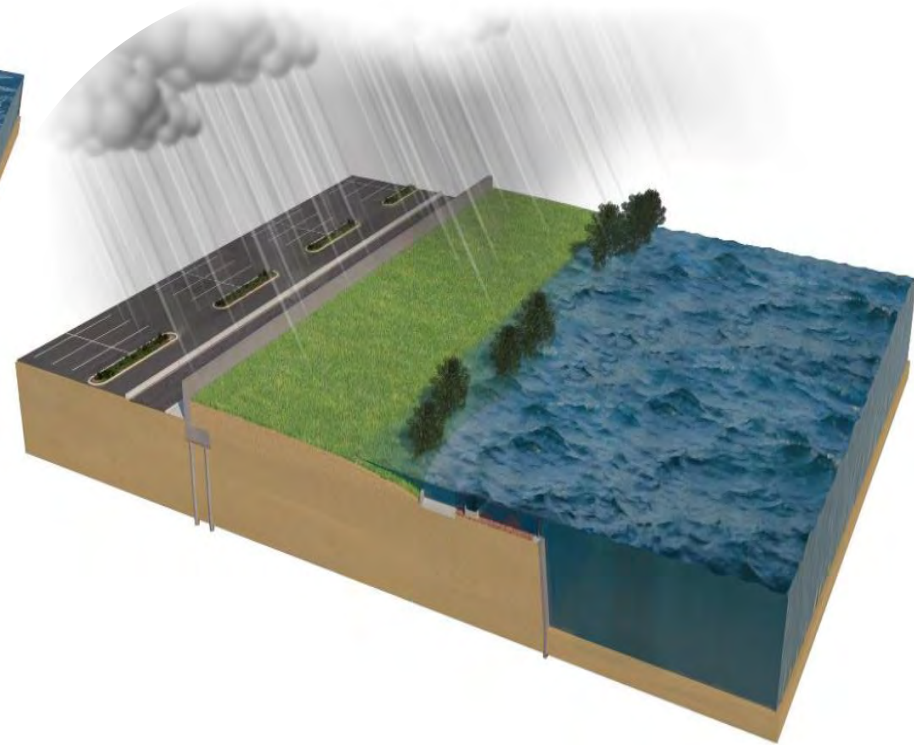
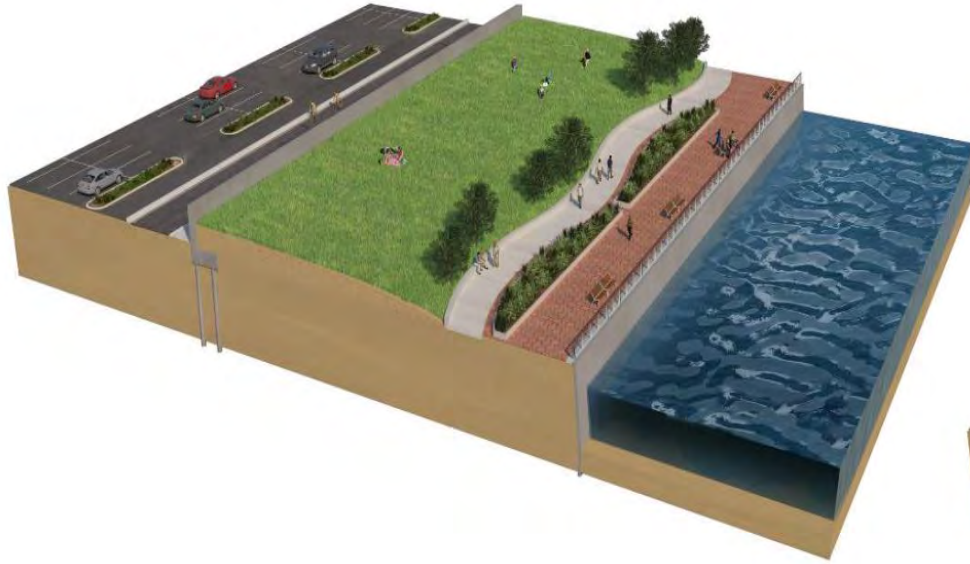
# Dune Stabilization— In Action

## Bogue Banks, North Carolina

➔ Holistic approach to beach management, with dune & berm design triggers

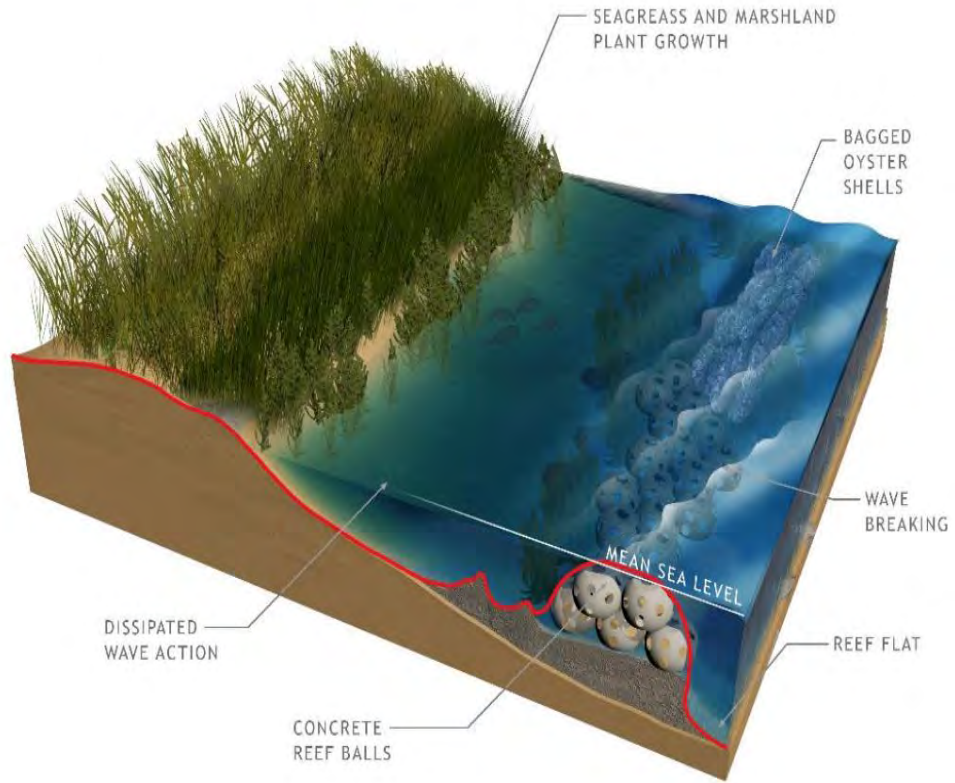


# Designs – Resilient By Nature



Letting the Water In

# It's all about the layers



# Lesson 4: Living Shorelines – In Action!

Applications and success stories

# Lightening Point Bayou La Batre, Alabama



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<https://www.youtube.com/watch?v=Ul6fyhot7UM&feature=youtu.be>

# Extra Credit!



Colorado  
Lagoon



Bolsa Chica &  
Huntington  
Beach  
Wetlands

Explore a wetland  
near us!



# Questions, Comments, Discussion

Thank you!



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## Huntington Beach Wetlands Restoration Huntington Beach, California





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Colorado Lagoon Restoration  
Long Beach, California





Seal Beach National Wildlife Refuge Thin Layer Placement & Huntington Harbour Dredging  
Seal Beach and Huntington Beach, California

