

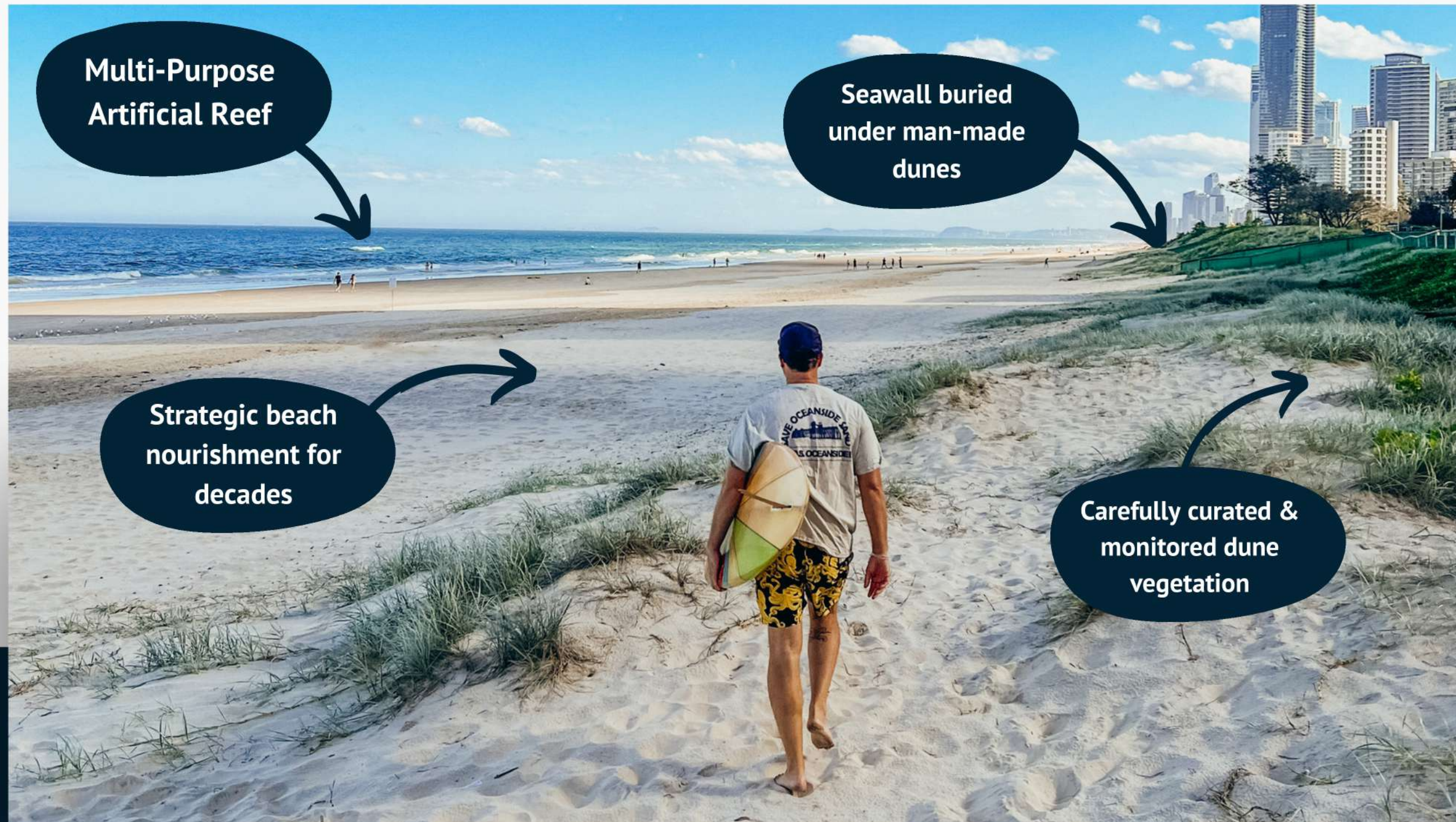
A Framework for Coastal Resilience:

Integrating Artificial Reefs, Nearshore Nourishment,
Dune Management & Artificial Headlands



**ONE OCEAN
SCIENCE
CONGRESS**

What's the solution?



Resilient

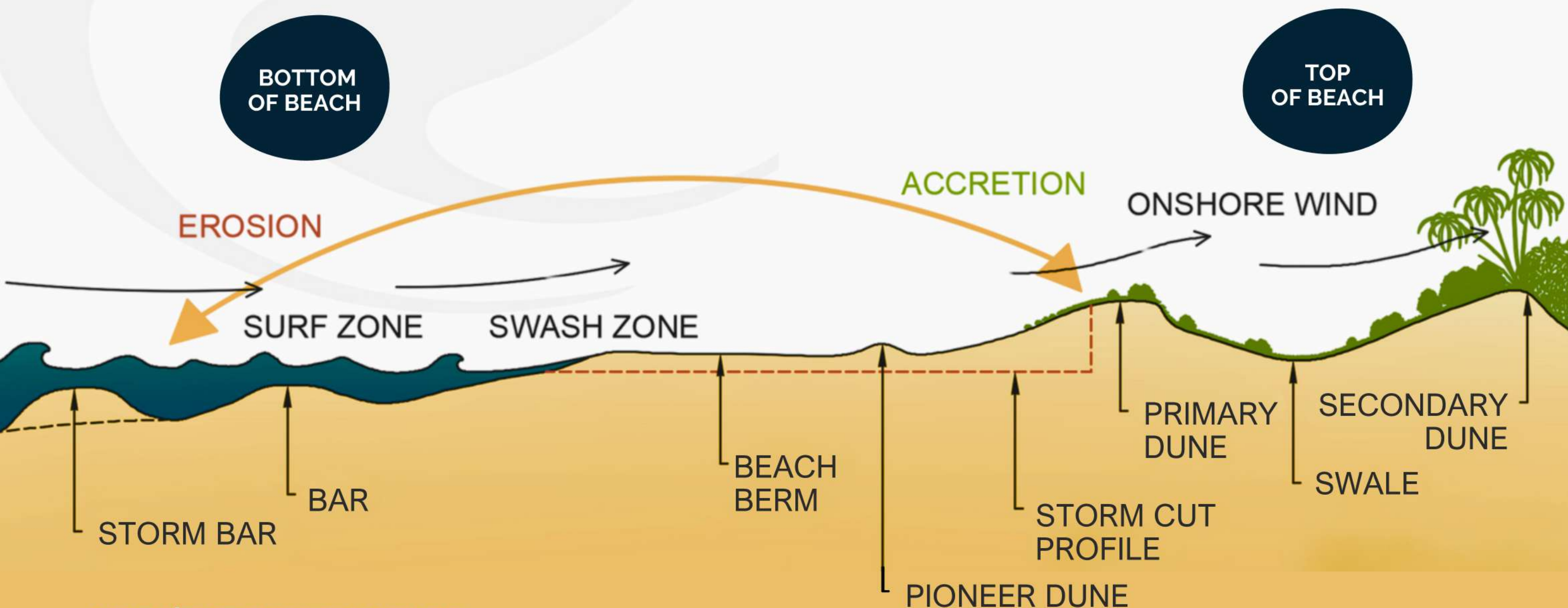
adjective

Able to return quickly to a previous good condition after problems or negative changes

Coastal resilience is about creating strategies to:

- ✓ Reduce erosive impacts
- ✓ Increase recovery potential
- ✓ Regenerate natural ecosystems

Many coastlines are naturally resilient



Environmental changes

Human influenced changes

.....

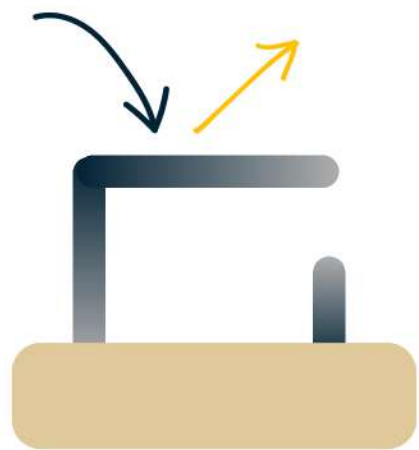


Our Solutions

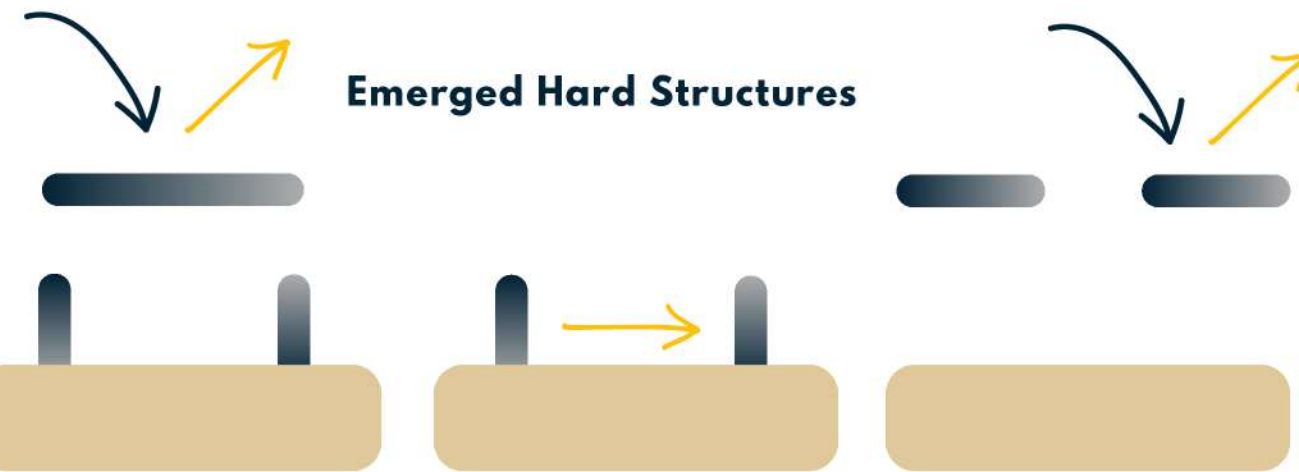
Conditions can
change

Solutions

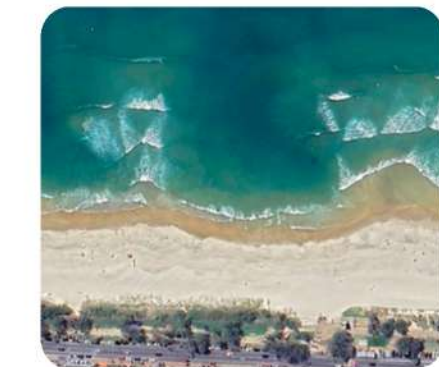
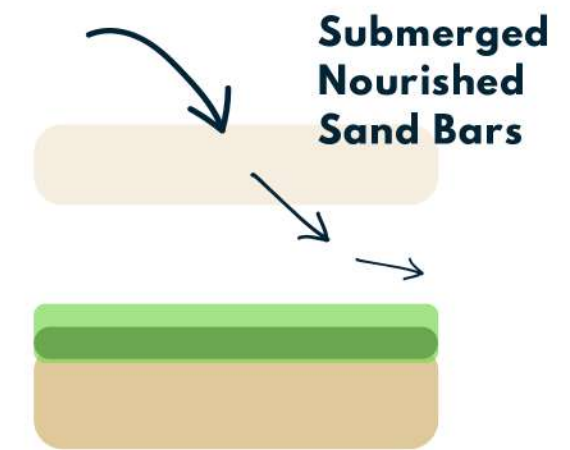
Working 'In' Nature vs 'With' Nature



Avoid natural processes



Change natural processes

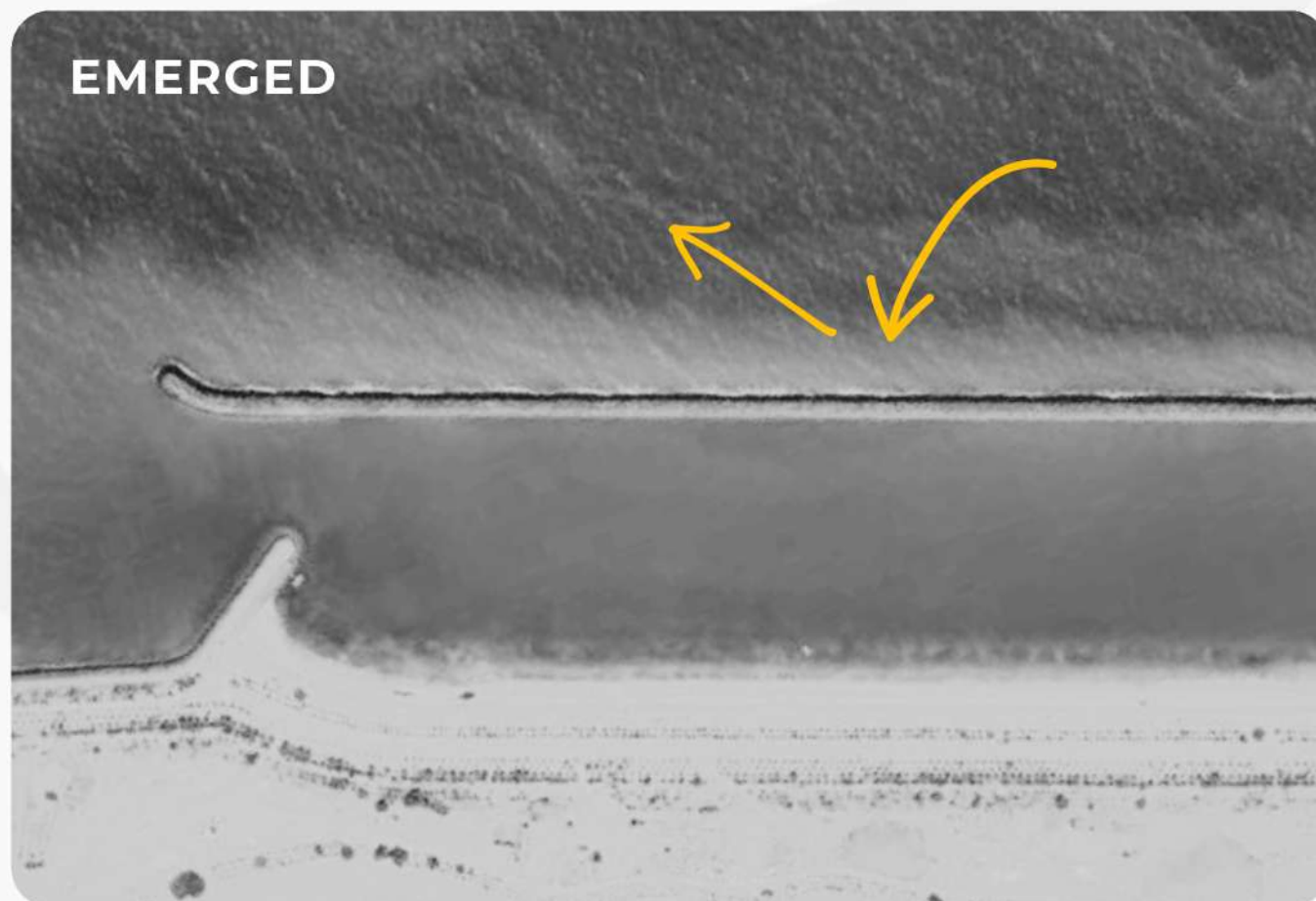


Reduce natural processes

Avoid vs Reduce

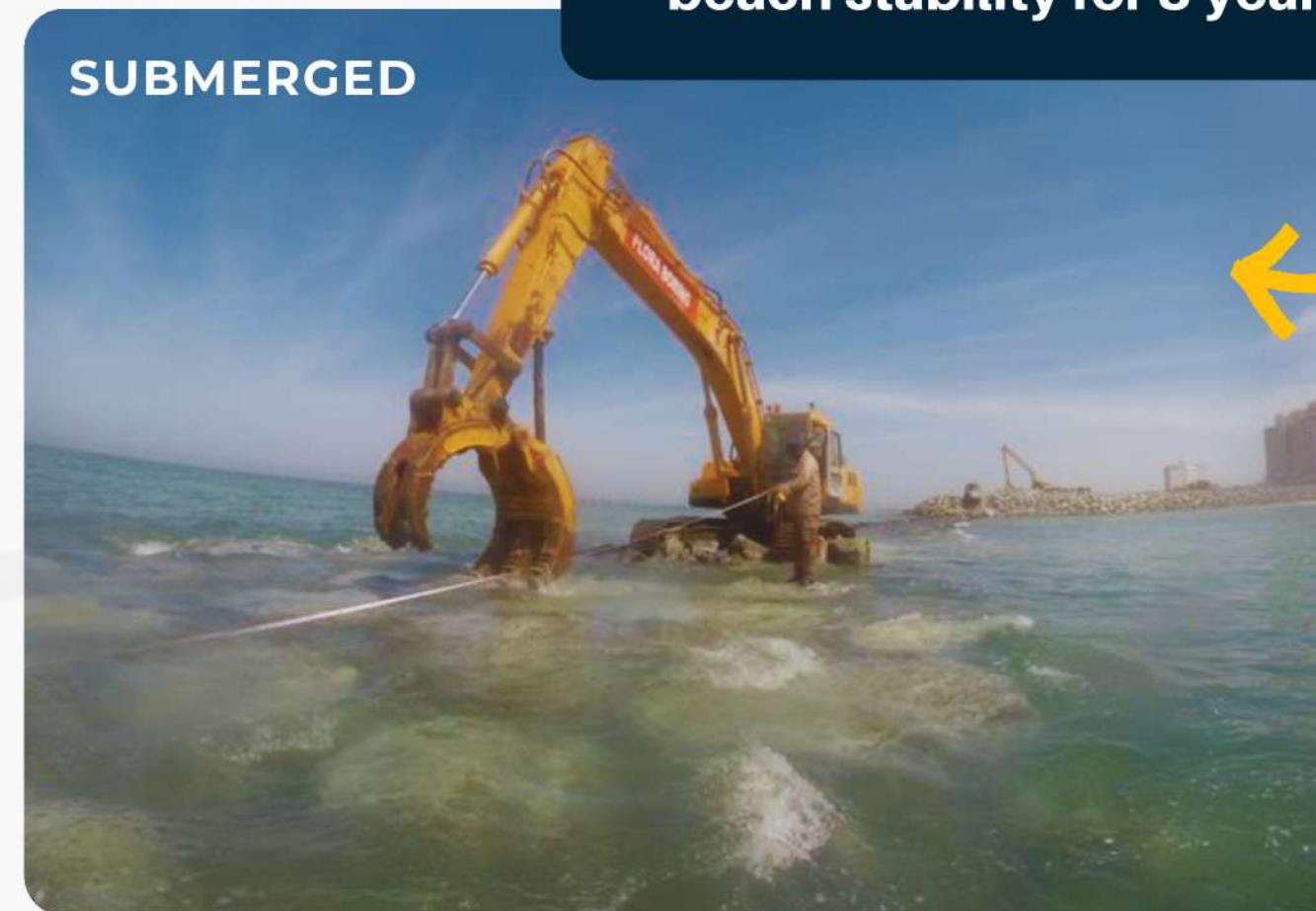
an example on the same coastline

EMERGED



Avoid natural processes

SUBMERGED



Reduce natural processes

Successfully guaranteed
beach stability for 8 years

The Gold Coast

A Story of Engineered Resilience

In the 1960's and 1970's the GC saw cyclonic events and extensive erosion

- Large volumes of sand stripped from the beaches and dune systems by waves and wind
- Loss of infrastructure triggered emergency works and rethinking of coastal protection

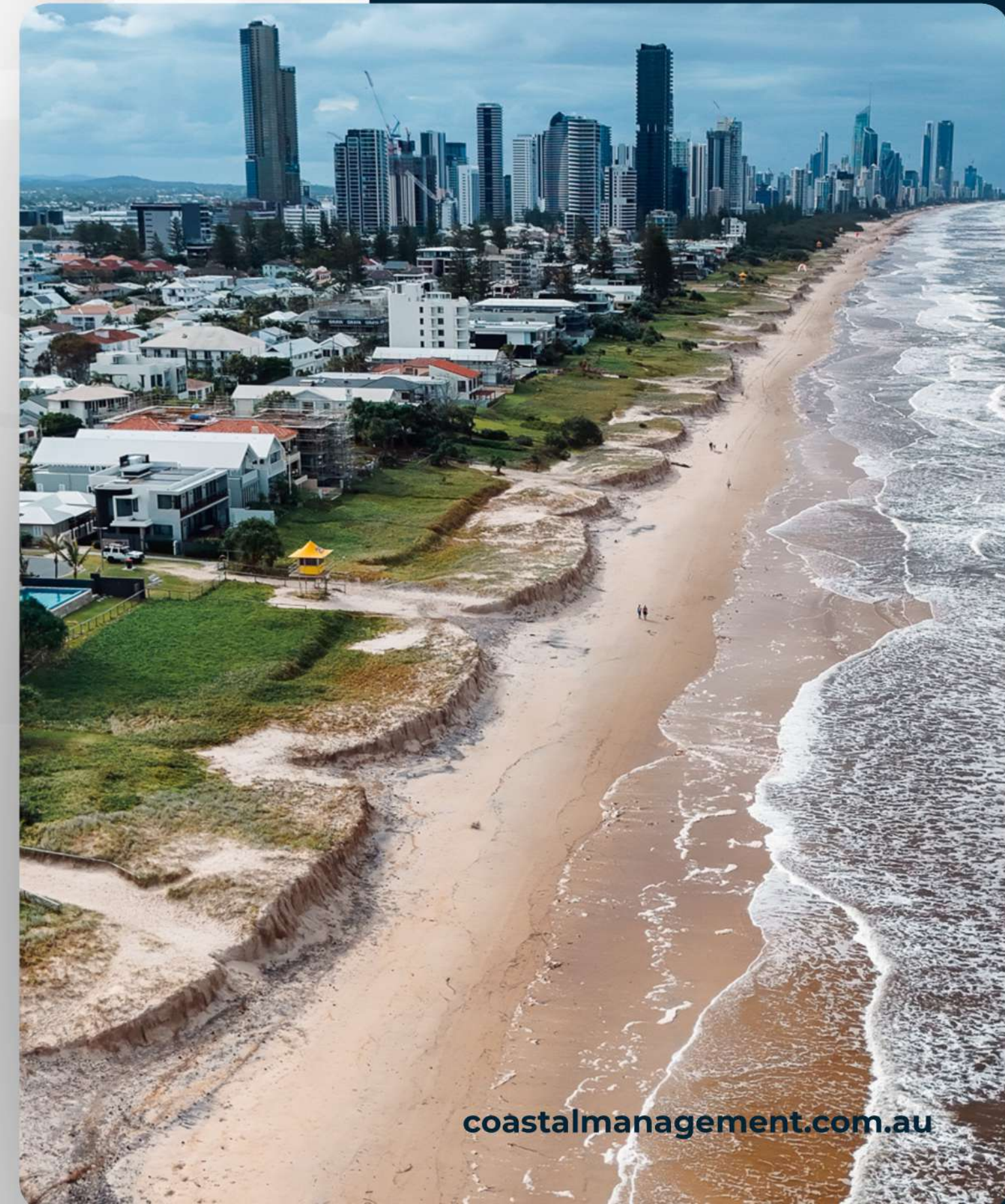
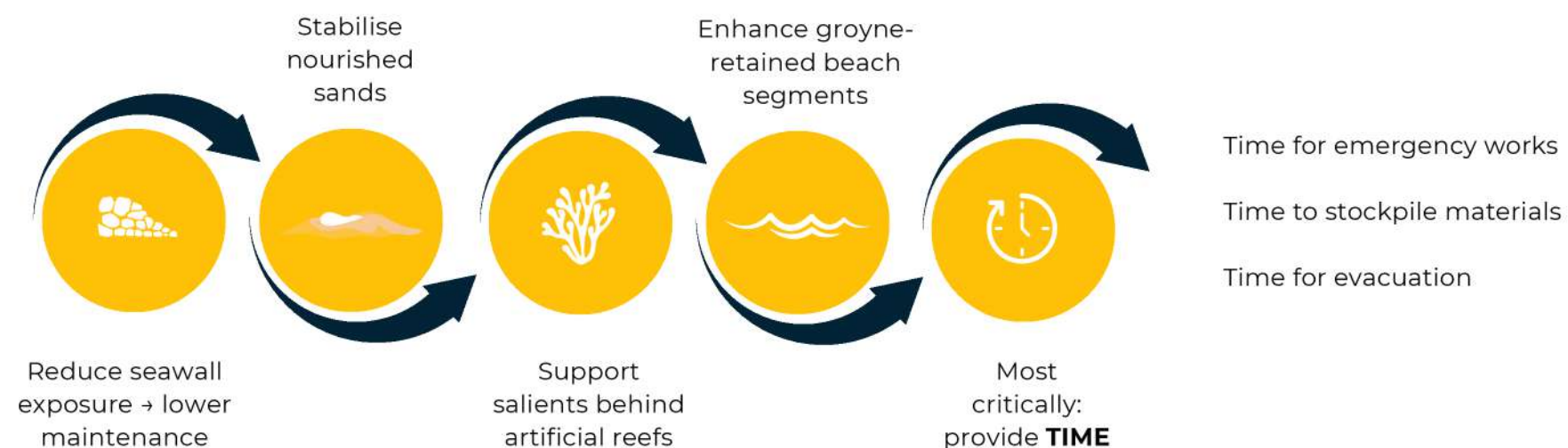


Cyclone Alfred '25

A Real-Life Stress Test

- Intense storm event with high wave energy and wind
- Severe erosion scarps formed up to 3m high
- **No significant damage to infrastructure**
- **Dunes functioned as designed: absorbing impact & preventing retreat beyond seawall**

Urban Dunes As Buffers

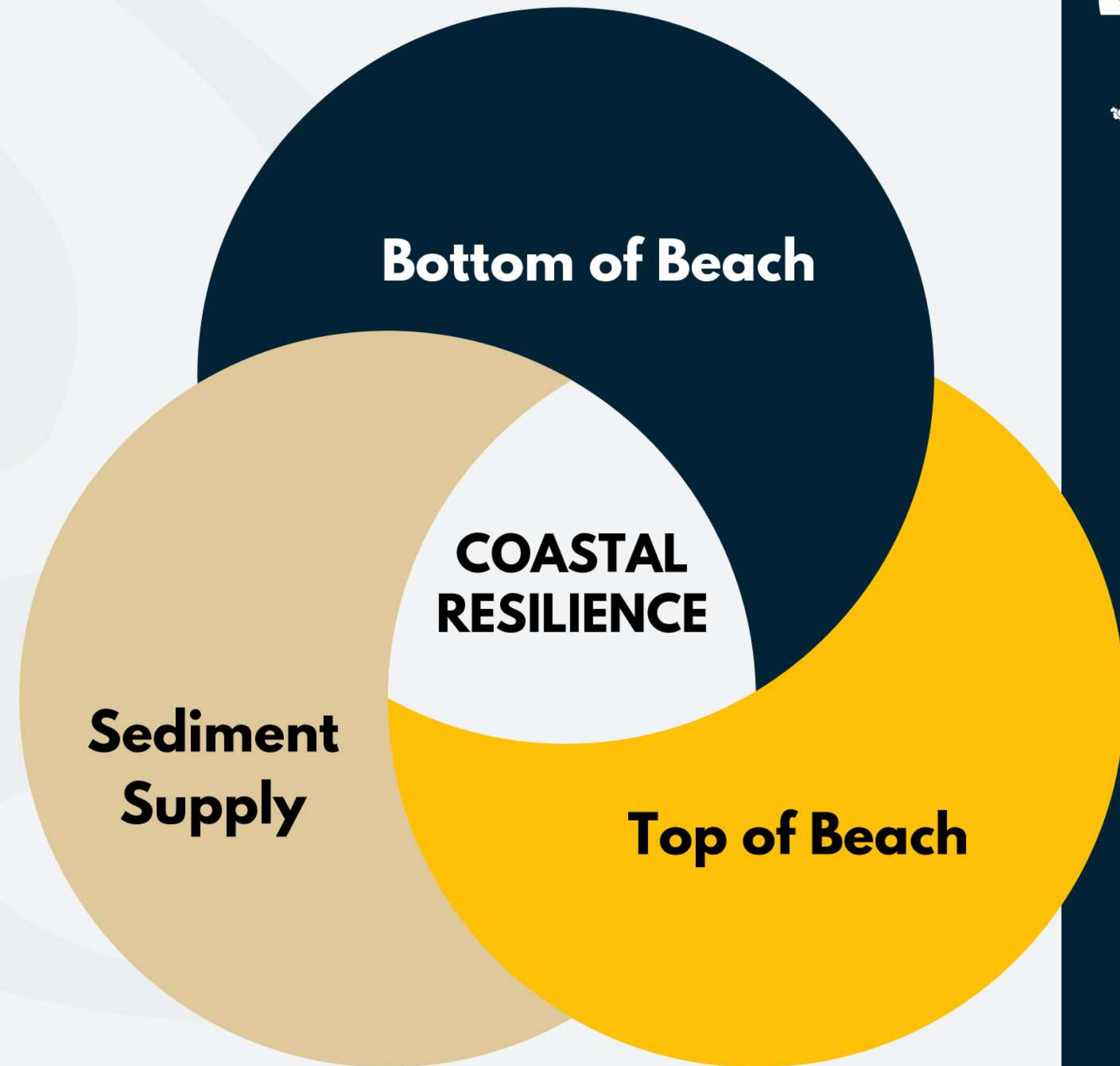


The Coastal Resilience Framework

- **BOTTOM OF BEACH**
Enhance the Subtidal Zone and Nearshore Stability
- **TOP OF BEACH**
Protect and Restore Dunes and Dry Beach Areas
- **SEDIMENT SUPPLY**
Ensure Balanced Sediment Movement and Sources

By integrating solutions that consider all three factors while allowing natural processes to thrive, this framework lays the foundation for building coastal resilience.

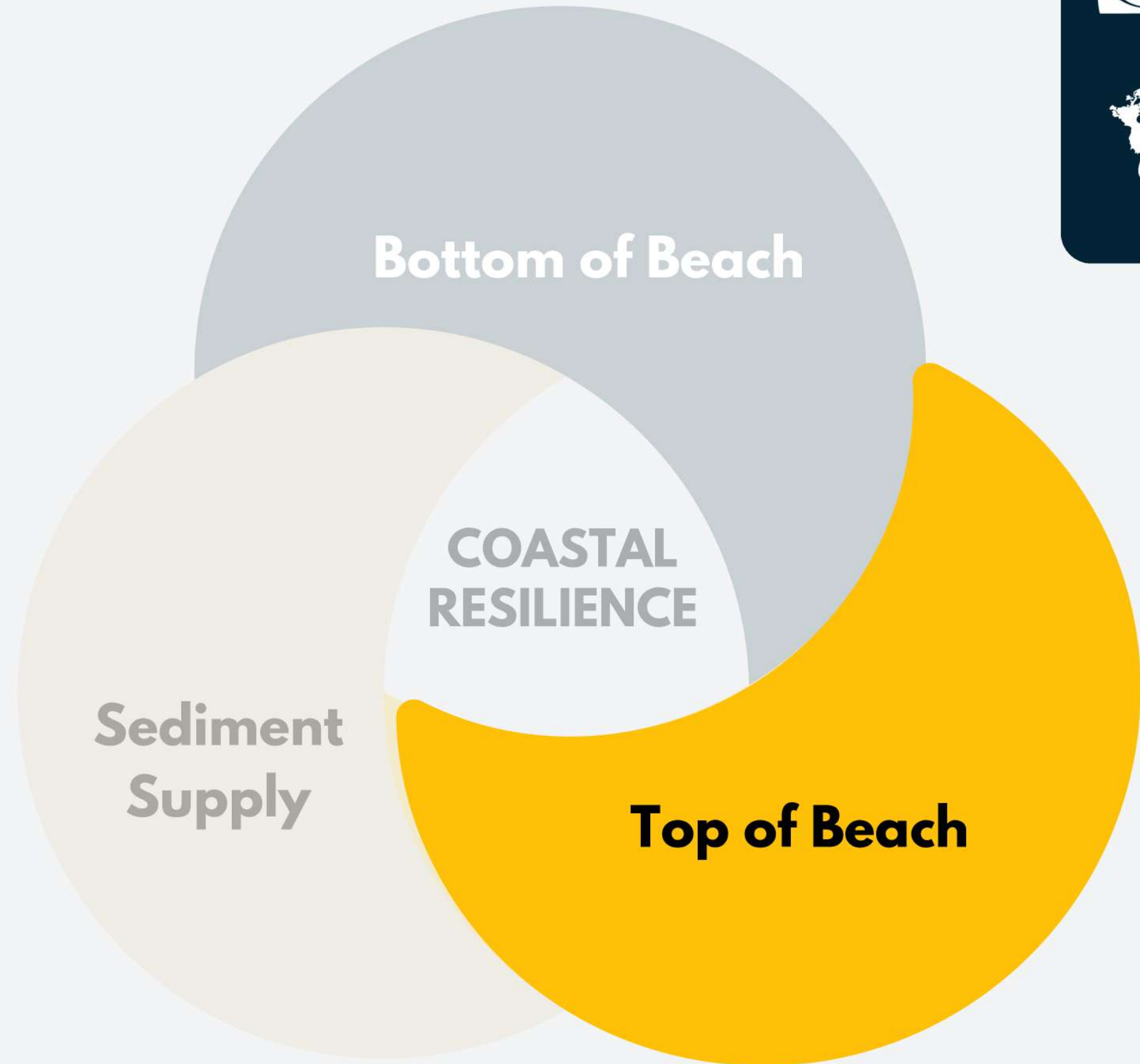
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Top of Beach

Dunes and Dry Sand Areas

- Nourishment & Dune Restoration
- Terminal (buried) structures
- Erosion Control Structures or Headlands





Seawall Construction

Boulder foundation
buried beneath sand
'last line defence'



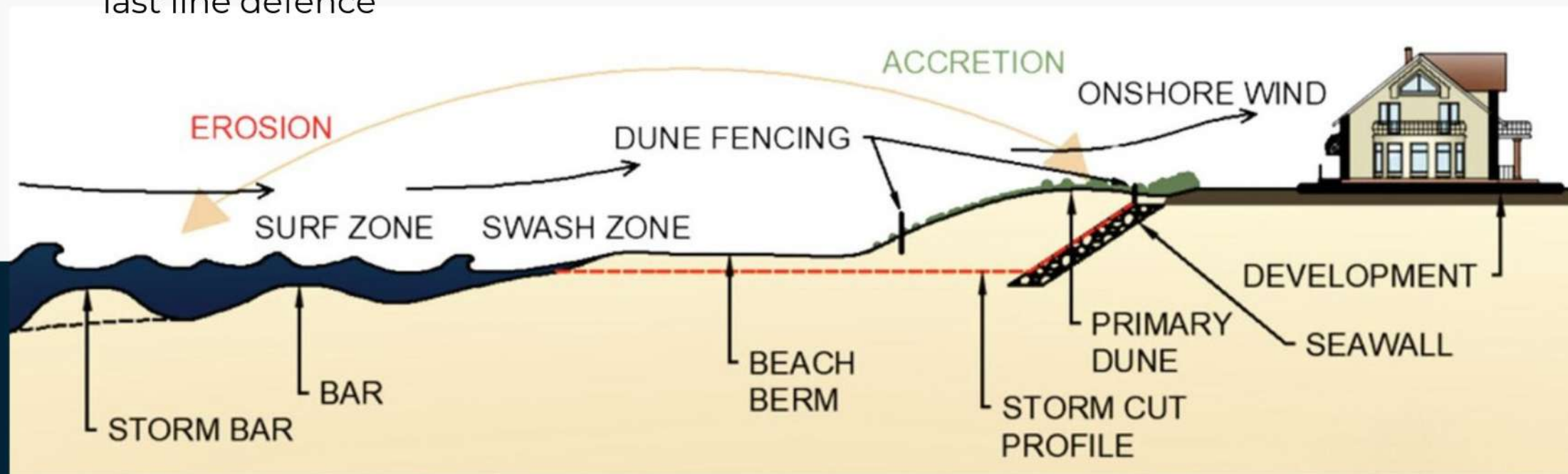
Dune Vegetation

Baby dunes planted
for stability



Established Dunes

Thriving, resilient coastal
protection

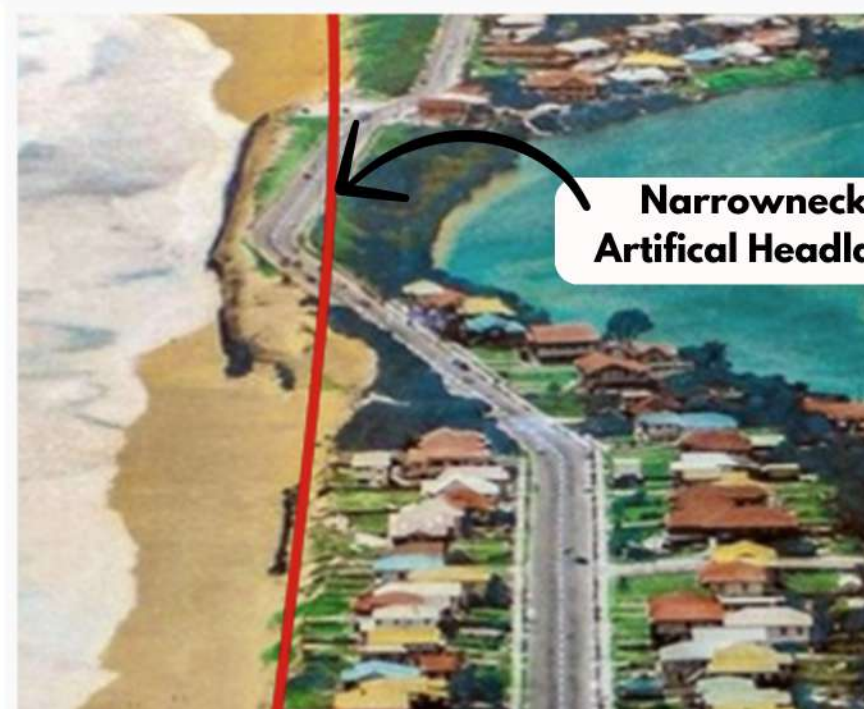


Engineered Dune System

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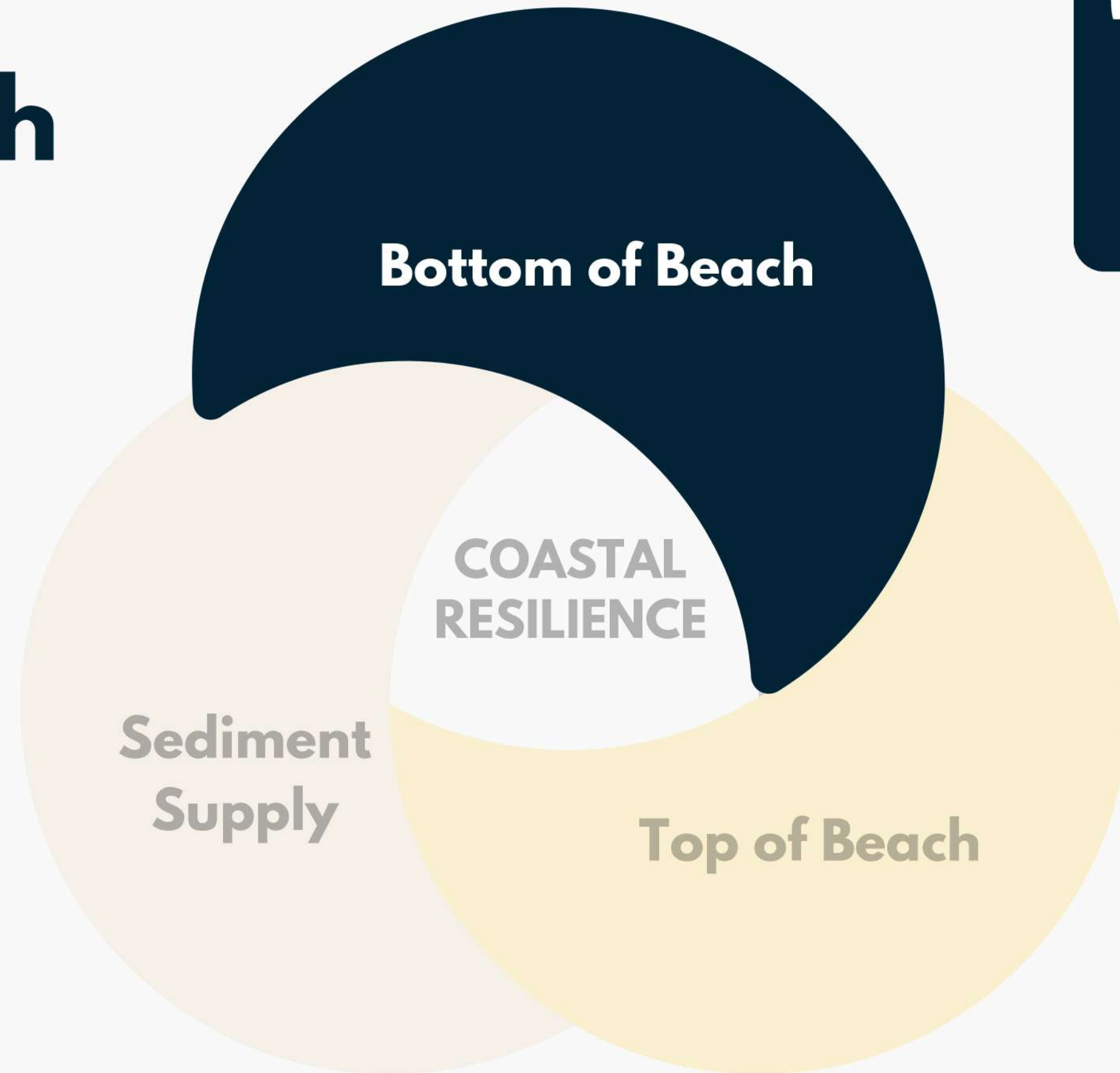
The Gold Coast Example
Erosion Control & Dune
Development

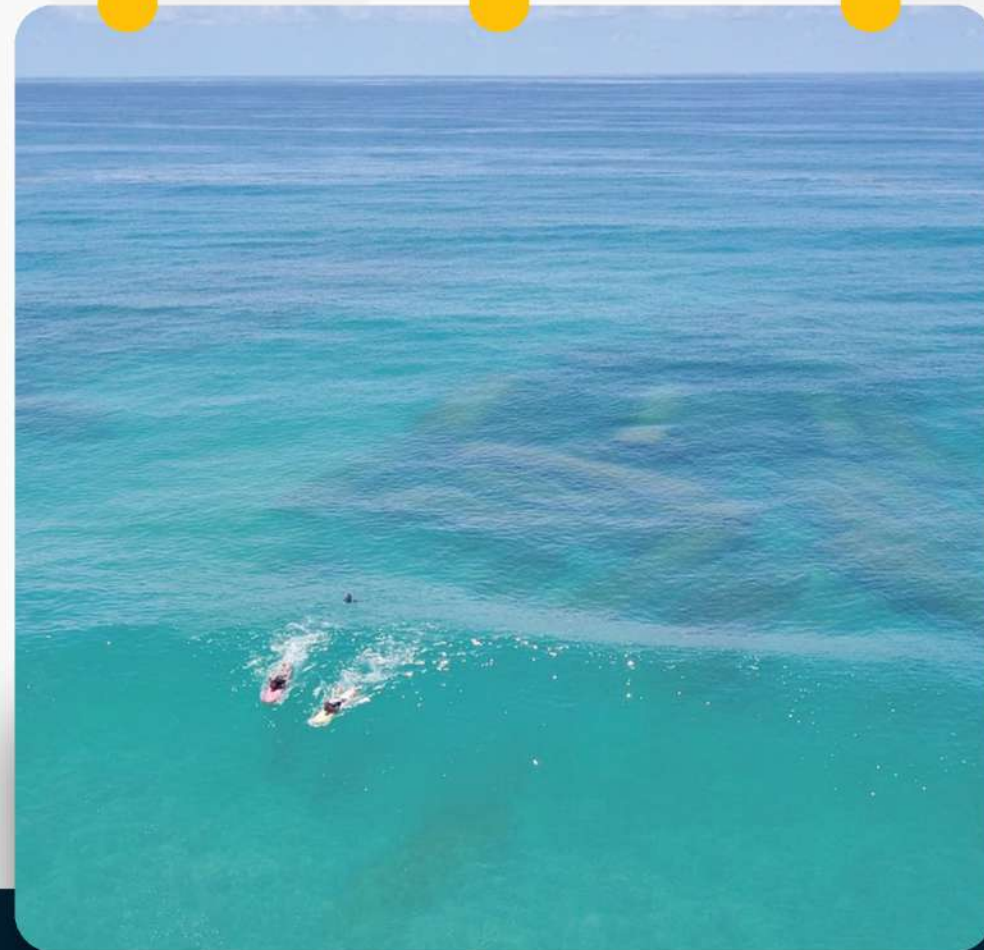


Bottom of Beach

Subtidal and Intertidal Zones

- > Artificial Reefs
- > Nearshore Nourishment
- > High quality monitoring





Multipurpose Artificial Reef

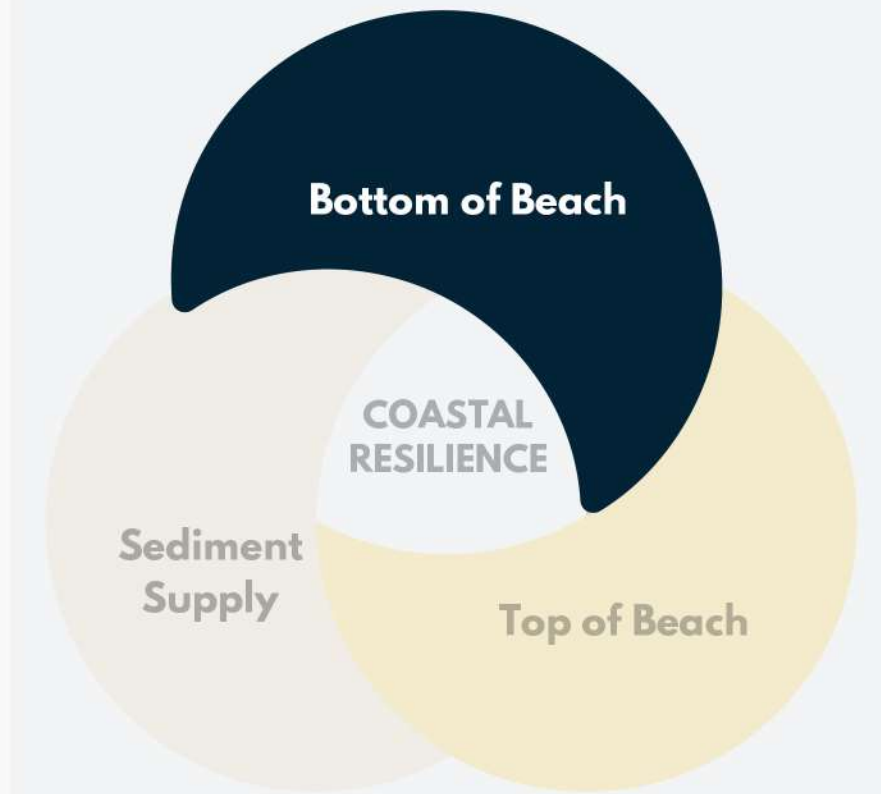
- Reduce storm wave energy
- Improve sand retention in nearshore area
- Improve local and regional ecology
- Provide user amenity



Nearshore Nourishment

Builds up the offshore sand bar

- A system piloted and proven on the Gold Coast and now used around the globe
- Either “rainbow” or bottom dump sand in offshore zone

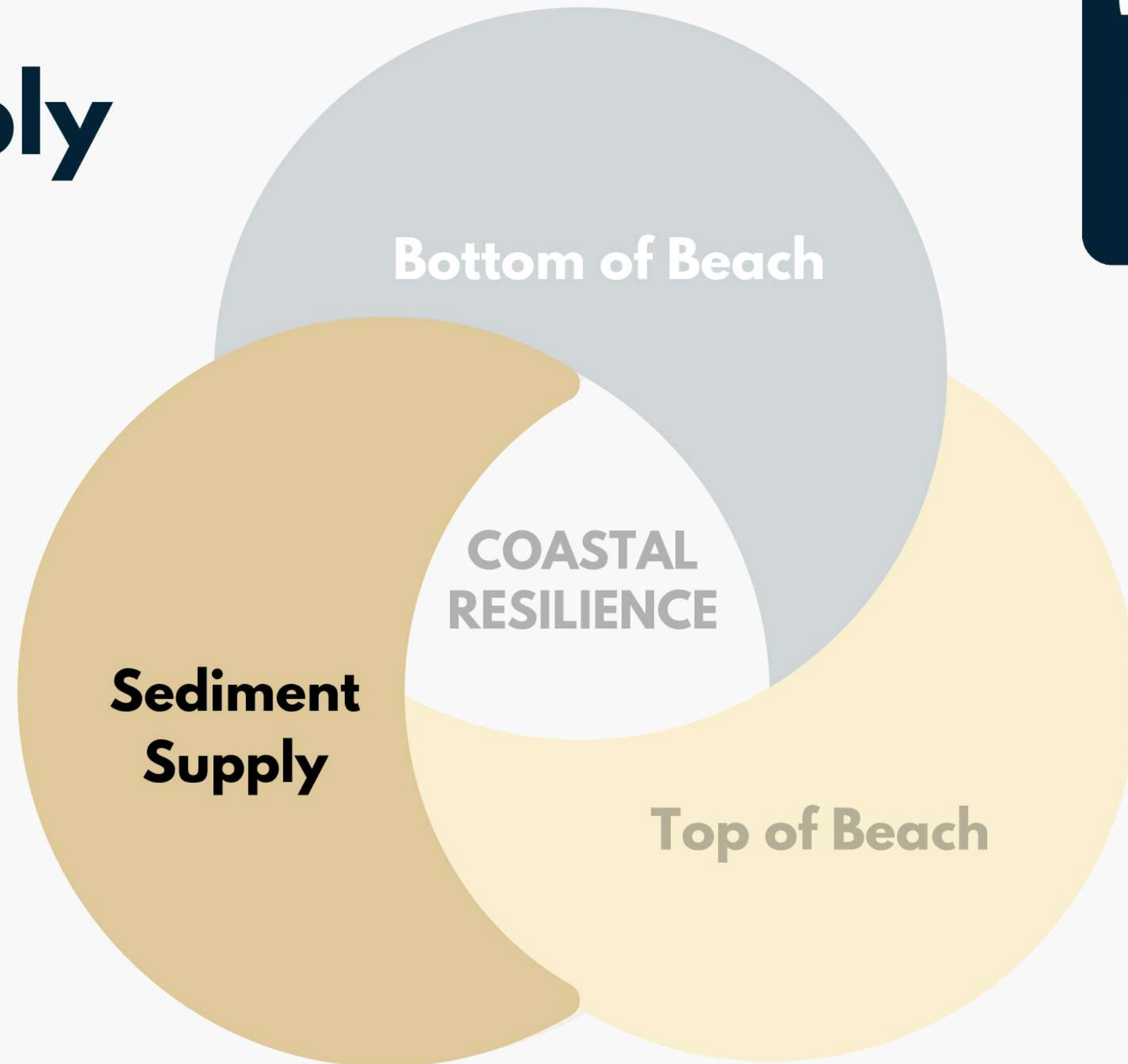


The Gold Coast Example
Nearshore Nourishment

Sediment Supply

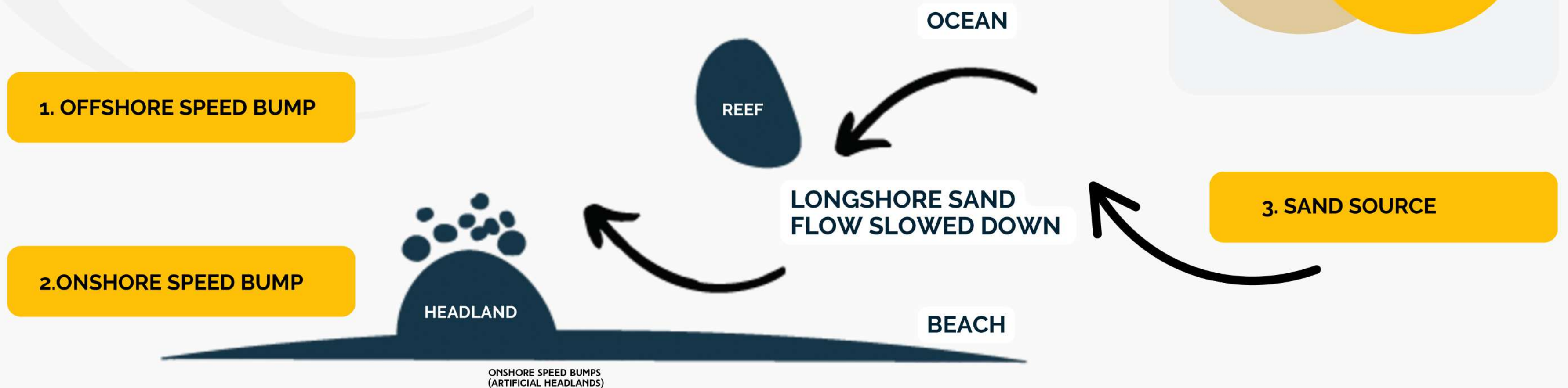
Sand Sources and Movement

- Sand bypass & backpass system
- Sediment Budget Analysis
- Sand management policies

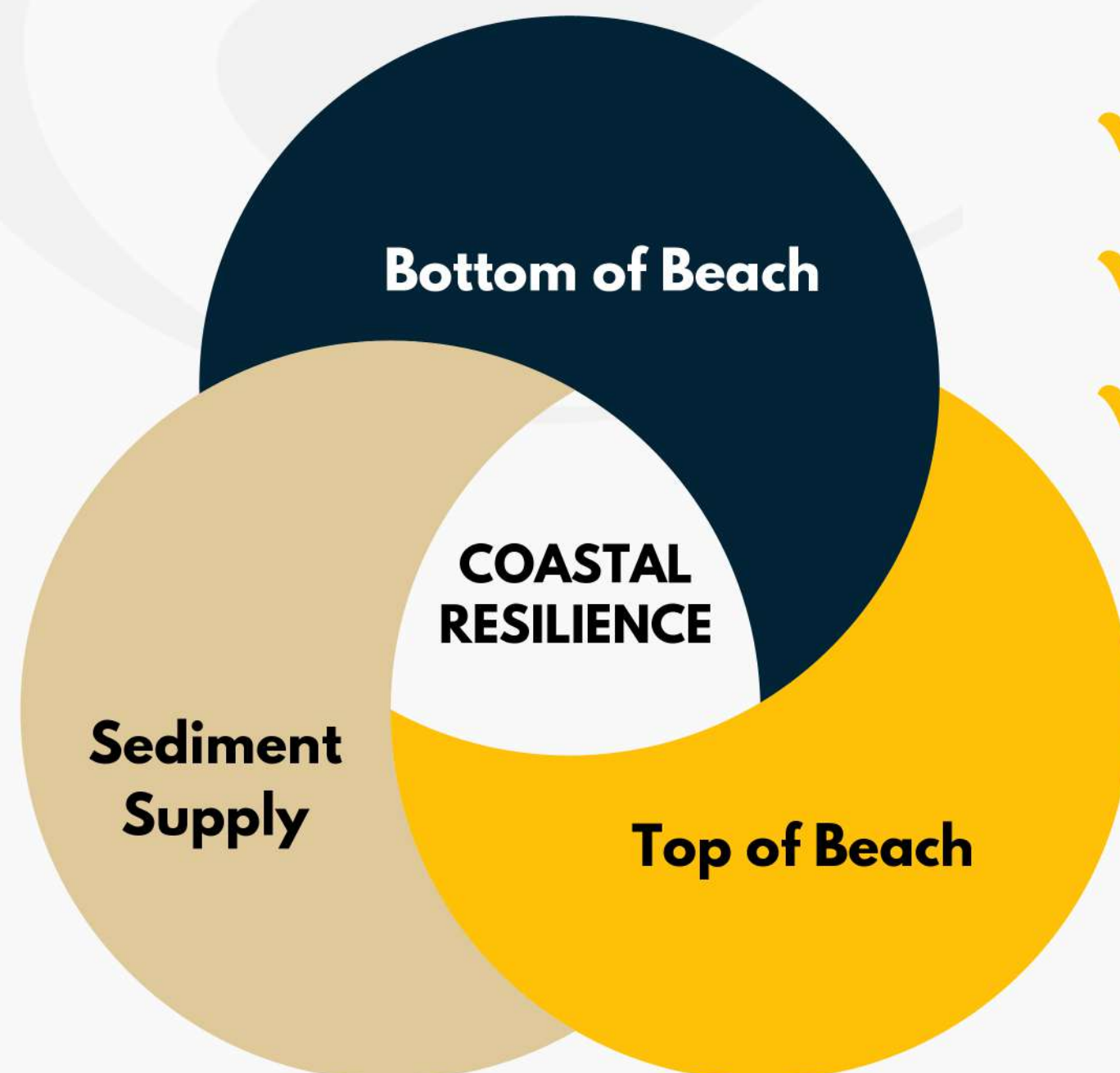


Working Together

The Living Speed Bumps



The Coastal Resilience Framework in Action



- ✓ Reduced erosive impacts
- ✓ Increased recovery potential
- ✓ Regenerate natural ecosystems



Resilient

adjective

Able to return quickly to a previous good condition after problems or negative changes

Let's Connect

Need coastal resilience solutions?

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SCAN HERE



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