



# Coastal Ecosystems

*Mangroves, Seagrass and Coral Reefs*

# Coastal Ecosystems

Mangroves, Seagrass Beds, Coral Reefs

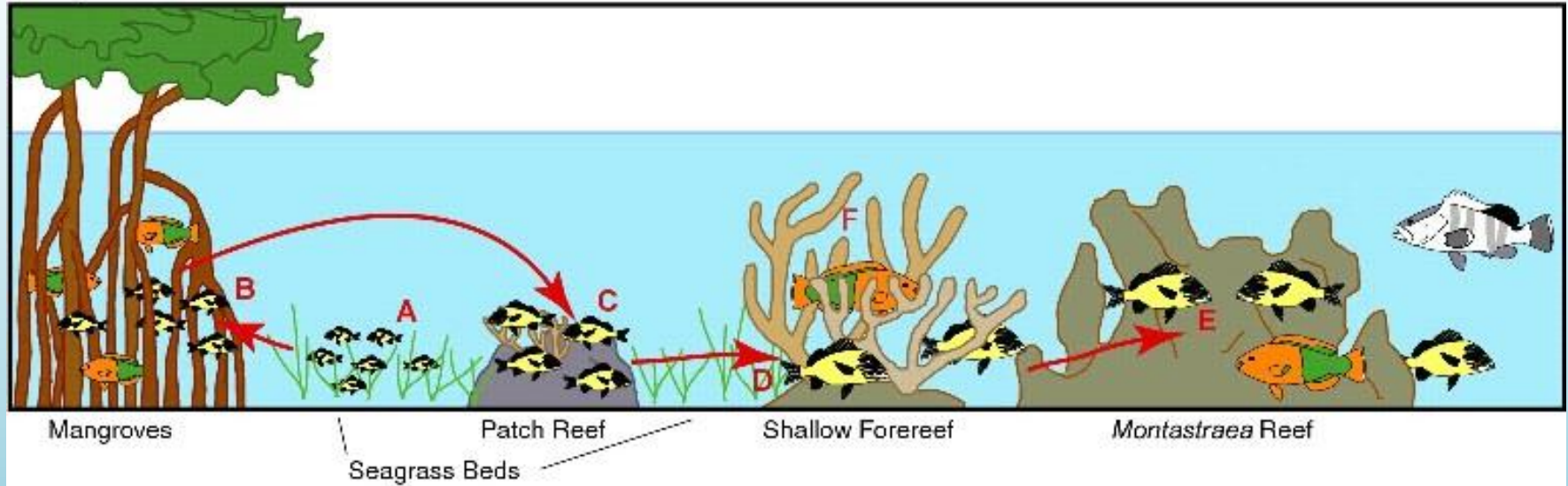


Organisms move between the three areas for food and shelter, daily or as part of their life cycle

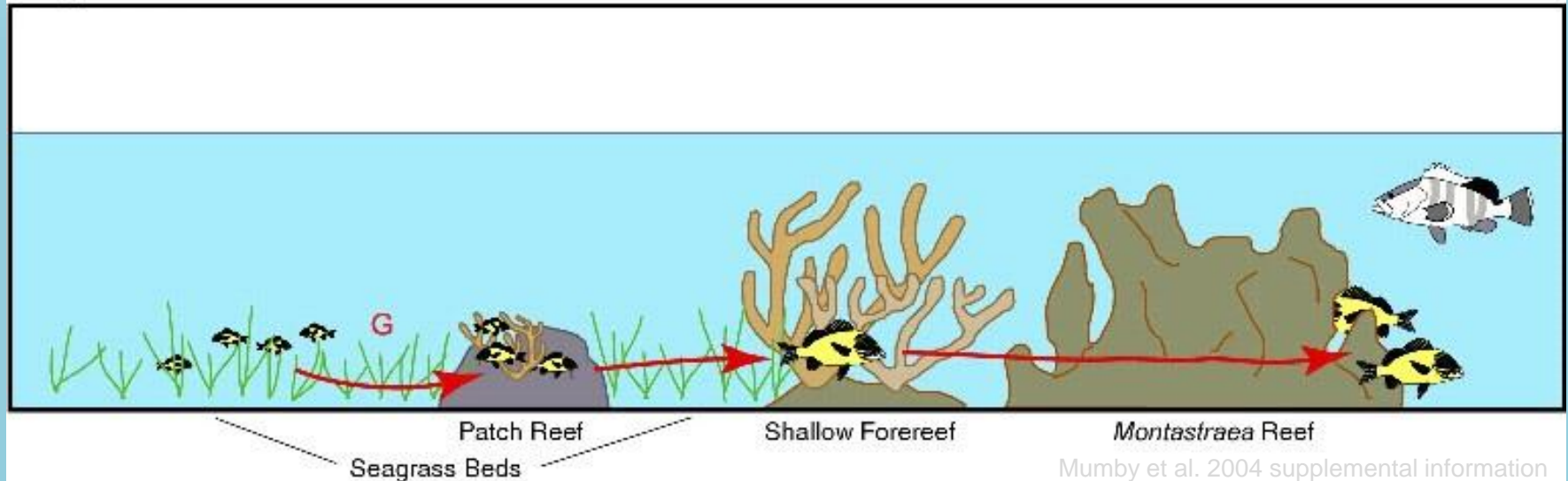


# Example - Mangrove Loss

## Mangroves Present



## Mangroves Absent



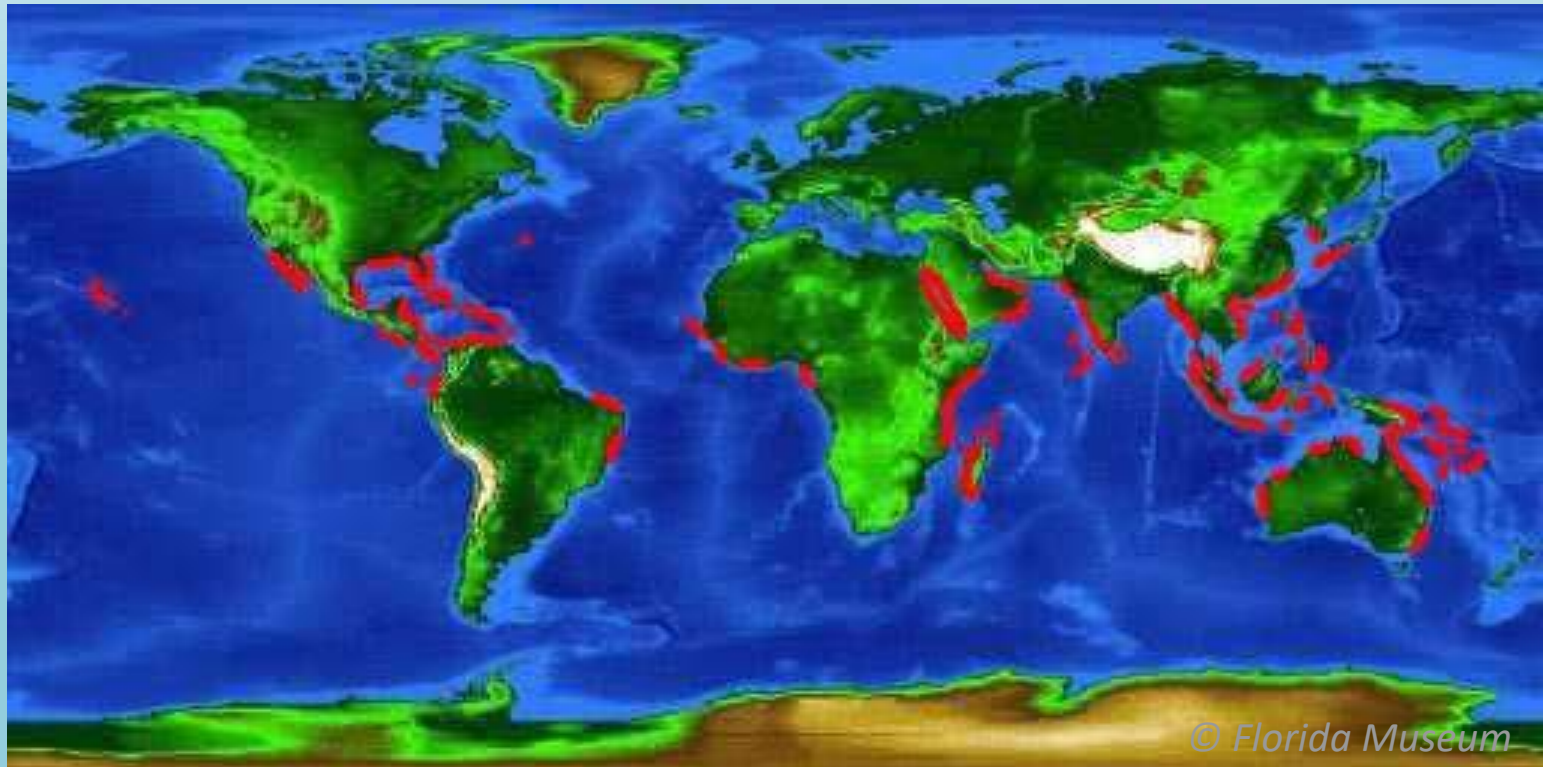
# We must protect the entire coastal lagoon

- High productivity
- Rich Biodiversity
- Ecosystem Services
  - Storm protection
  - Habitat
  - Nursery for commercially important species
  - Carbon storage
  - Clear water



# Let's Start With Mangroves

Found in tropical countries, growing along sheltered coastlines, ponds, rivers and lakes.



Mangroves are trees adapted to live near salt water.



# Mangroves

There are about 70 types of mangroves in the World.

Red, White and Black Mangroves and a close relative, Buttonwood are found in Cayman.





# Red Mangrove



- Flowers of the red mangrove are fertilized then begin to develop.

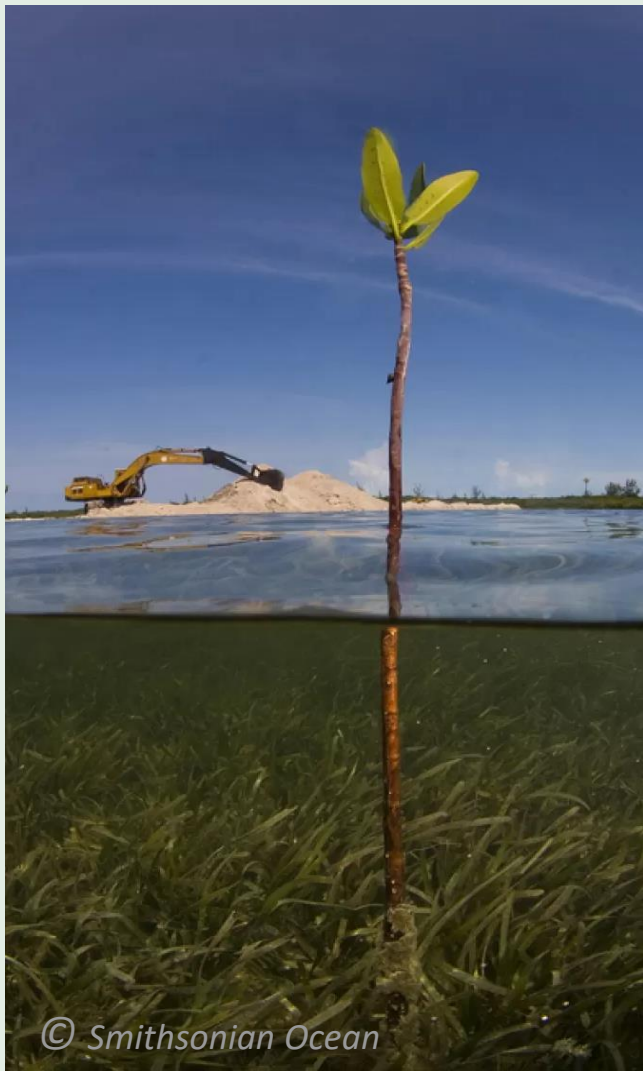
# Red Mangrove Seedling



- ▶ The propagule or seedling, does not drop from the tree immediately, but continues to grow on the parent tree until it is able to survive on its own.
- ▶ When it does drop off, the propagule can float. It is heavier at the root end, and eventually the lower end makes contact with soil and begins to grow.

# Red Mangrove





© Smithsonian Ocean

Seedling



Prop Roots

# Black Mangrove



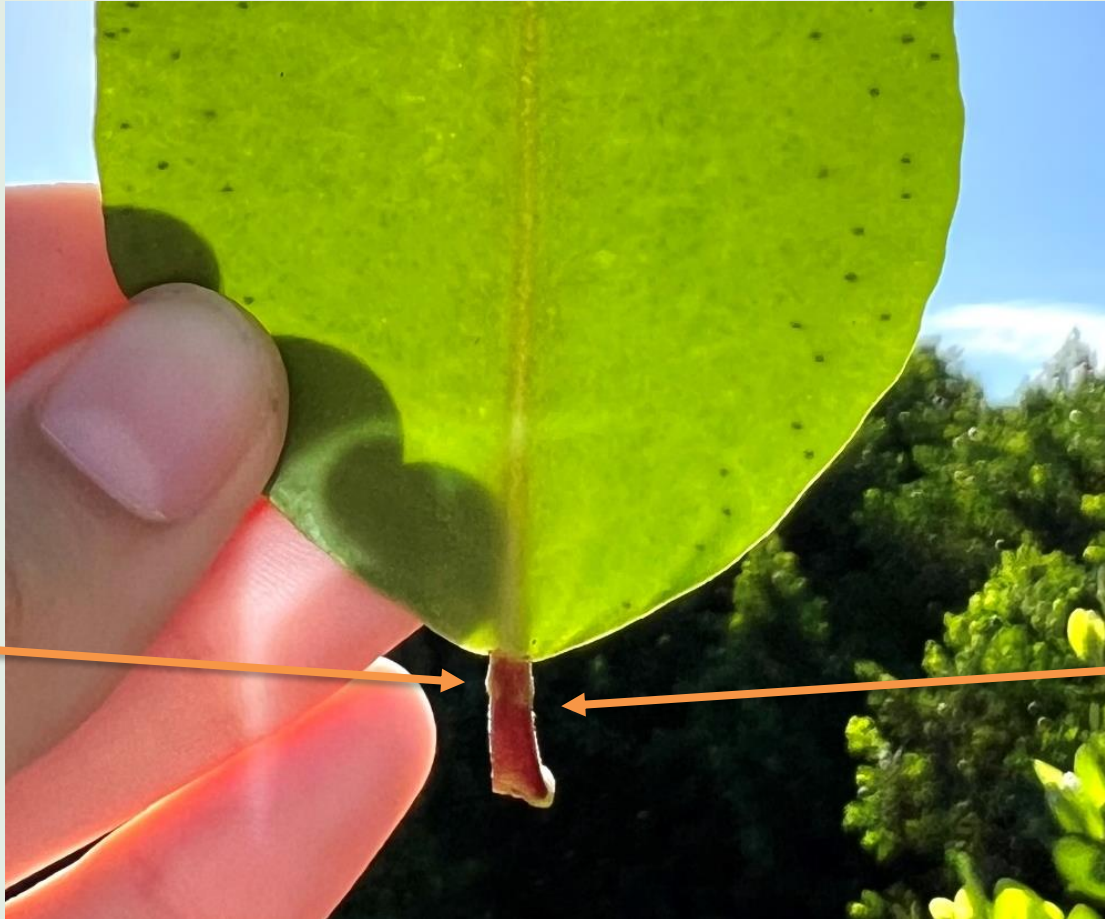
# Black Mangrove



# White Mangrove



# White Mangrove - Nectararies





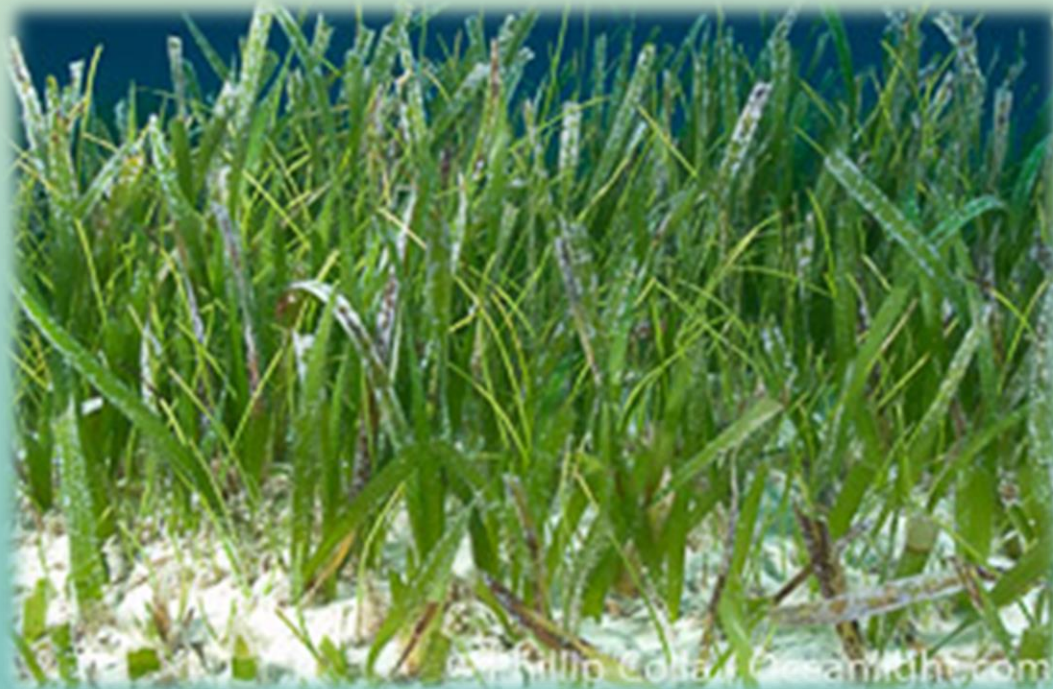
# Seagrass

- Seagrasses are found in shallow salty and brackish waters all over the world.



# Seagrass

- Seagrasses have roots, stems and leaves, and produce flowers and seeds. Just like other plants on land!
- They are one of the most productive ecosystems in the world.



# Seagrass

## Types of Seagrass in Cayman

Shoal Grass



Manatee Grass



Turtle Grass



# Seagrass

## Seagrass Benefits:

- Provide shelter and food to lots of different animals, from tiny invertebrates to large fish, crabs, turtles and birds.
- Support fisheries and biodiversity.
- Help clean surrounding water and remove carbon dioxide from the atmosphere.



© Smithsonian Ocean



© Cruising Guides

# Seagrass

Because of these benefits, seagrasses are believed to be the third most valuable ecosystem in the world



# Seagrass

## Threats to Seagrass:

- Coastal Development
- Dredging
- Unregulated boating and fishing
- Climate Change
- Pollution



© Oceanfnd.org



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© Broome Seagrass

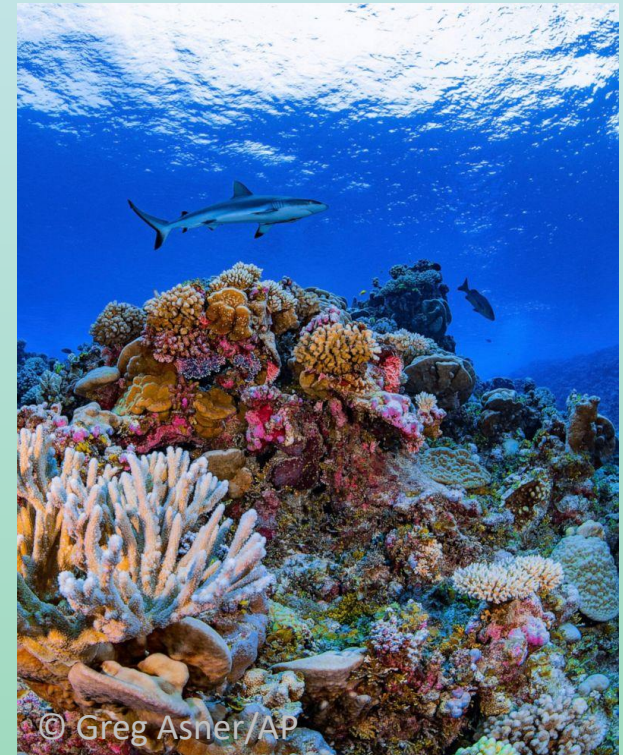
# Coral Reefs

- Coral Reefs are large underwater structures made up of many living animals called polyps.
- Each Polyp houses zooxanthellae which is an Algae.
- The Zooxanthellae have a symbiotic relationship with the Coral.



# Coral Reefs

- Coral Reefs come in all different shapes and sizes and are made up of hard and soft corals, sponges and gorgonians.
- They are one of the most productive and biodiverse ecosystems in the world.
- Coral Reefs provide many benefits to us!





# Coral Reefs

## Coral Reefs Benefits:

- Shoreline protection from storms and big waves
- Provide shelter and food to lots of different aquatic species.
- Support fisheries and biodiversity.
- Removes and stores carbon dioxide from the atmosphere (Blue Carbon)
- Major Tourism attraction





## BIODIVERSITY

Home to a quarter of the world's marine species.



## FOOD SOURCE

Provides food to more than 500 million people that live near the coast.



## TOURISM

Provide a livelihood for millions of individuals in the tourism industry

# CORAL REEF BENEFITS

**SHARE** this message so everyone can learn about the **environmental and economic benefits** that coral reefs provide to our planet.



## PROTECTION

They serve as natural marine barriers that protect coastal communities from high impact waves.



## MEDICINE

Important medicinal components have been found in several marine species that inhabit coral reefs.

### Did you know:

Scientists have estimated that 75% of the world's corals are at risk and at least 10% have already died.

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[wildcoast.net](http://wildcoast.net)

# Coral Reefs

## Threats to Coral Reefs:

- Coral Bleaching
- Coastal Development
- Sedimentation
- Eutrophication
- Destructive Fishing Practices
- Careless Tourism
- Invasive Species



All these ecosystems are interconnected and the survival of each is crucial for the others



# Mangroves provide many important functions important to the Cayman Islands:



- Ideal habitat for animals
- Nursery for fish
- Storm protection
- Shoreline protection
- Filters water
- Tourism and recreation
- Precipitation patterns
- Carbon storage
- Builds land
- Beauty and inspiration

# Habitat

Mangroves offer  
food and shelter for:



# Habitat

Mangroves  
offer food and  
shelter for:

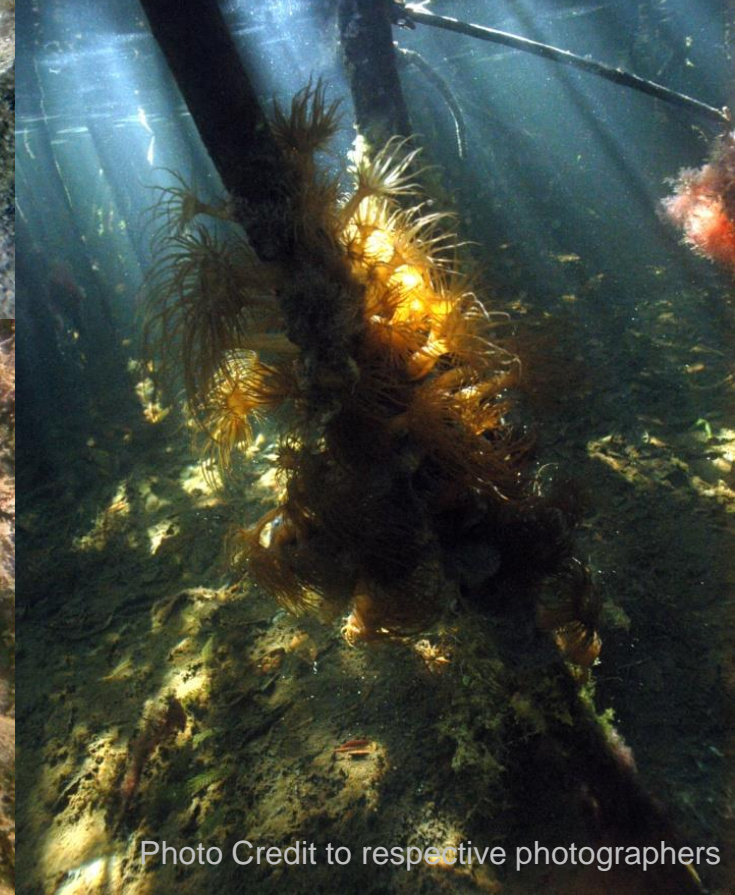
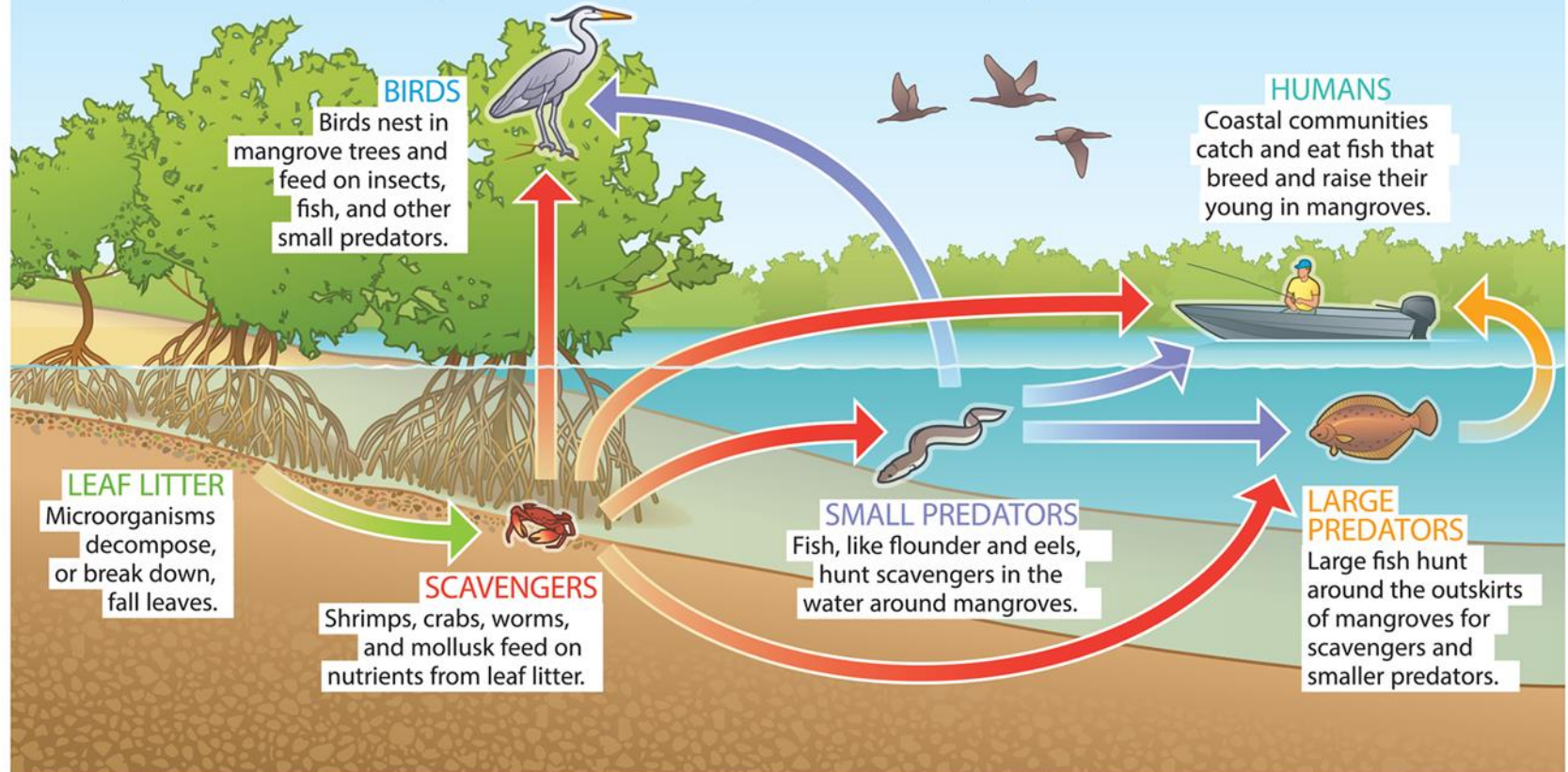


Photo Credit to respective photographers

# Mangrove Food Web

## MANGROVE FOOD WEB

Many species live in and around mangroves. Together, these organisms make up a complex food web in which organisms feed on plants and predators seek out prey.





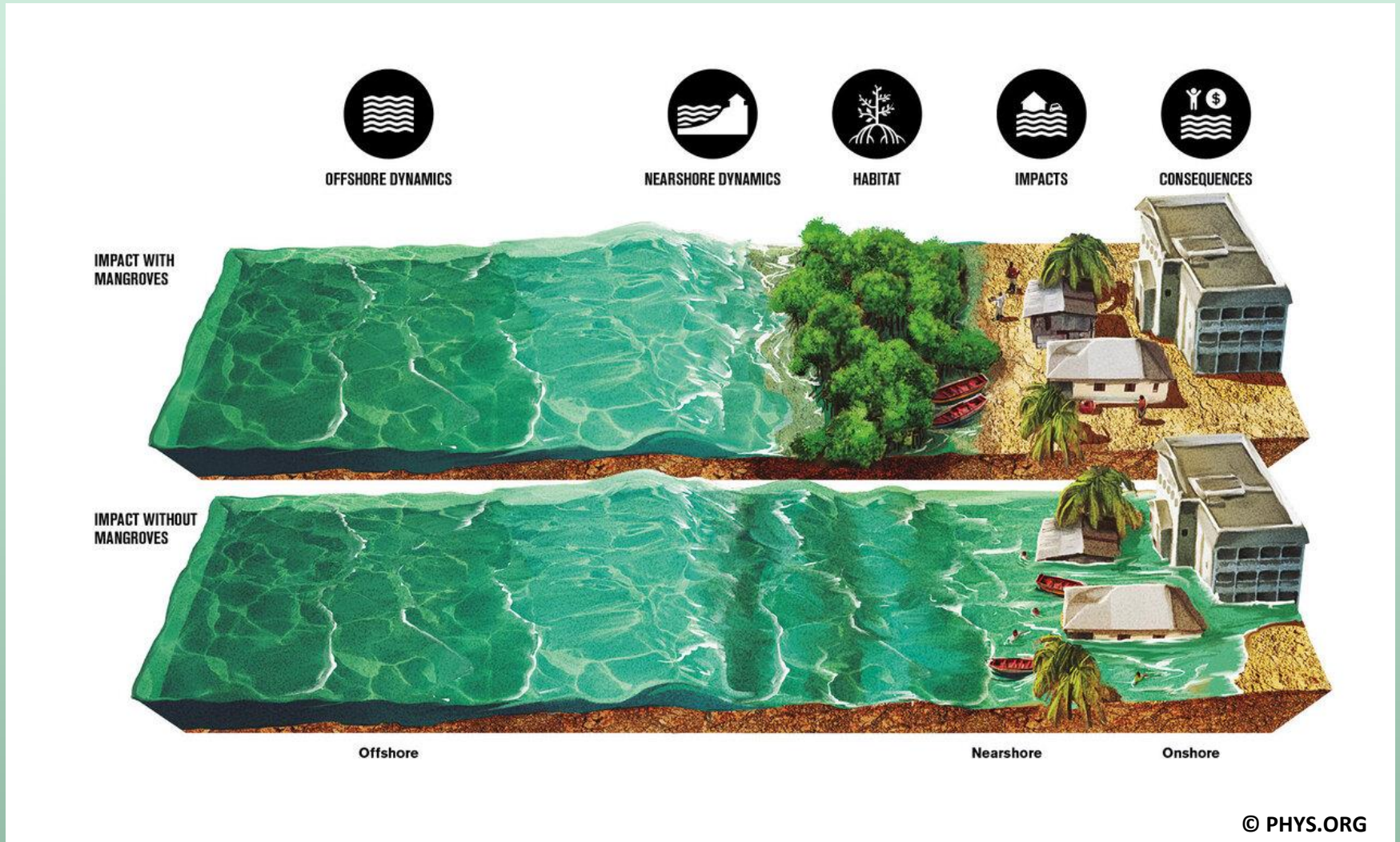
# Fish nursery

Baby fish can escape their predators by hiding in the roots.



# Storm protection

Mangroves provide a first line of defense against hurricanes on land.



# Shoreline protection

Mangroves and other plants help to secure beaches.



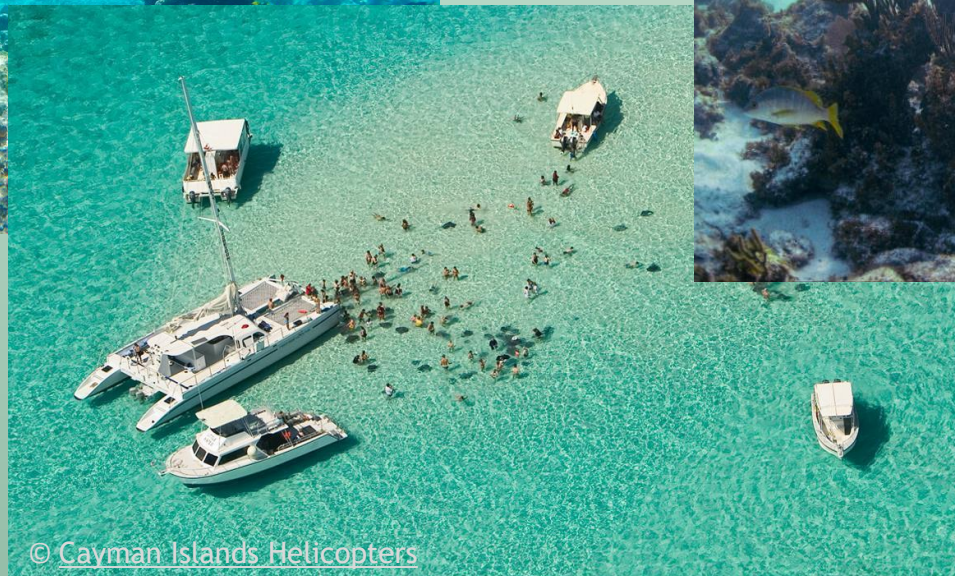
Barkers, Grand Cayman



Booby Pond, Little Cayman

# Clean, clear water

Mangroves play an important role in maintaining clear water and ensuring fish and nutrients for the reefs.



# Tourism

- Thousands of Cayman's tourists choose to visit the mangroves.



# Sport fishing

Sport fishermen seek bonefish, tarpon and snook around mangroves. Baitfish are netted here and even deep-sea fishing is directly related to mangroves.



© 10OUTDOORS



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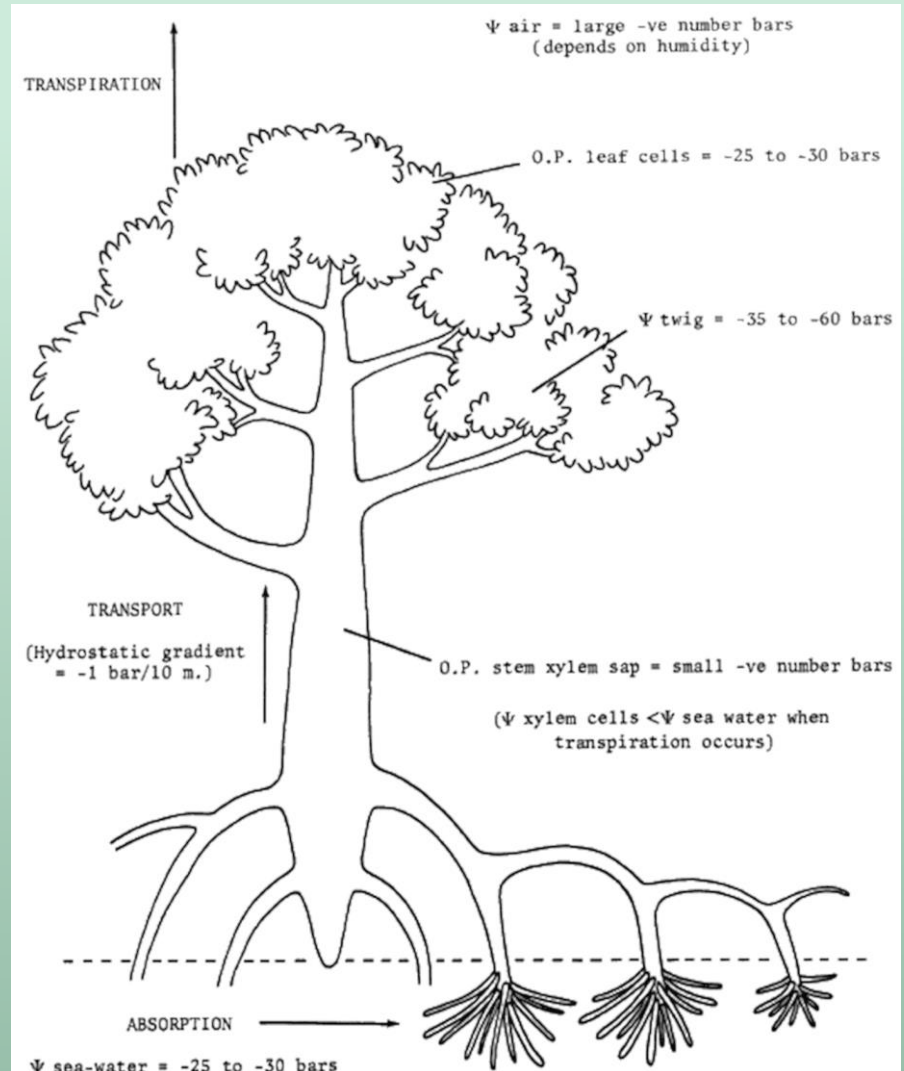
# Builds Land



- Mangroves build land at the rate of about 3mm/year by:
- Catching soil in their roots
- Dropping leaves and decaying roots
- Current sea level rise is about 3 mm/year!

# Precipitation Patterns

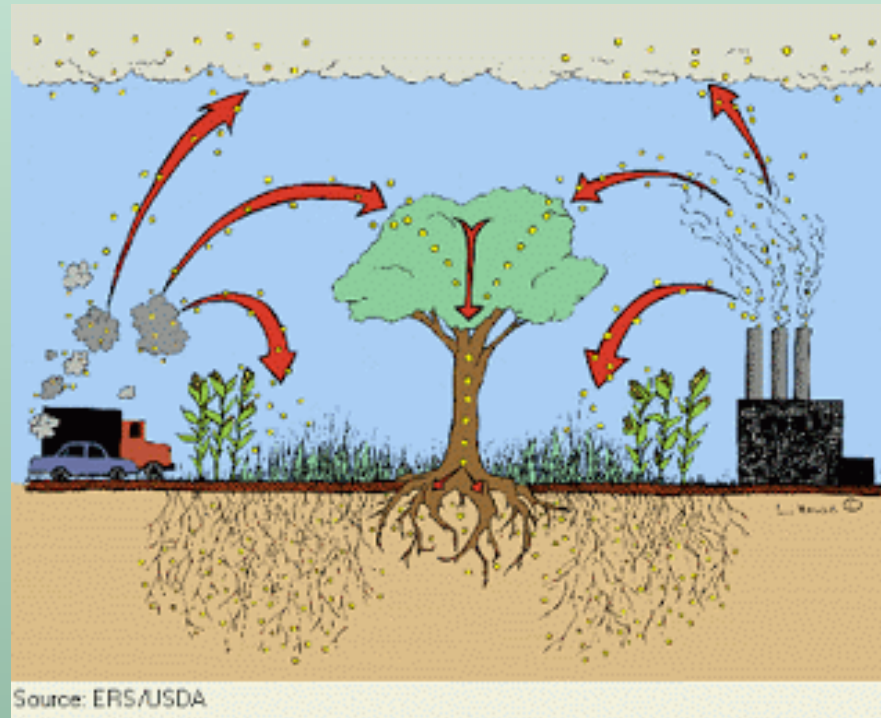
- Rainfall is greater in western areas of Grand Cayman than in the eastern districts. As more of the Central Mangrove Wetlands are removed and developed, George Town and West Bay will see less and less rainfall.



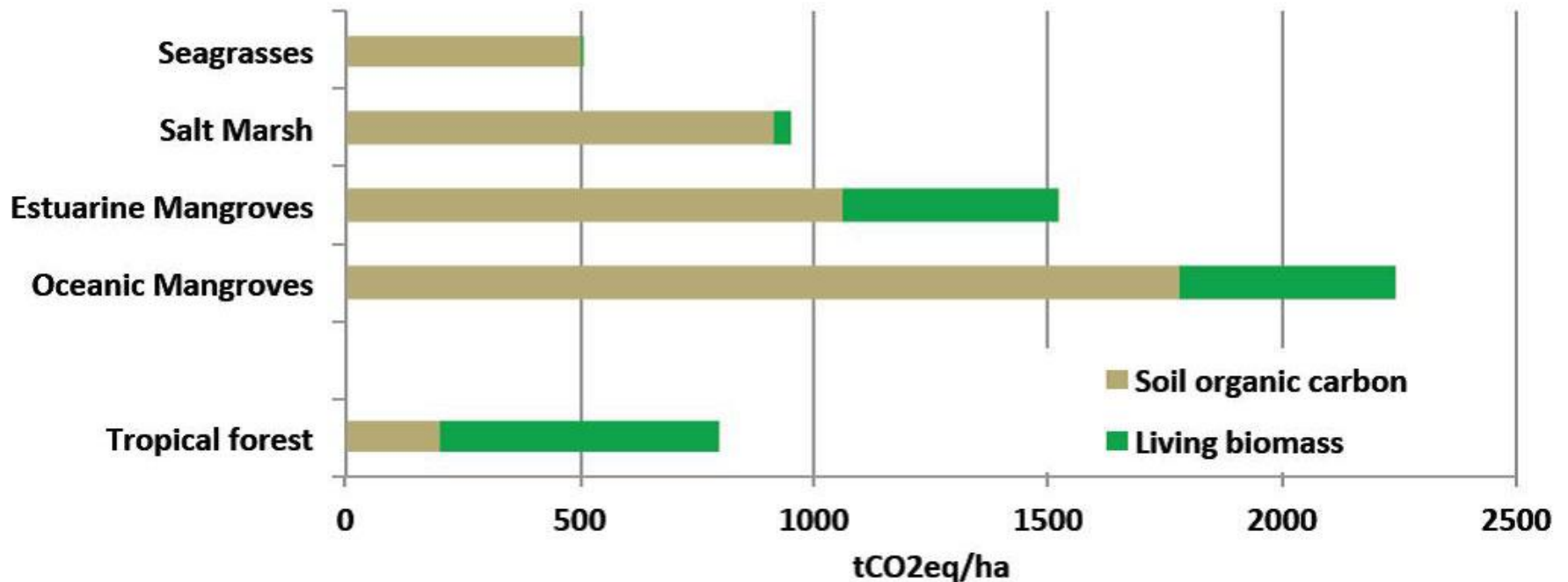


# Carbon Storage

- Mangrove ecosystems are important “carbon sinks” and play an important role in climate change mitigation.



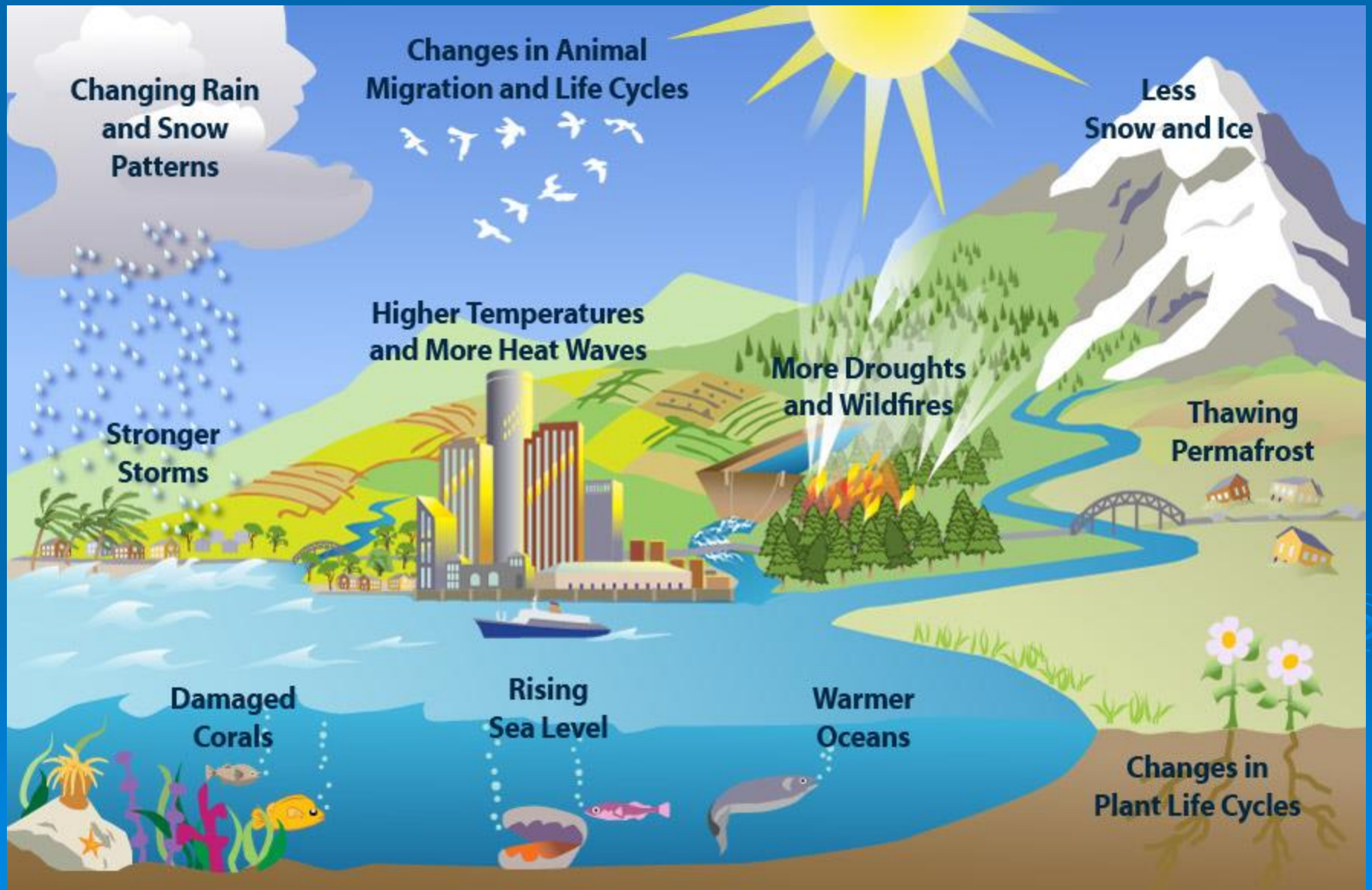
# Carbon Storage Abilities of Different Habitat Types



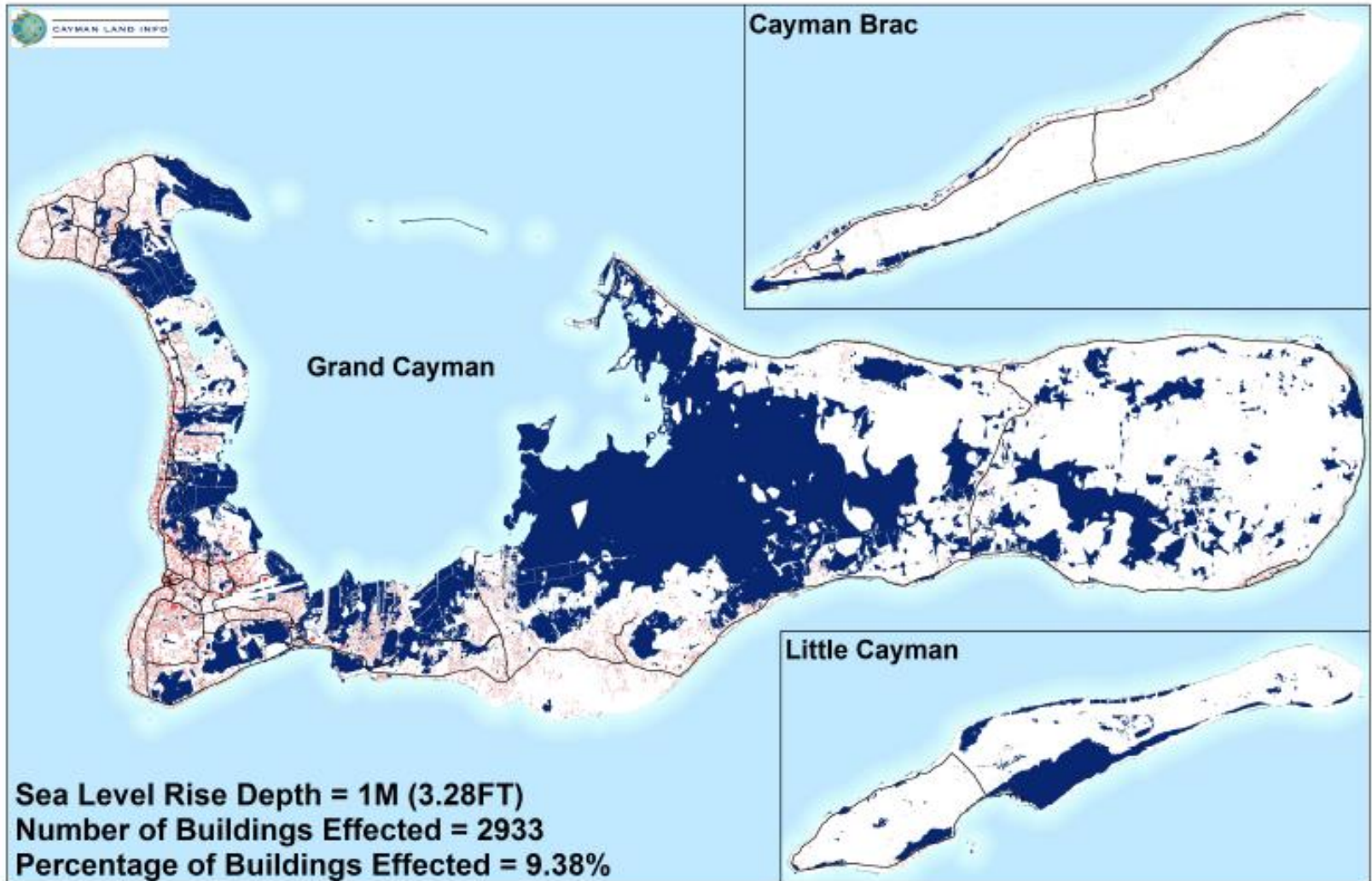
\*Data is per unit area, where tCO<sub>2</sub>eq/ha is tons of carbon dioxide equivalents per hectare

Source: Murray, Brian, Linwood Pendleton, W. Aaron Jenkins, and Samantha Sifleet. 2011. Green Payments for Blue Carbon: Economic Incentives for Protecting Threatened Coastal Habitats. Nicholas Institute Report. NI R 11-04

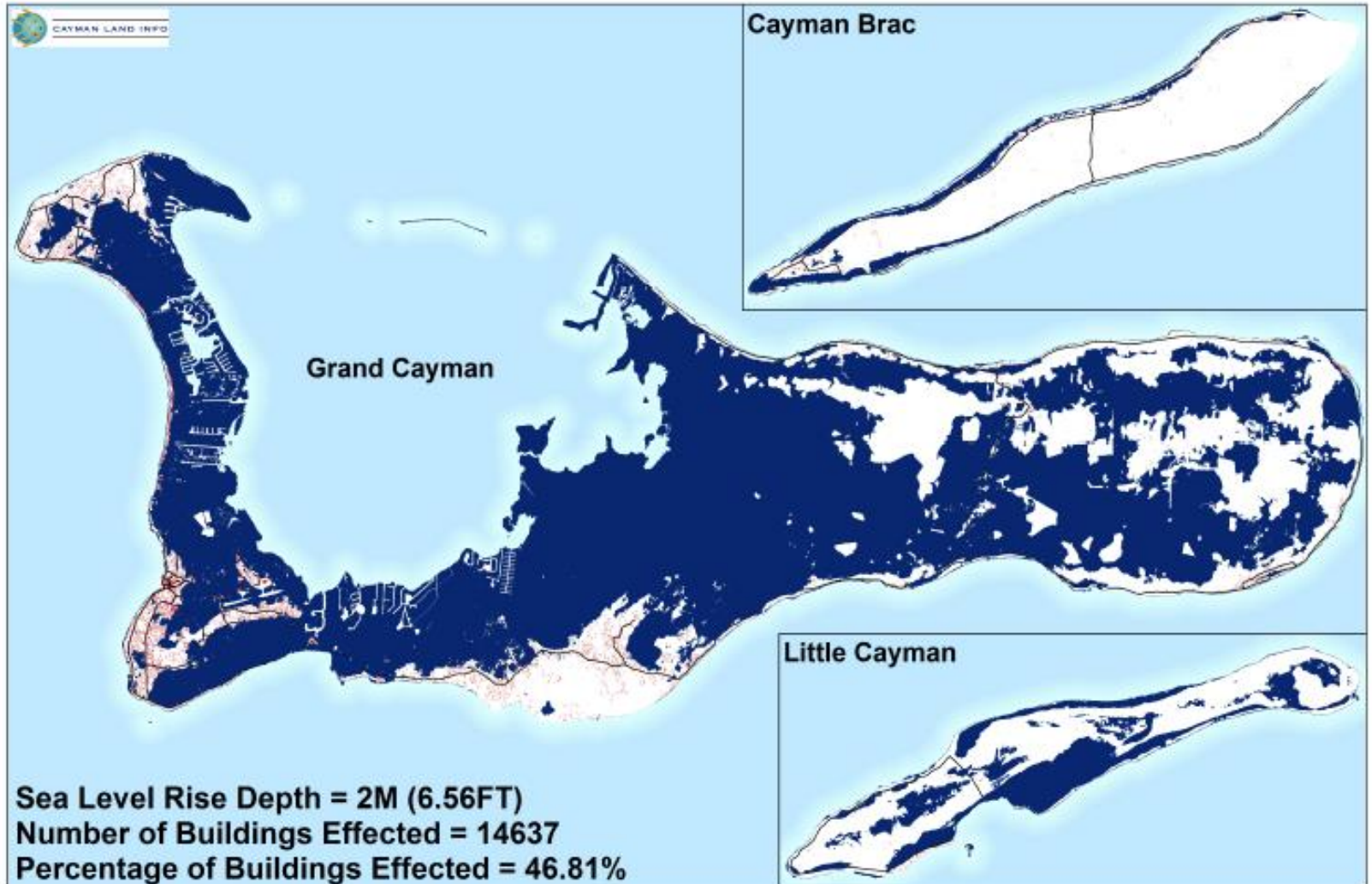
# Effects of Climate Change



# 1-meter sea level rise



# 2-meter sea level rise



# Threats

- Dumping of garbage
- Cutting forests
- Oil spills
- Shrimp Farming



# Threats

Quarries

Pollution

Coastal development









# Preservation

## Central Mangrove Wetlands – 8,655 Acres

### The National Trust

- Holds, in trust for the people of the Cayman Islands, approx. 1500 acres of Mangrove Wetland
- Land Reserve Fund

### Department of Environment

- New laws
- 1500 acres protected in marine park
- Environmental Zones

