

# MY COMMUNITY, OUR EARTH

## MIAMI

### A Comparison of Mangrove Communities: Florida and Mexico

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**Problem Statement:** How do the mangrove communities of South Florida compare to those found in Mexico?

#### Background

A mangrove forest is a biome characterized by a great abundance of mangroves.

Mangroves have adapted to their harsh environment by developing structures dedicated to oxygen intake and creating impermeability to salt. The red mangrove props itself up to absorb air through pores in its upper roots. The black mangrove has structures called pneumatophores, which protrude from the ground to absorb air. The red mangrove has roots that are significantly impermeable to sodium salts. The white mangrove gets rid of salt by secreting it through their leaves. Mangroves get most of their nutrients from the air, since the soil found where they live is not nutritious.

Mangroves are found between 25°N and 25°S. There is an estimated amount of 469,000 acres of mangrove forests in the state of Florida. In Mexico, there is an estimated amount of 820,000 acres of mangrove forests. There are approximately 69 of mangroves around the world. The most common types of mangroves in the Gulf of Mexico and Florida are the red mangroves, black mangroves, and white mangroves.



Mexico Mangroves Three families Four species		Florida Mangroves Three families Four species	
Rhizophoraceae family	<i>R. Mangle</i>	Rhizophoraceae family	<i>Rhizophora Mangle</i>
Cambretaceae family	<i>Laguncularia racemosa</i>	Avicenniaceae family	<i>Avicennia germinans</i>
Avicenniaceae family	<i>Avicennia germinans</i> <i>Conocarpus erecta</i>	Cambretaceae family	<i>Conocarpus erecta</i> <i>Laguncularia racemosa</i>

In Mexico, the types of mangroves found are the red mangrove (*Rhizophora mangle*), white mangrove (*Laguncularia racemosa*), black mangrove (*Avicennia germinans*), and buttonwood (*Conocarpus erectus*).

Red mangroves are mostly found near the shoreline. They tolerate the most salinity and therefore can grow on brackish water or saltwater swamps. They can be recognized by their reddish prop roots that extend above water.

Black mangroves are found further back on higher ground, where the tide changes expose their pneumatophores. They have a dark bark with shiny leaves that are hairy on the underside.

White mangroves occupy higher land than the red and black mangroves. They have no visible aerial roots. They grow quickly and produce greenish-white flowers.

The buttonwood is associated with mangrove communities, and can be found in the upland transitional zones. Instead of reproducing like the other mangroves, it produces seed pods. Its flowers are greenish in color. At the base of each leaf, there are salt-secreting glands.

Mangrove forests serve as protected nurseries for fishes and shellfishes, and provide refuge for birds. Examples of endangered species that are dependent on the mangrove forests for their survival are:

- Red-footed booby
- Masked booby
- Great frigatebird
- Whimbrel
- Grey heron
- Spangled emperor
- Blackspot snapper

Mangroves serve as a buffer zone between the land and sea; are a good source of timber, fuel, and fodder; protect the land from erosion; are a main source of income for fishing communities; purify the water by absorbing impurities and harmful heavy metals; decrease air pollution; are a potential zone of tourism; and last but not least, they provide an invaluable protection against hurricane and strong air currents.

In Florida, people mainly benefit from the wind, wave, and flood protection that mangroves provide; erosion prevention; and by how they maintain water quality and clarity. In Mexico, mangrove forests keep a stable climate, provide excellent fishing areas, are used for tourism, as well as wind, wave, and flood protection, erosion prevention, and water quality maintenance.

## Current Status & Results

Over the years, worldwide mangrove population has decreased drastically. The worldwide population has gone from an estimated 80 million acres originally, to an estimated 37 million acres in 2007. That's more than half of all mangroves lost!

## Distribution of mangroves in Florida and Mexico



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo and the GIS User Community

Threats to mangrove forests include:

- Clearing of mangroves to make space for human use.
- Overharvesting of mangroves for fodder and other products.
- Dams and irrigation
- Overfishing
- Destruction of the coral reefs that provide wave protection.
- Pollution
- Climate change

Climate changes such as global warming have caused a rise in sea level. The rise in sea level may result in water logging, ultimately killing mangroves and organisms that depend on them.



Eco artist, Xavier Cortada, works with students on the installation of the *Reclamation Project* at Felix Varela Senior High School

**The Mangrove Trimming and Preservation Act (1996)** was created to preserve the current mangrove population. Its major aspects are the following:

1. No herbicide or other chemical may be used for the purpose of removing leaves of a mangrove.
2. If the current height of the trees does not exceed 10 feet in height (measured from the soil to the tallest point of the tree). These trees may be trimmed down to a height of no less than 6 feet by the property owner or someone they supervise.
3. Trimming of mangroves in a riparian mangrove fringe area that exceed 10 feet in pre trimmed height, must be supervised or conducted exclusively by a professional mangrove trimmer.
4. No permit is required to trim mangroves that are located in a riparian mangrove fringe, to reestablish or maintain a previous mangrove configuration so long as the trees do not exceed 24 feet in pre trimmed height and the trees are not destroyed, defoliated or removed.

The **Florida Department of Environmental Protection** has been given the responsibility of implementing these mangrove regulation laws.

To protect and preserve the current mangrove population we should:

- Stop the clearing of mangrove forests.
- Prevent the harvesting of mangroves for any use except biological research.
- Filter sources of pollution near mangrove-populated areas.
- If reasonable, buy private lands that used to be populated by mangroves, and replant a mangrove forest.
- Preserve coral reefs.

Xavier Cortada's reclamation project can contribute to the repopulation of mangroves by planting mangroves in suitable areas. This will increase the mangrove forest acreage in Florida and in the world.

In Mexico there are several organizations dedicated to the conservation of forests, including mangrove forests. *Pronatura Sur A.C.* is located in Chiapas, Mexico and is dedicated to the monitoring and conservation of several areas. "Our strategy is to develop models of conservation that promote alternatives of use and management of natural resources that benefit the communities" says their website.

During the fieldtrip to the Deering Estate, I learned about some of the most common species of mangrove. I learned how sea levels affect mangrove distribution, about the type of insects and arthropods that live there, and how they protect us from hurricanes.

We can compare our collected water quality and weather data to compare them to the standards required for optimal mangrove function and reproduction, and determine which of these abiotic factors poses as a threat to mangrove forestation.

Our responsibility and objective is to prevent the loss of mangrove forests in Florida and to promote reforestation.

To help the areas investigated, we can promote pollution reduction in Miami, preserve and repopulate coral reefs, ensure that most viable offspring make it to maturity, and increase the acreage of mangroves. It is important to get involved in the preservation of mangrove forests because, as previously stated, they play an important role in our biosphere.



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### Worldwide distribution of mangroves.

