A Comparison of Mangrove Communities: Florida and Australia

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

Background

The term "mangrove" refers to an assemblage of tropical trees and shrubs that grows in the intertidal zone. A mangrove forest is an agglomeration of special trees that live on the edges of tropics, where the rainforest meets the ocean. Mangroves are special because they have the ability to grow in unstable, tough environments in which other plants are not lucky enough to grow. Mangroves thrive in areas where the water is not necessarily high in oxygen; salt water, fresh water, and even brackish water. You can find mangroves around saline coastal sediment habitats in the tropics and subtropics – mainly between latitudes 25°N and 25°S. These woody trees grow rather quickly, reaching twenty five meters when they are fully grown. The country in which I had the luxury of researching, Australia, has the third largest area of mangroves in the world after Indonesia and Brazil, totaling around 11,500 km^2 representing approximately 6.4% of the world's total mangrove area. In comparison, the Florida area of mangroves: 1,750 km^2 is much less yet Florida is a main distributor of mangroves in the western hemisphere.

There are approximately 55 species of mangroves found worldwide, and the most common ones are red (*Rhizophora mangle*), white (*Lagun-*

Australia	Florida
8 Genus **27 Species**	**4 genus** **4 Species**
Acanthus *ebracteatus*	Languncularia *racemosa*
Acanthus *ilicifolious*	
Avicennia *integra*	Avicennia *germinans*
Avicennia *marina*	
Bruguiera *parviflora*	
Bruguiera *cylindrica*	
Bruguiera *exaristata*	
Bruguiera *sexangula*	
Bruguiera *gymnorhiza*	
Bruguiera *rhynchopetala*	
Ceriops *australis*	
Ceriops *tagal*	
Ceriops *decandra*	
Lumnitzera *racemosa*	
Lumnitzera *x rosea*	
Lumnitzera *littorea*	
Rhizophora *apiculata*	Rhizophora *mangle*
Rhizophora *x lamarkii*	
Rhizophora *stylosa*	
Rhizophora *mucronata*	
Sonneratia *alba*	
Sonneratia *x gulnagai*	
Sonneratia *x urama*	
Sonneratia *caseolaris*	
Sonneratia *lanceolata*	
Xylocarpus x moluccensis	Conocarpus *erecta*
Xylocarpus *x granatum*	

cularia racemosa), and black (*Avicennia germinans*). These species also happen to be amongst the ones found Florida, but Florida is also home to the buttonwood tree (*Cornocarpus erectus*) which is a mangrove associate and grows within mangrove habitats. Each species possesses specific characteristics:

Red Mangroves- These are commonly found closest to the water, they have reddish stems and arching prop roots which gives the plants the name "walking trees". They also have long , pendulous, green popagules(reproductive structures of the mangrove) that are often visible year-round hanging from tree branches.

Black Mangroves- These mangroves are found in abundance further inland in areas that often have a high salinity. Black mangroves have a very dark bark and numerous pneumatophores. The pneumatophores help bring oxygen to the roots and their length can vary from a few centimeters to about 60cm long. Another notable charactreristic of this mangrove species is that it has the ability to excrete salt from its leaves.

White mangroves- They are usually found beyond the shoreline at the upper edge of the tides. White mangroves are different from other species in their leaves, which are flattened at both ends. During the summer they tend to have copious fruits hanging from the ends of their branches.

Buttonwoods- These plants are found in upland areas away from the water edge. With spreading crowns, furrowed bark, and pointed leaves, these plants often have brownish round fruits in clusters at the tips of their branches.

Australia is home to 27 different species. While the genus of each species is listed above, the common names for each mangrove in order that they appear on the chart above. Holly mangroves, grey mangroves, orange mangroves, yellow mangroves, black mangroves, stilt, apple and puzzle-nut mangroves are the common names of the species found along the coast of Australia. Characteristics that differentiate each mangrove species amongst the genus *Bruguiera*, *Rhizophora*, and *Sonneratia* (to name a few) are as follows:

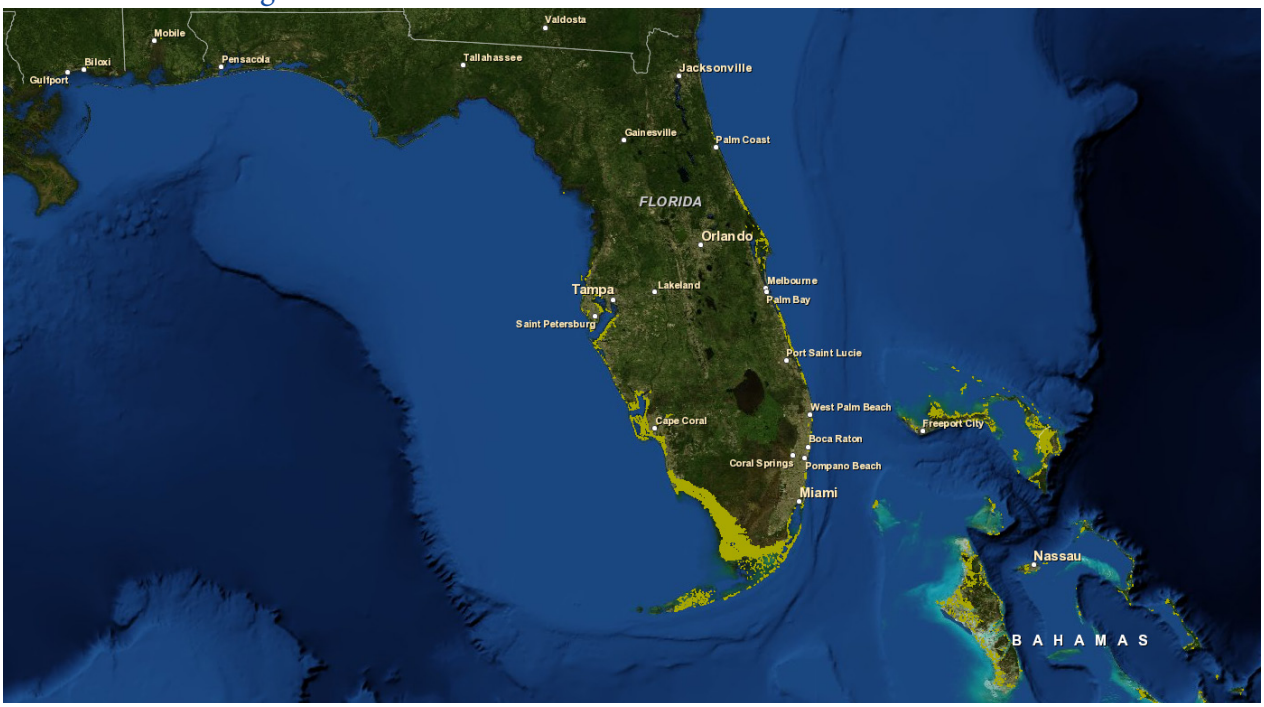
Bruguiera (orange mangroves)- They are distinguished by the number of buds in inflorescences, bud size, ribbing on calyces, numbers of calyces, shape of petal lobes, presence and length of spines between petal lobes and bristles on petals lobes. These mangroves thrive across the northern coast from Western Australia, Northern Territory, Queensland and New South Wales.

Rhizophora (stilt mangroves)- They are distinguished by cork wart spots on leaf undersurfaces, style length, petal hairiness, hypocotyl shape, and relative lengths of peduncles and petioles.

Sonneratia- They can be indentified by the color of petals and stamens, calyx surface, shape of the calyx on mature fruit, plus the shape of leaves and leaf apices.

Mangrove forests contribute to biological diversity by allowing for animals to take shelter in a variety of places on the plant. Some examples of animals that benefit from mangroves are fish like mullet, shrimp, lobster, crab as well as many other marine inhabitants of mangrove ecosystems.

Distribution of mangroves in Florida and Australia



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

Current Status

Other than biological diversity, some advantages/uses of mangroves are that their extensive root system stabilizes sediments and protects shorelines. In Florida, they also intercept nutrient runoff from upland sources and thus protect and improve water quality. Floridian mangroves provide important habitat for aquatic, terrestrial, and arboreal, contribute to recreational and aesthetic values, and serve as nursery areas for many commercially and recreationally important species of fish and crustaceans. In Australia, mangroves have the ability to filter nutrients that enter the ocean from land, they serve as sanctuaries for young fish and shellfish, they protect coastal communities from storm surges, and they harbor diverse plant and animal communities as well. Mangroves currently store about 20 billion tons of carbon, roughly 2.5 times current global fossil fuel emissions.

Unfortunately for this highly beneficial ecosystem, over the year's mangrove forests have been susceptible to damage from natural catastrophes such as hurricanes and lightning strikes. We as humans have also contributed to

harming mangrove ecosystems with our destruction cause by dredging, filling, impounding, cutting and trimming, oil spills, and accumulation of trash. Roughly 50% of the global mangrove area has been lost in the past two decades. Currently, the urban, industrial, and agricultural development in Florida has resulted in the largest losses of mangrove habitats. For example, 87% of the mangrove shoreline in Lake Worth has been destroyed. In the Upper Florida Keys, approximately 60% of shallow water mangroves were lost from 1965-1985; 40% of that loss was due to dredging and filling. Another prominent threat to mangrove forests is climate change. As the sea level rises, the outer boundary of mangrove forests will erode, and new wetlands will form inland as previously dry areas are flooded by the higher water levels.

Implications & Conclusions

Luckily efforts have been made to the future of mangroves a more positive one, especially on July 1, 1996, when Florida Legislature amended the law regulating the trimming and alteration of mangroves (The Mangrove Trimming and Preservation Act). The Department of Environmental Protection was granted the responsibility of implementing this new law. We can also help in preserving mangrove ecosystems. The best thing to do would be to live a "green" lifestyle by eating organic vegetables. We could also use more environmentally friendly products to avoid water pollution as well as use less water. On Earth Day 2006, Miami artist Xavier Cortada launched his eco-art project. Volunteers collected seedlings from various sites in Miami-Dade County where they would have perished and spread them throughout retail and commercial businesses in South Beach, schools, and the science museum. I think Xavier Cortada's plan is exactly what we need, more and more people will be aware of what's going on and they will put more effort into the conservation of mangroves. Mangroves will survive. Despite not going on the Deering Estate field expedition, throughout the sharing of data with other students I learned how environmental condition can directly affect mangroves, and how important it is to preserve these habitats. It is important to get involved in preserving the environment because ultimately we shall be in charge of its future. We must take into account all the families of animals mangrove forests are home to, and if we were to think of them as our own loved ones we would want them to have a safe and stable home.

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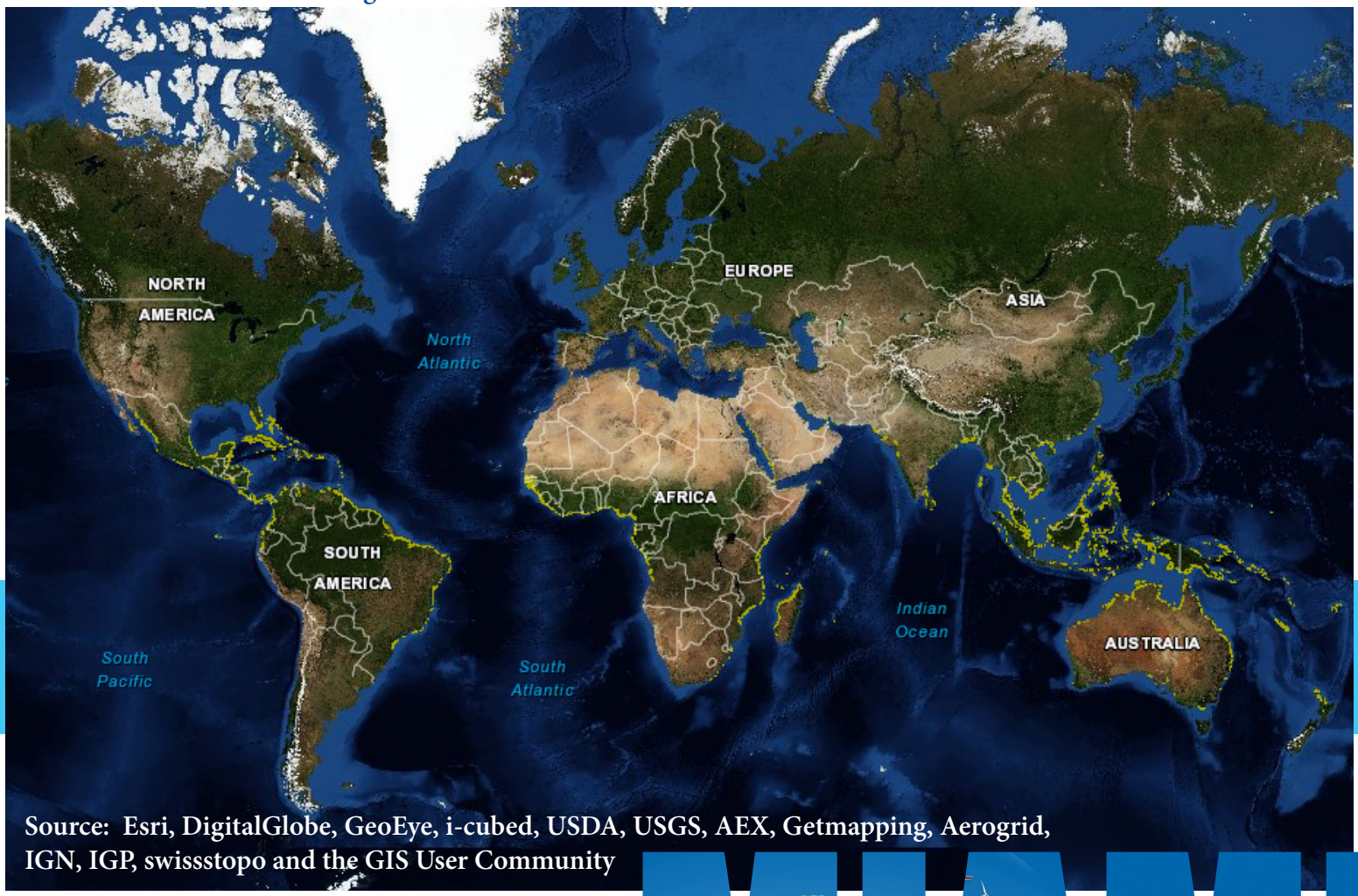
Worldwide distribution of mangroves.



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

LTER

Felix Varela Senior High School

Schoolyard FCE LTER

Reclamation Project
EcoArt by Xavier Cortada

my community, our earth
GEOGRAPHIC LEARNING
for Sustainable Development

NATIVE FLAGS
Eco-art by Xavier Cortada

NSF

Deering Estate At Cutler