



*Can Red Mangroves Reduce Ocean
Acidification?*

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Introduction



One of the main ways the Keys get their income is tourism. Almost all of our attractions are connected to our magnificent ocean. Our ocean is facing several challenges, but one of them is Ocean Acidification. Ocean Acidification is carbon dioxide (CO₂) gas in the atmosphere dissolving into the ocean (National History Museum, 2024). There are various reasons why this happens.

Deforestation is one of the main causes of Ocean Acidification, and the decrease of red mangroves (Rhizophora mangle). This results in fewer trees/mangroves to soak in the gas (National History Museum, 2024). Also, when plants/mangroves are cut down and burnt or left to die, the carbon that makes up their organic tissue is released as carbon dioxide. Currently, the burning of fossil fuels such as oil, coal, and gas for human industry is one of the major causes of Ocean Acidification.

As a part of the future, I want to make the world a better place and alter what the older generations have done. I am conducting this experiment because I believe that the answer to reducing acidification of the ocean environment may lie in the photosynthesis processes of red mangroves.

Background research

Ocean Acidification is threatening our ecosystem. The Gulf of Mexico pH levels are between 6.49 and 7.24 while it's supposed to be between 7.5 and 8.4. The Gulf of Mexico is shallower, saltier and warmer than the Atlantic Ocean. Animals in the Gulf of Mexico that use calcium carbonate have to work a 100x harder to construct and maintain their shell structures - which leaves them with less energy to hunt for food, grow, reproduce, and this causes crustaceans' shells to become thin and brittle (MBARI, 2024). Scientists at MBARI (Monterey Bay Aquarium Research Institute.) did an experiment on seagrass, and its effect on ocean acidification. That experiment showed how seagrass can absorb CO₂ from ocean water when they photosynthesize, which raises the pH to higher (ocean being less acidic) levels.

Hypothesis

If red mangroves propagules are placed into the same environment as the ocean, then ocean acidification will be lowered because aquatic plants/mangroves absorb CO₂ when they photosynthesize.

Supplies

The supplies needed to conduct this experiment are:

- *Two transparent (glass) containers that are at least 3 liters each.*
- *6 liters of seawater from your nearest beach.*
- *pH strips that can be bought on Amazon (Recommendations are on citations)*
- *5 red mangrove propagules*
- *4 inches of sand from your nearest beach.*
- *1 gallon of Distilled water*
- *Hand soap or dish soap.*
- *Sponge or any type of scrubber*
- *1 dual bubbler*
- *Sunlight*
- *3 packs of D batteries for bubbler.*

Procedure

The procedure needed to conduct this experiment is:

1. Clean the two containers by scrubbing them (using your scrubber) with dish/hand soap.
 2. Rinse the containers with distilled water.
 3. Place 5 mangrove propagules into one of the containers
 4. Fill containers with 2.5 cm of sand
 5. Fill containers with 2.5 L of seawater
 6. Make sure the water is clear! If it is not, wait at least 1 day for sand to settle.
 7. Then place both of the containers in direct sunlight.
 8. Set up your dual bubbler
 9. Use the pH strips to record the pH everyday for 3 days
 10. Record results
 11. Do this 2 more times
- Make sure the mangroves aren't exposed to sunlight for long periods of time.

Variables

The variables in this experiment are:

Independent variable:

Plants photosynthesizing.

Dependent variable:

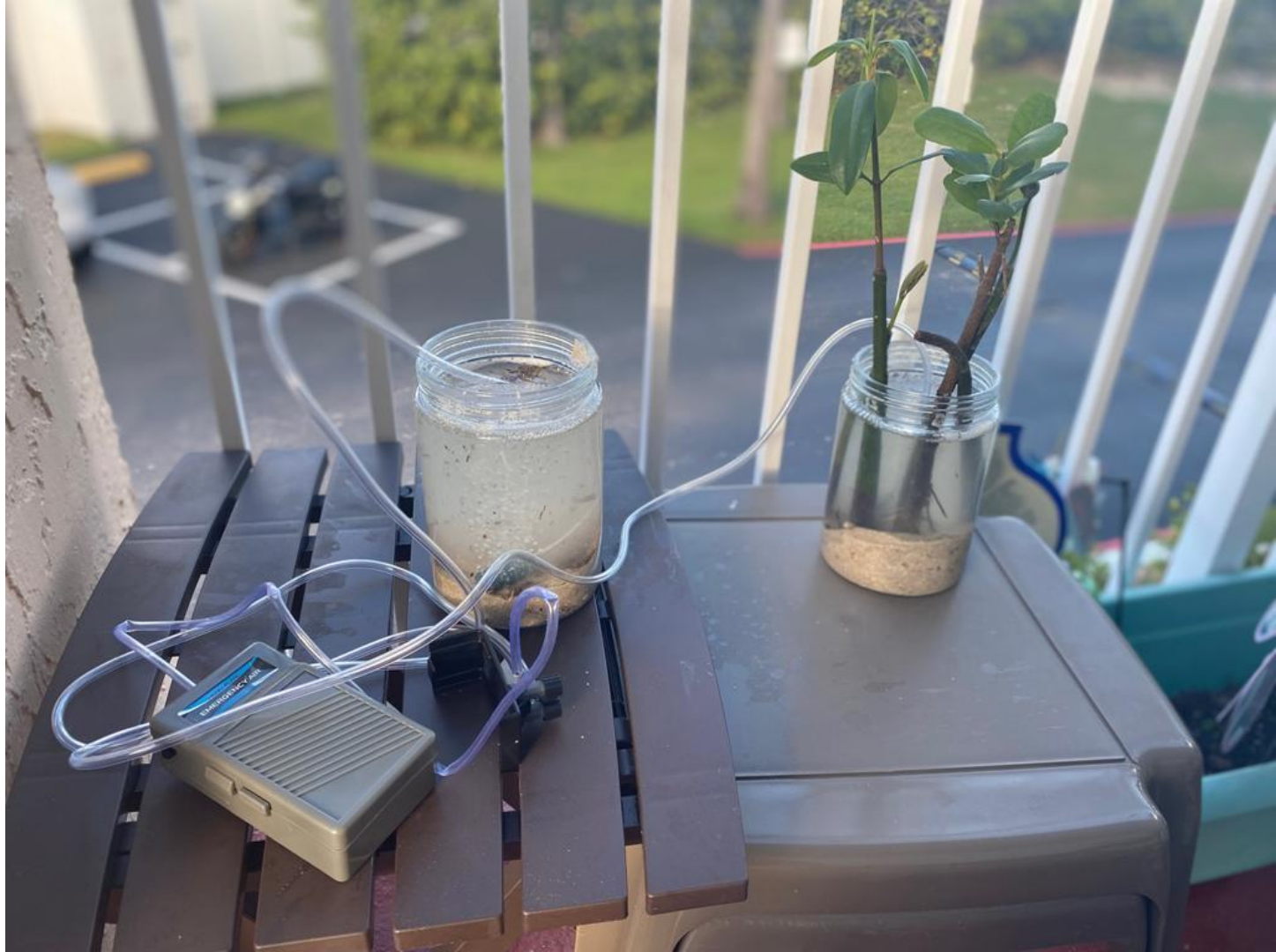
pH level of the water.

Constant:

The seawater used.





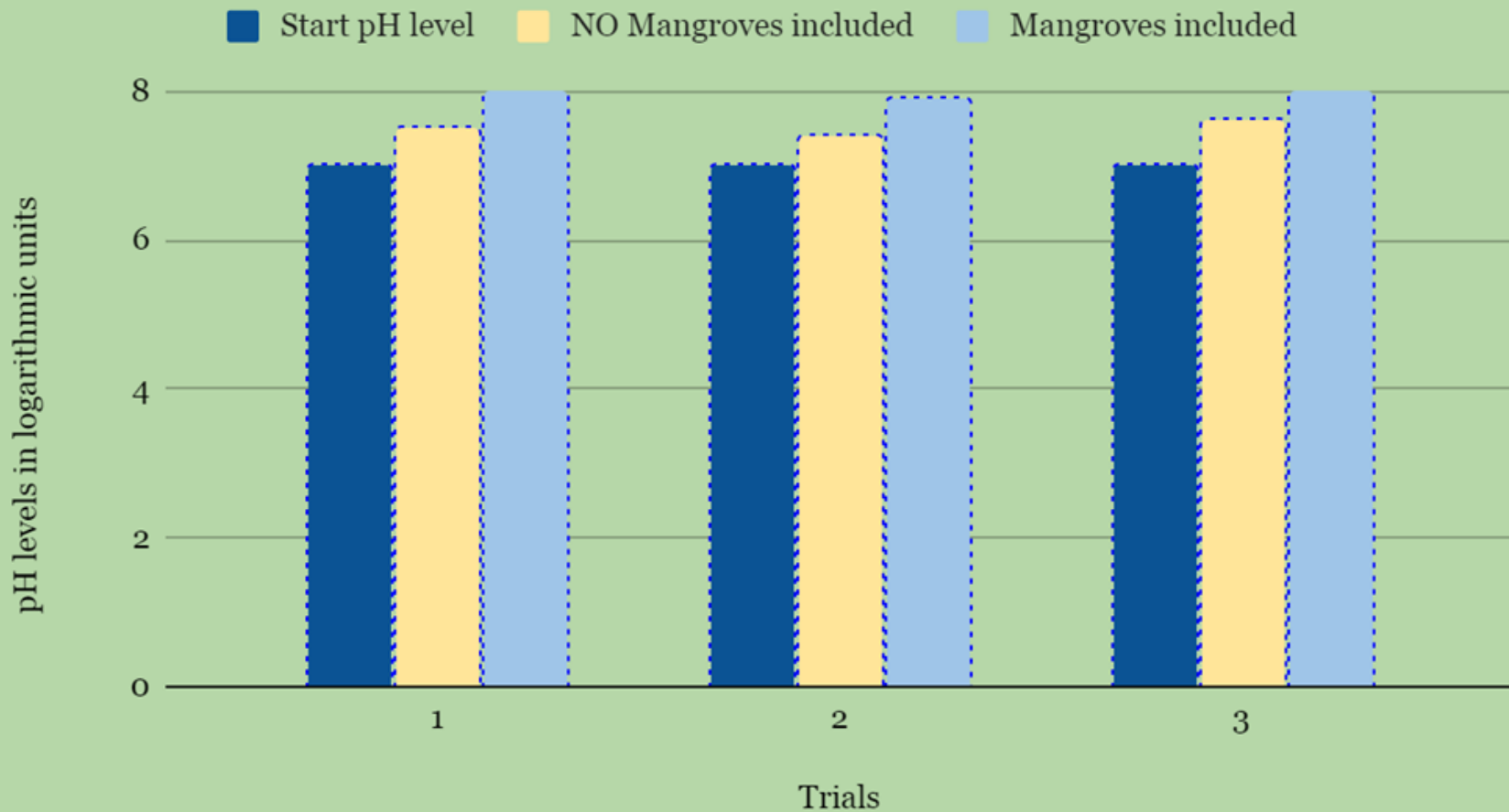






Trials	Start pH level	NO Mangroves included	Mangroves included
1	7	7.5	8
2	7	7.4	7.9
3	7	7.6	8

Can Ocean Acidification be Lowered with Red Mangroves?



Analyzing of Results/ Conclusion Part 2

Ocean Acidification, a threat to our oceans and marine animals. Ocean Acidification is mainly caused by climate change and is hurting our marine animals and our environment. Ocean Acidification causes crustaceans and other marine animals with shell structures to have to work a 100x harder because of the disintegration of their shells, leaving less energy to gather food for survival (MBARI, 2024). Thankfully, Ocean Acidification can be reduced by the photosynthesis process of aquatic plants/mangroves (NOAA, 2024). As my hypothesis states that, if red mangroves propagules are placed into the same environment as the ocean, then ocean acidification will be lowered because aquatic plants/mangroves absorb CO₂ when they photosynthesize. The main findings I found while conducting my experiment were how the pH was rapidly increased in the container with propagules, unlike the container with just sand and water. Therefore, proving my hypothesis correct. This experiment as a whole was very successful, but I could edit some things. The first thing I could edit is the amount of time the mangroves were exposed to sunlight. This is important because a sick mangrove or any type of plant cannot photosynthesize as well as a healthy plant. Another thing I could edit is instead of doing the experiment outside, it could be done mostly inside. To conclude, my hypothesis was proven correct and a successful experiment was conducted.

Citations in APA

References

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