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Diel Cycling of Carbon in the San Antonio River

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CARBON CYCLING IN THE SAN ANTONIO RIVER

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OUTLINE

- Introduction
- Methods
- Background
- Data/Results
- Conclusion

INTRODUCTION

- The San Antonio River is typically sourced from a karst aquifer. Due to low aquifer level, recycled water keeps water flowing downstream to continue its recreational and scenic role.

- Diel cycling of carbon within the San Antonio River was studied to observe the role the river plays within the naturally occurring Carbon Cycle.

- Photosynthesis and cellular respiration influenced carbon cycling. Carbonate dissolution and CO2 outgassing influences controls carbon concentration.

Hypothesis:

- Organic metabolism removes CO2 from solution during the day and causes outgassing at night
- Extrinsic factors along the urban stretch of the San Antonio River influence the carbon cycling

METHODS

- Diel cycle collection of water samples along an ~ 7 km stretch of the river from its source going through zones influenced by biological waste input, submerged plants and tourism
- YSI Multi-Parameter Probe to measure water quality parameters
- Parameters observed:
  - pH
  - Dissolved Oxygen (DO)
  - Conductivity
  - Alkalinity

BACKGROUND

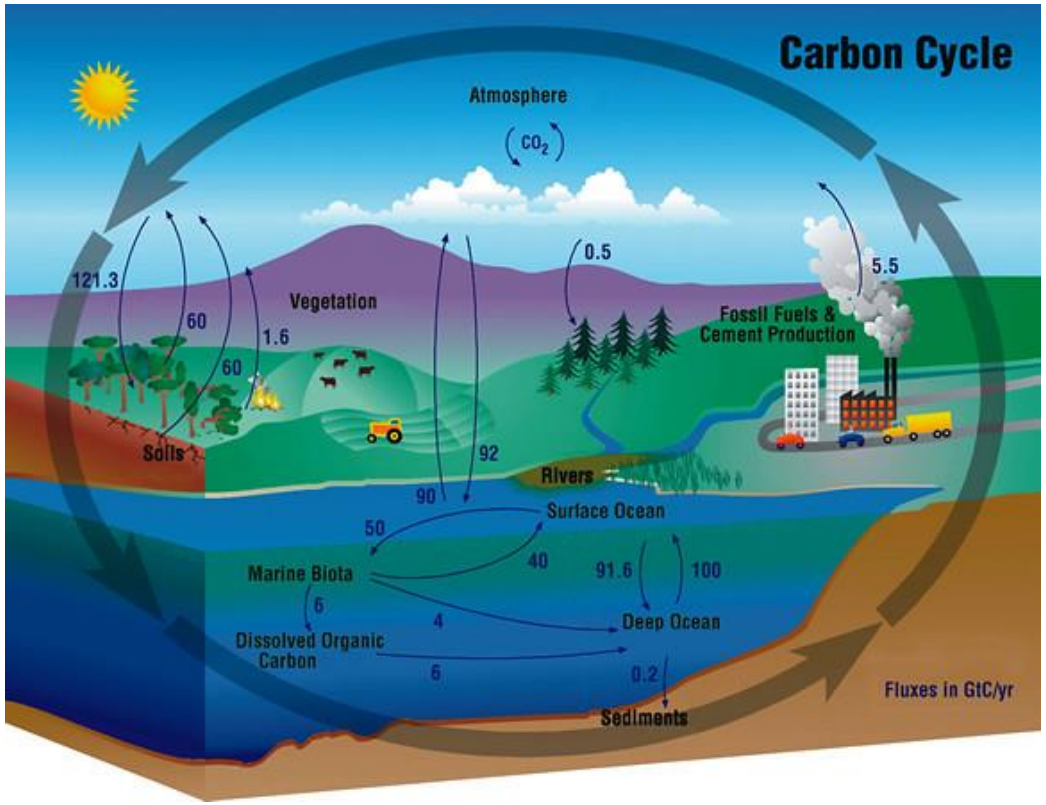
- During extreme droughts, almost all the water in the San Antonio River is recycled water from San Antonio Water System (SAWS)
- The study area starts from the discharge point to just outside downtown before reaching residential areas

Photo synthesis

Respiration

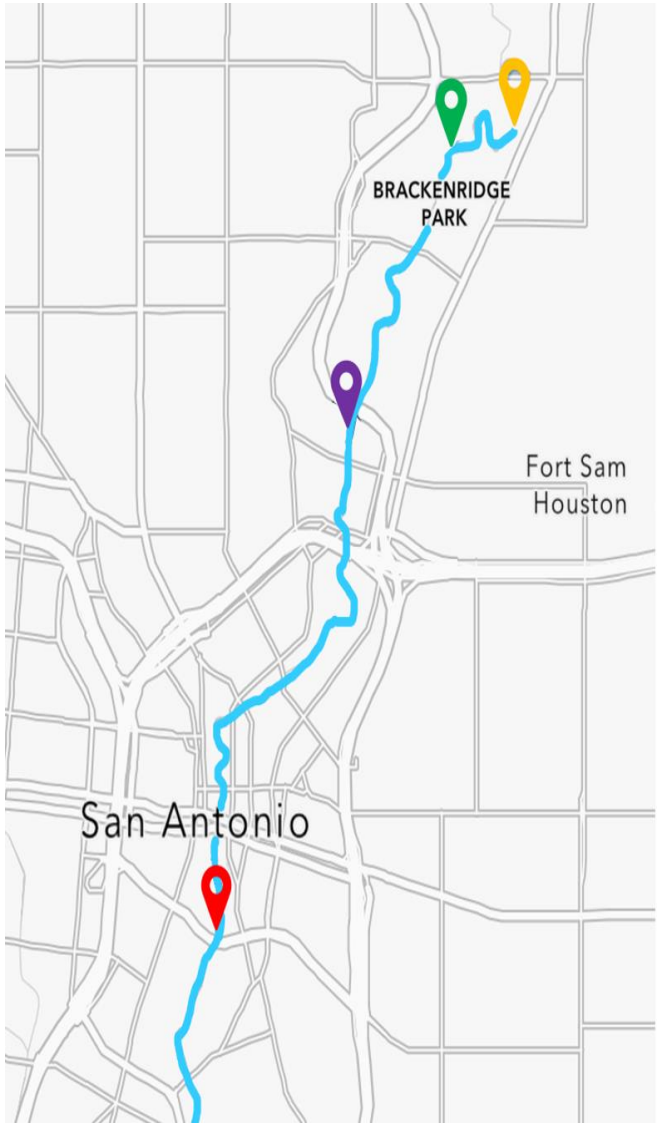
$CO_2 + H_2O \rightleftharpoons H^+ + HCO_3^- \rightleftharpoons H^+ + CO_3^{2-}$

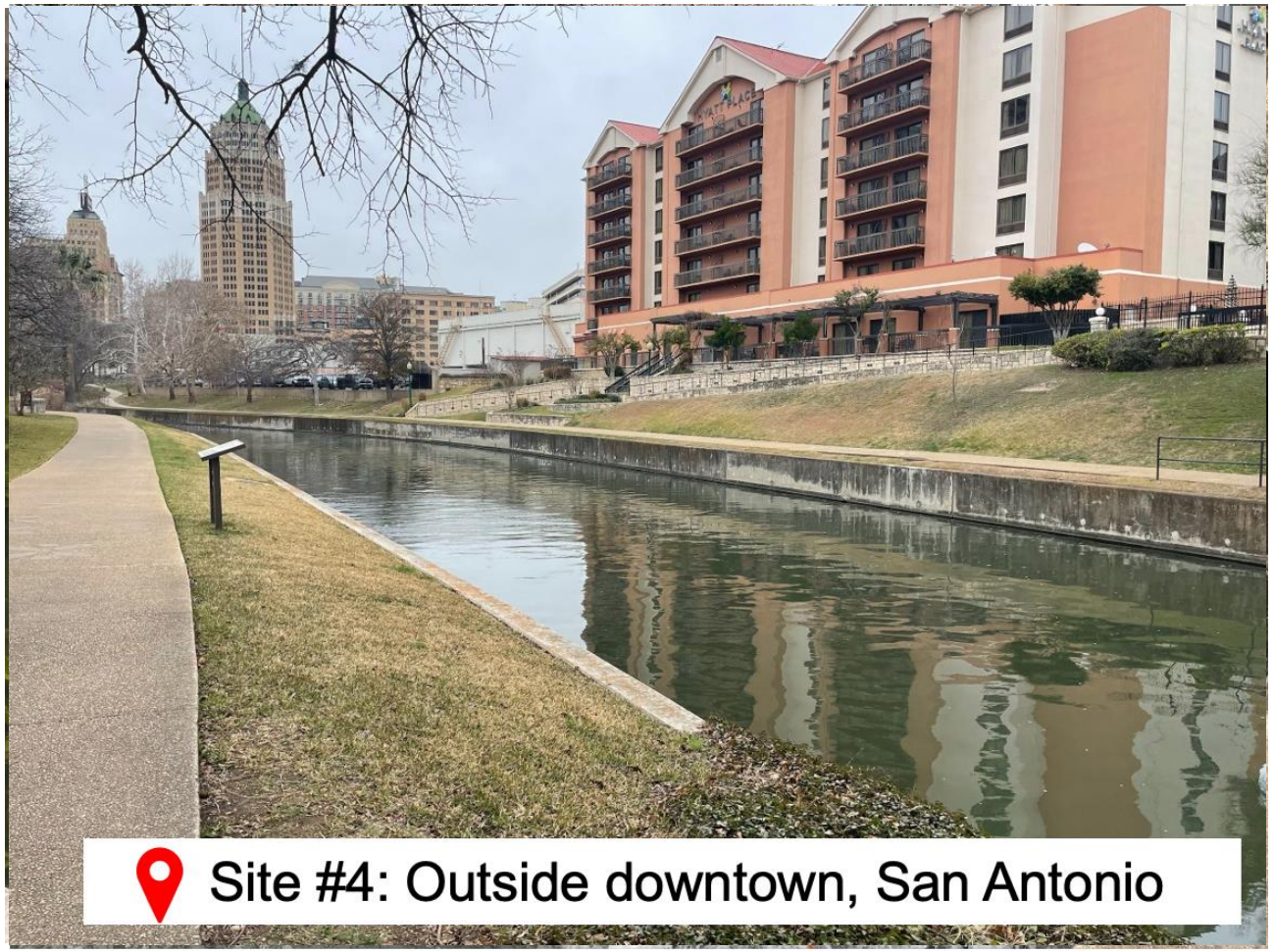
Case 1- Respiration adds CO_2 Case 2- Photosynthesis removes CO_2



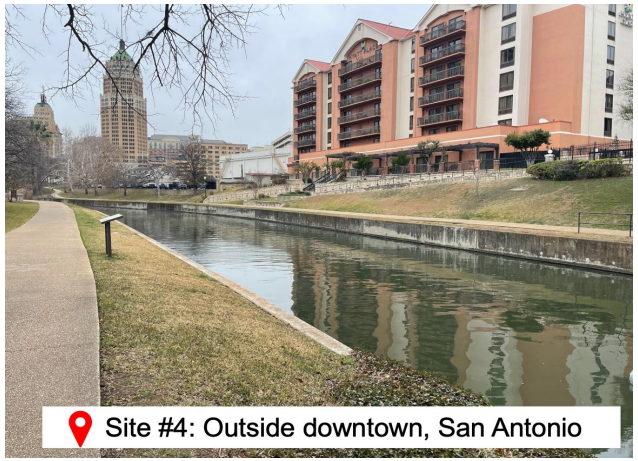
SAMPLING SITES

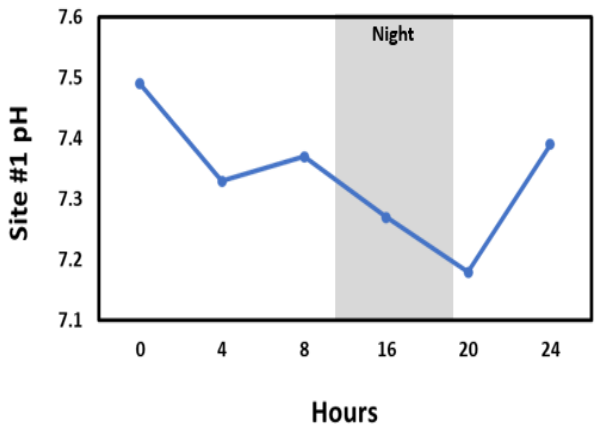
4 sample sites along the San Antonio River to capture the influences on carbon cycling are studied

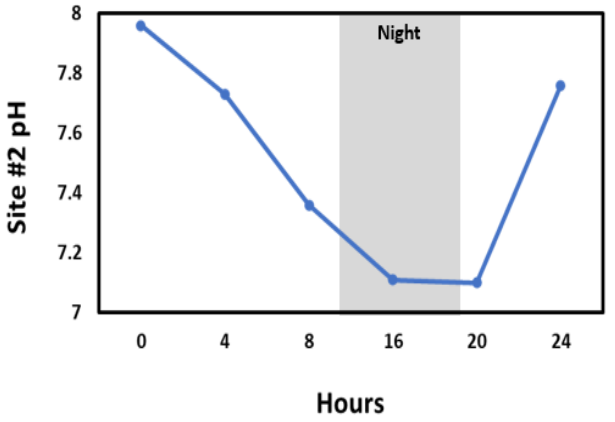


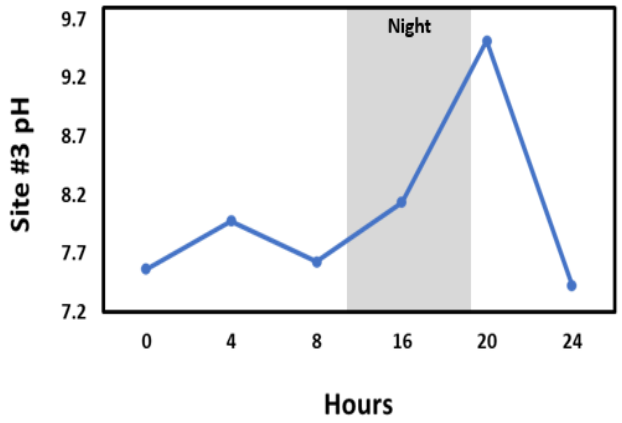


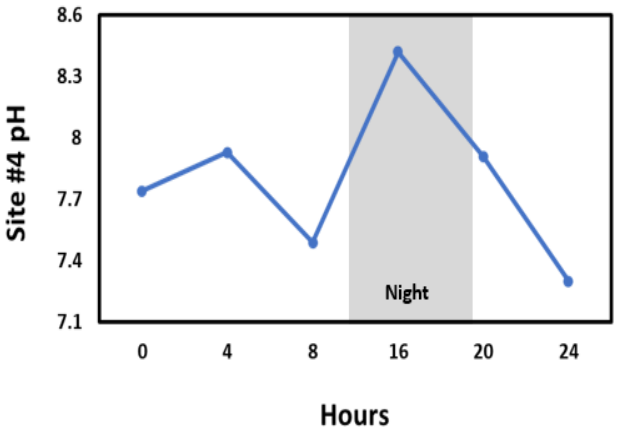
RESULTS & DISCUSSION











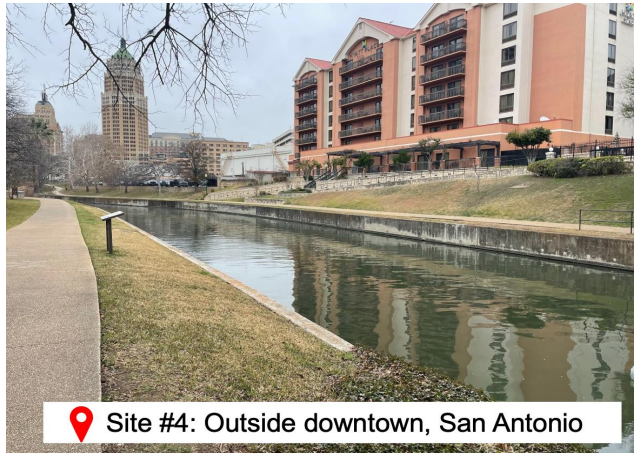
- The pH increases during the day and falls at night
- Amount of CO_2 being dissolved in the river
- The quantity of plant life present in the water affects the pH

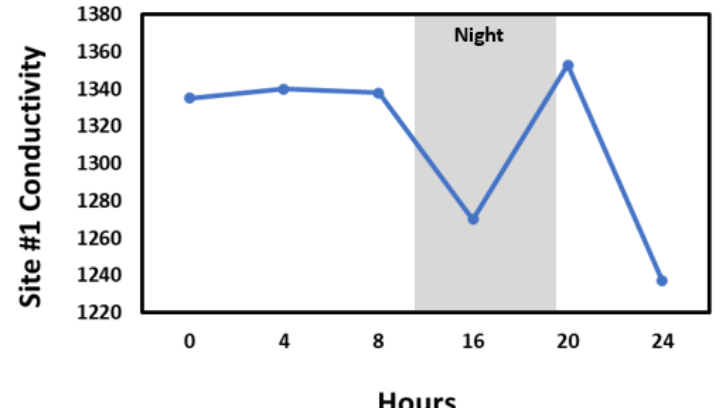
RESULTS & DISCUSSION

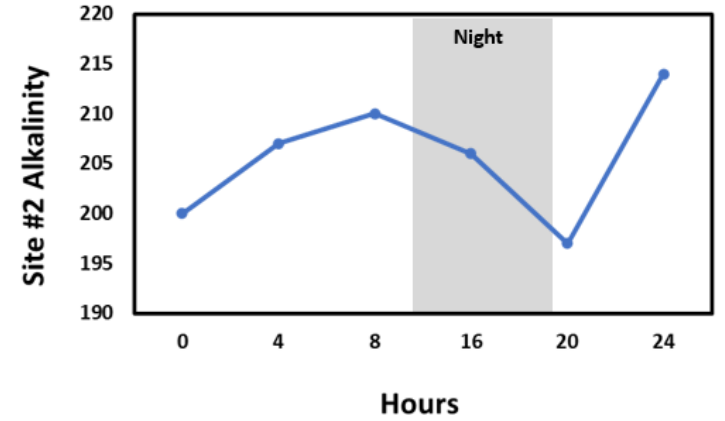

Site #1: Discharge Point

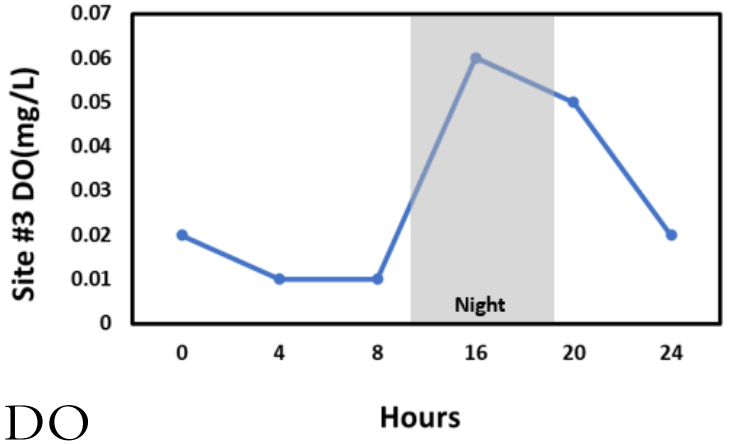

Site #2: San Antonio Zoo/UV Water Treatment


Site #3: Dam on Josephine


Site #4: Outside downtown, San Antonio







- Alkalinity and pH coincide with each other
- Carbon dioxide emissions in water also affect SPC, alkalinity and DO

CONCLUSION

- Photosynthetic processes during the diurnal cycle plays a role in the behavior of the pH, alkalinity, and dissolved oxygen(DO)

- **The San Antonio River contributes to CO_2 emission via out-gassing**

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