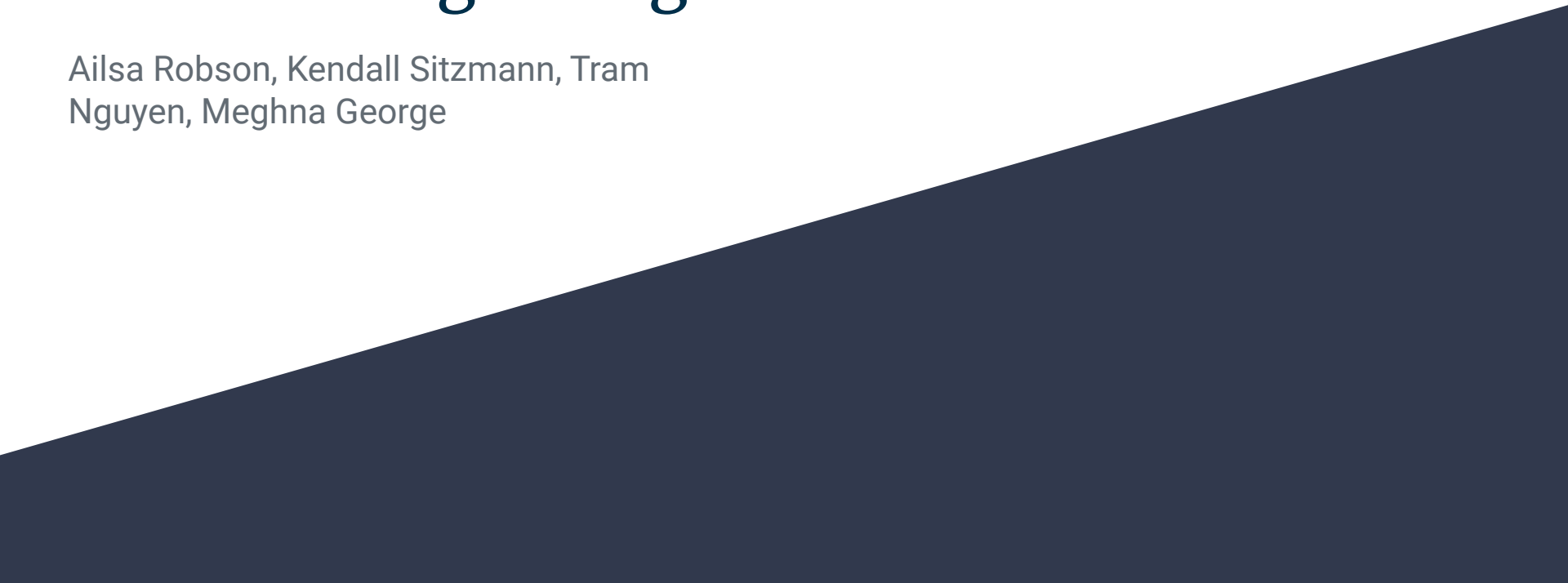# What are the environmental and socioeconomic implications of local sea level rise regarding the Texas Gulf Coast?

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Overview

- Background Information
- Research Question/ Hypothesis
- Methods
- Results
- Conclusions

Background Information

- Texas Gulf Coast spans 367 miles
- Gulf Coast is vital to US and Texas economy
  - Oil and gas industries
  - Industrial
  - Tourism
  - Texas ports generate $370 billion & about 1 million jobs
- Local Sea level rise (SLR) in the coast has risen over 18 inches since 1950s
  - Due to sinking land

Background Information

- Consists of many estuaries, salt marshes, and wetlands
  - Habitats are destroyed because of SLR
  - Galveston Bay has lost 17% of wetlands
  - Coast is coming closer to homes
  - More storm surges and flooding
- By 2100 Galveston County will have the highest population at risk due to SLR
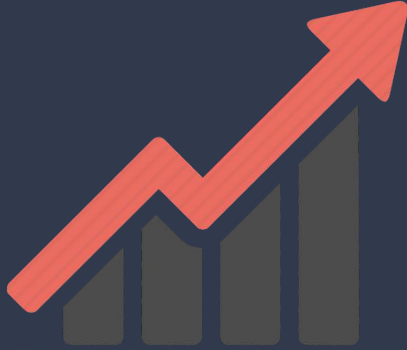
Hypothesis

- How is rising sea level impacting the socioeconomic and environmental factors of Galveston Bay?
  - To answer this question:
    - Prove the sea level is rising
    - Get information from locals in Galveston Bay
    - Compile quantitative and qualitative results

NOAA.gov

Methods

- Quantitative Data
  - Obtained from the National Oceanic and Atmospheric Administration (NOAA)
  - Public information
  - Shows an overall increase in sea level specifically in Galveston Bay

Methods

- Qualitative Data
  - Chose businesses near Galveston Coast
  - Conducted via phone interviews
  - Categorized numerically
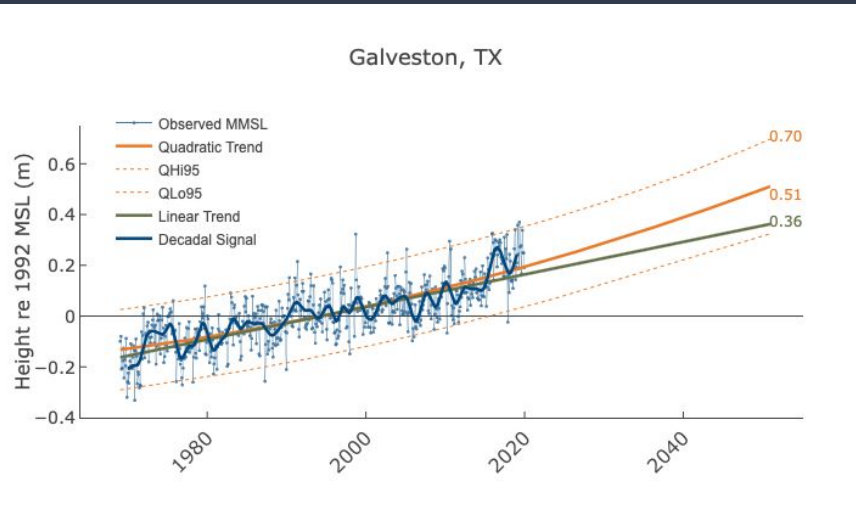 - Key to hearing real impacts on people in the area

Results

Figure (1): Galveston Bay 2050 Sea level Projections,
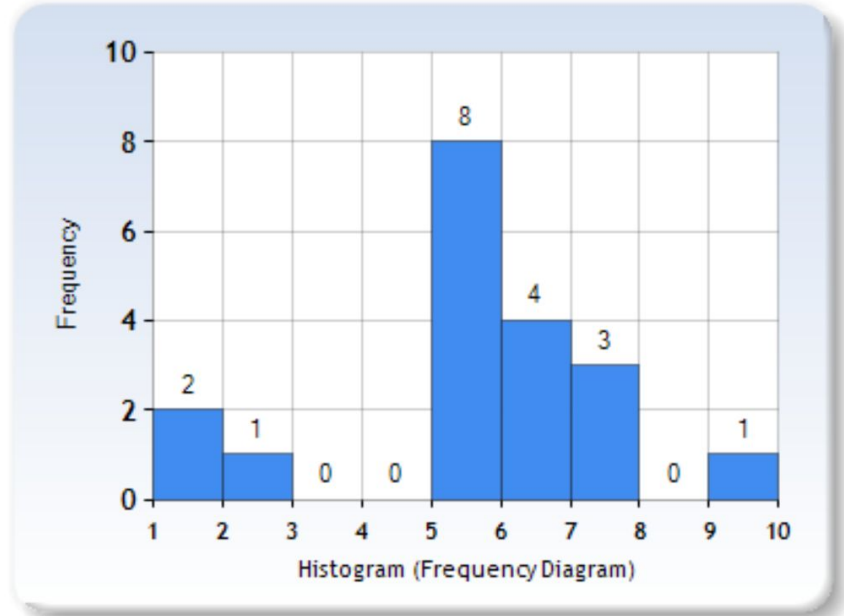Virginia Institute of Marine Science

Figure (2)

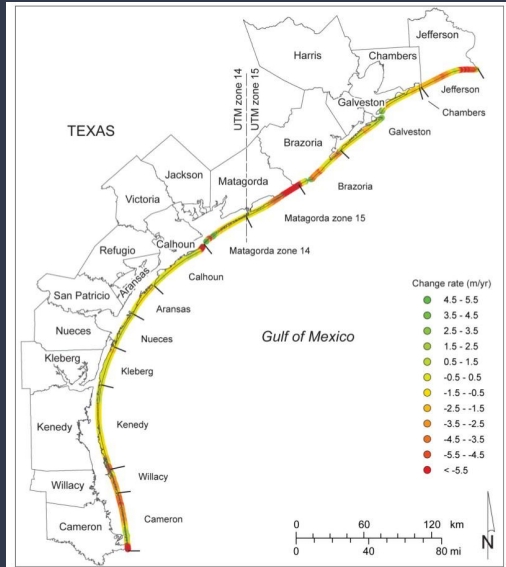Standard deviation: 2.00
Mean: 5.15
Mode: 5.5

Results

Figure (3):Subedee, M., Dotson, M., & Gibeaut, J. (n.d.). Investigating the environmental and socioeconomic impacts of sea level rise in the Galveston Bay, Texas region.

- Galveston port reported the highest disappearing rate of shoreline (Figure 3)
- 4.5-5.5 meters per year
- Affects tourism industry
- Ruin beach and environmental aesthetics
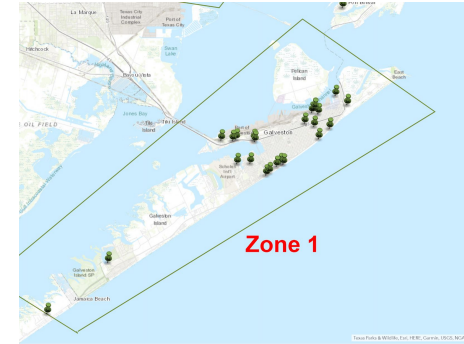- Increase waste site impacts

Figure (4&5) created with ESRI ArcGIS

- Locations of locals contacted
- Zone 1 consists of the most contacts since they're closer to shorelines
- Zone 1 reported the highest ratings of impacts

Results:

Social Impacts

- Displaced homes

- Unemployment

- Change of lifestyles

Socio-Economic Conditions for Galveston Bay Region

County	Population	Employment	Households	Total Personal Income
Chambers	28,779	13,733	11,685	$1,037,909,000
Galveston	283,551	137,838	110,864	$10,832,200,000
Harris	3,886,207	1,869,915	1,397,426	$171,282,800,000
TOTAL	**4,198,537**	**2,021,486**	**1,519,975**	**$183,152,909,000**

(IMPLAN, 2008 and Texas Workforce Commission, 2008)

Displaced Population-Number of Households

	0.69 Meters	1.5 Meters
Chambers	626	762
Galveston	74,452	88,905
Harris	4,354	9,237
TOTAL	**79,432**	**98,904**

Galveston:
- Total number of households - 110,864
- Least extreme case - 74,452 homes displaced
- Most extreme case - 88,905 homes displaced

Impact on lifestyles:
- People are attached to their physical locations
- Loss of homes, churches and schools can cause increases in fears, anxiety, mental health illnesses

Results:

Economic Impacts

- Damage control

- Flood prevention

- Loss of businesses

Socio-Economic Parameter	2.5 m (8.2 feet) Extreme	2 m (6.5 feet) High	0.5 m (1.64 feet) Intermediate	0.2 m (0.65 feet) Low
Population	40,260	23,168	759	245
Homes	27,543	17,761	814	312
Property Value	$5,661 million	$4,401 million	$301 million	$112 million
Houses of Worship	106	83	0	0
Schools	22	18	0	0
Hospitals	6	2	0	0
Colleges and Universities	2	0	0	0
Libraries	1	0	0	0

Table: Impact on Buildings and Population under various SLR scenarios, Climate Central

Texas Gulf coast SLR since 1950: 18 inches = 1.5 m

Results:

Environmental Impacts

- Waste site damages

- Beach erosion

- Land subsidence

- Loss of Wetlands

Map 7. 1.5m Waste Site Impact

Legend
- Waste Water Treatment Plant
- Superfund Site
- Industrial & Hazardous Waste
- Radioactive Waste
- Municipal Solid Waste
- Water

Water elevation derived from LiDAR
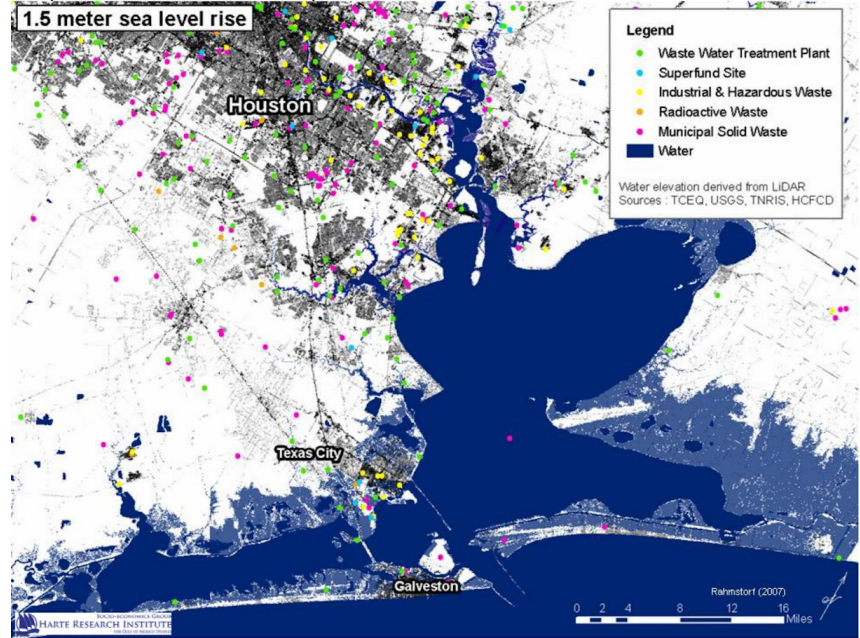Sources : TCEQ, USGS, TNRIS, HCFCD

Figure 6 - Yoskowitz, Gibeaut, and McKenzie – Harte Research Institute for Gulf of Mexico Studies Texas A&M University-Corpus Christi
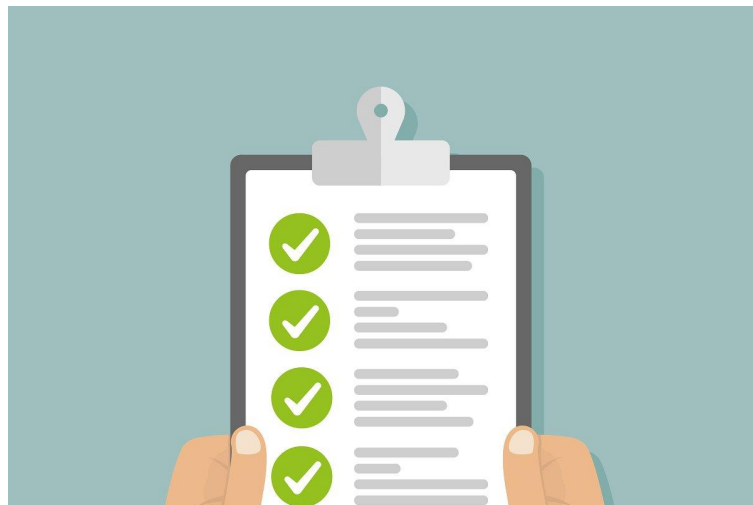
1.5 meter scenario:
- a total of 33 sites impacted
  - 16 wastewater treatment plants
  - 9 solid waste sites

Conclusion

- There is a clear impact on the socioeconomic factors

- Things can't continue the way they are currently

Policy Implications

Working together with policy workers, we could educate them on the topic and show them that different policy implications need to take place now before it's too late.

Questions?