Potential Impacts of Sea Level Rise on Hilton Head Island, SC

5,000 acres will be submerged >50% of the time with 2.25 ft. of sea level rise

Program for the Study of Developed Shorelines
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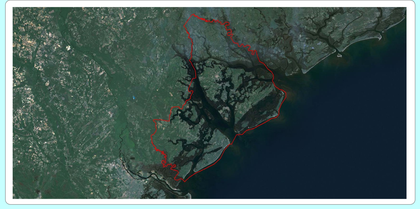
PROGRAM FOR THE STUDY OF DEVELOPED SHORELINES

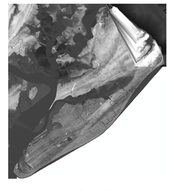
Project Description

Hilton Head Island, South Carolina is highly vulnerable to land loss from sea level rise and accelerated rates of shoreline erosion due to its low average elevation, low slopes, high tidal fluctuations, and exposure to seasonal storms. The island is a centerpiece of the South Carolina beach-based tourism industry which stands to suffer significant losses to infrastructure and ecosystems unless long-term adaptive planning is implemented. Yet, adequate planning requires high-quality, science-based projections of those areas likely to be impacted by a future rise in sea level.

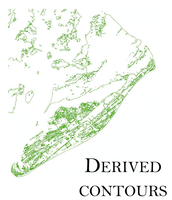


Methods

A 5 ft resolution DEM based on a 2002 LIDAR flight of Beaufort County was used to derive 1 ft contour lines relative to NAVD88. Because MHW at Hilton Head is 3.75 ft, the 6 ft contour interval was used to estimate a sea level rise scenario of around 2.25 ft. Most projections for future sea level indicate that we will experience a rise of at least 2.25 ft by the end of the century. We overlaid low lying areas with parcel data provided by the Beaufort County GIS Office and 30 m LandSat data to categorize impacted areas by land cover and zoning. We also overlaid the impacted land with the current road network and building footprints to identify problem areas.



2002 LIDAR data



Derived contours

Land polygon

Building footprints

Roads

Land cover classes

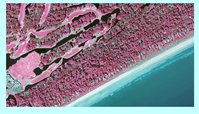
Assumptions

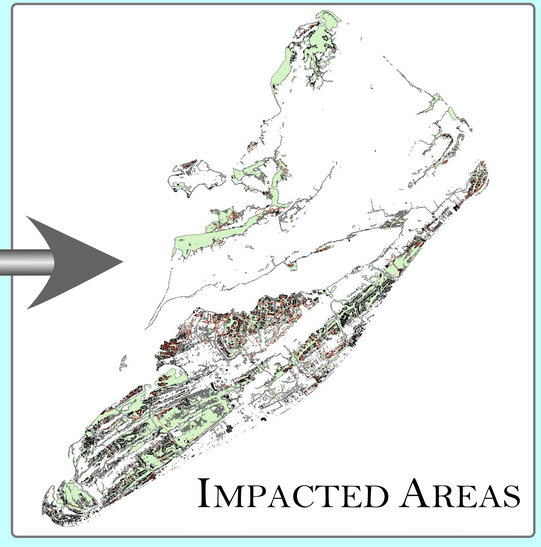
•Aquifer connectivity - unconnected low lying areas are shown as areas of loss.

•Accretion/Erosion does not occur - this assumption is reasonable for large portions of the interior of the island.

•Accurate LIDAR to DEM conversion process: Thomas and Hutton guarantee 15 cm RMSE (+/- 6 inches) vertical accuracy for all land above MHW (3.75 ft.)

•Data veracity from GIS office - much of the data has been hand digitized such as building footprints.





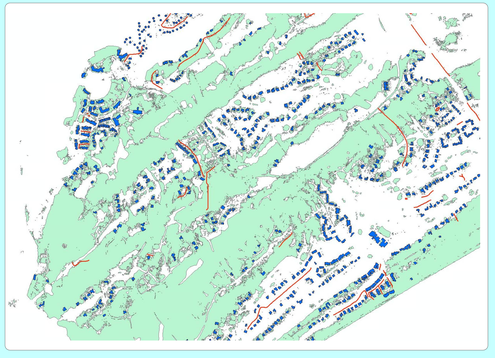
Impacted Areas

Results

Of the 21,500 acres in the 21,860-parcel database maintained by the county, 5,022 acres were submerged more than 50% of the time. SC GAP analysis land cover data were used to identify current land uses.

Infrastructure impacts: 3080 buildings are contained within or touch the perimeter of land below 6ft NAVD88 and nearly 50 miles of road would be impacted by a 2.25 ft rise in sea level.

Environmental impacts: the largest land cover classes in areas of loss were dry mixed forest/woodland (1655 acres), marsh/emergent wetland (1182 acres) and grassland/pasture (442 acres).



Land Use Impacts

Cover type	Present area (acres)	Impacted area (acres)	% Impacted
Maritime forest	9596.7	1654.5	17.2
Marsh	1495.7	1180.8	78.9
Fresh water	827.1	466.5	56.4
Grassland/pasture	2730.9	442.3	16.2
Urban residential	3040.8	433.1	14.2
Wet scrub/shrub thicket	478.5	165.2	34.5
Marine water	309.9	157.9	50.9
Bottomland	615.0	138.2	22.5
Urban development	596.7	79.8	13.4
Swamp	165.3	75.7	45.8
Cultivated land	927.1	63.6	6.9
Closed canopy evergreen	212.2	46.5	21.9
Dry scrub/shrub thicket	185.0	25.5	13.8
Wet soil	23.0	22.2	96.5
Beach	104.0	18.5	17.8
Open canopy/recently cleared	84.9	18.0	21.2
Needle leaved-evergreen mix	60.4	17.1	28.2
Wet evergreen	68.9	10.7	15.5
Pine woodland	11.5	3.9	34.2
Sandy bare soil	1.8	1.7	97.3
Pocosin	0.2	0.2	100.0
TOTAL	**21535.7**	**5021.9**	**23.3**

Western Carolina University

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University of South Carolina Beaufort

Beaufort County GIS Department Begun 1991

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