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

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 cornerstone 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 low lying areas likely to be impacted by a future rise in sea level.

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 (< 1/3 inches) vertical accuracy for all land above MHW (3.75 ft).
- Aquifer connectivity - unconnected low lying areas are shown as areas of loss.
- Aquifer connectivity - unconnected low lying areas are shown as areas of loss.
- Data veracity from GIS office - much of the data has been hand digitized such as building footprints.
- 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).

RESULTS

Of the 21,500 acres in the 21,960-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: 3,080 buildings are contained within or touch the perimeter of land below 6 ft NAVD88 and nearly 30 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 (1,192 acres) and grassland/pasture (442 acres).