



Master Thesis Defense by Ms. Rachel Edwards

ABSTRACT

The Galveston Bay area in Texas is at particular risk of sea level rise (SLR) induced hazards because of its unique geography and geology, including relatively high subsidence rates due to hydrocarbon and groundwater extractions. SLR is an exceptionally difficult public policy problem because shorelines have a dynamic nature while laws are static. This study examines the effects that four different development strategies could have on landscape structure. Using the Sea Level Affecting Marshes Model (SLAMM), the possible effects of SLR under four development policy scenarios are examined in four regional subsites that each represents a different natural and built environment. The policy scenarios are (1) “Armoring Removed” which serves as a control and employs no shoreline protection, (2) Current Armored Shoreline which models the current situation regarding development and armoring, (3) Green Infrastructure which shows what may happen if living shorelines were used instead of dikes, and (4) Shoreline Armoring which describes the armoring of the entire coastline. Coastal habitats and their ecosystem services are hypothesized to be most reduced under the armoring and Current Armored Shoreline scenarios due to coastal squeeze. Initial results indicate that over 100 hectares of uplands just in Galveston, TX would be converted to other habitat types under 0.74 m of SLR by 2100 in a Current Armored Shoreline policy scenario. Action should be taken immediately to develop policies that foster resiliency and avoid the worst outcomes for both human and non-human communities in Galveston Bay. This work is part of a larger study on living with sea level rise along the Texas coast.