GIS MODELLING OF URBAN FLOOD PRONE AREAS

Project Description

The current trend of sea-level rise and climate change is a threat for coastal areas. GIS modelling of an urban area can guide policymakers to take informed decisions on planning and infrastructure development. Using the FUNWAVE model on nearshore, we modeled two different wave and storm surge flooding scenarios for New Haven Harbor, 10-year and 100-year return period. Through the output of the flood simulations using GIS, we estimated the amount of water on the streets (including sidewalks and parking), buildings, and lifelines. We also focused on how the properties affected by the flooding changes around the New Haven Tweed Airport area under different scenarios. The study aims to increase the understanding of the flooding in urban areas by preparing communication tools via maps.

Project Findings

- The sea-level rise projections (up to 20 inches of by 2050) increases the affected infrastructure and community lifelines in New Haven harbor.
- High-resolution models that include the wave and storm surge improve the estimated total water levels in the projected areas.
- Compared to the 10 year and 100-year return scenario, the total flooded building area increases significantly with 2050 projections on the same flooding, respectively.
- Three case scenarios assisted us to understand the main flow direction. The preventative flood control structures may change the flood impact on the important infrastructure.

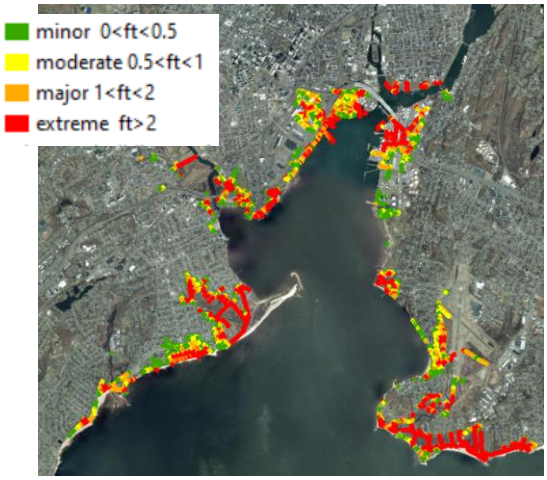

Figure: Street flooded, 10-year 20 inches return period

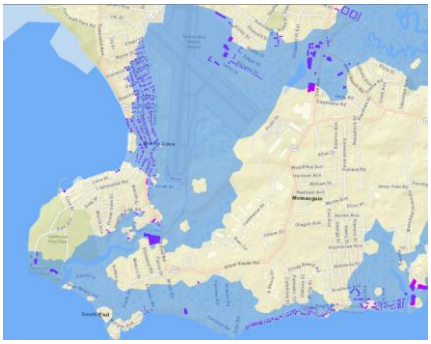

Figure: Current situation, no flood control structure.

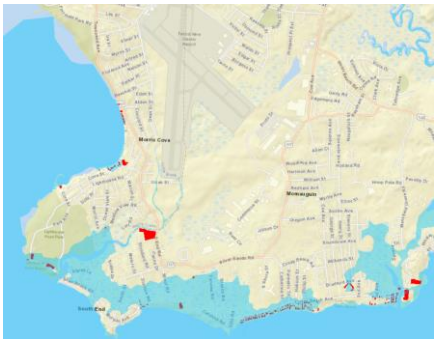

Figure: Flood control structure across Morris Creek, Farm River, and along Morris Cove.

Research Gaps and Recommendations

- The GIS model accuracy depends on the topography file accuracy.
- There has not been a standard classification to estimate how much water will be destructive for streets and buildings. The maps can be updated for specific criteria.
- The sea level rise increases how frequently the storm with same return interval will be encountered. For example, the 10 year return interval storm by 2050 increases to 2-3 year storm in 2050.