Identifying Community Exposure Along the Carolina Coast

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Increasing resilience can improve a community's ability to respond to and recover from a hazard more quickly and with fewer resources. Often, the ecosystem services provided by natural landscapes can be leveraged to benefit nearby communities and reduce a community's exposure. Identifying hazards and areas exposed to climate threats are necessary steps to improving resilience.

To locate areas facing potential flood hazard exposure, the National Fish and Wildlife Foundation (NFWF) partnered with NEMAC to develop a coastal resilience assessment for the United States. Following a resilience framework, this assessment uses geospatial analyses and modeling to identify assets that are potentially exposed to flood and severe storm events. NFWF will then use the models to help identify landscapes that may be suitable for restoration projects that aim to improve both fish and wildlife habitat and increase resilience in our communities.

Building Resilience of the Natural Environment and Human Communities

Identifying Exposure to Coastal Flood Events

Building resilience begins by determining the exposure of a community's assets to natural hazards. This analysis focuses on the concept of exposure, which is defined as the location of a community's asset—such as a business, infrastructure, or people—in relation to an area potentially impacted by a threat or hazard.

To identify places where assets are most exposed to flood threats, two models were initially created: a model spatially depicting coastal flood hazards (the Threat Index) and another depicting the presence and quantity of critical assets (the Community Asset Index).

Threat Index

Threats are defined by datasets that show coastal flood and severe storm hazards on the landscape.

- Flood-prone areas
- Storm surge zones
- Sea level rise scenarios
- Soils with poor drainage
- Soils with high erodibility
- Low-lying areas
- Geologic stressors

Community Asset Index

Assets are defined as critical community infrastructure that, if compromised, would impact a community's ability to respond to a flood event.

- Population density
- Socially vulnerable populations
- Critical facilities
- Critical infrastructure

Community Exposure Index

Each cell value of the Threat and Community Asset Indices are calculated to create the Exposure Index. This Index identifies areas on the landscape where community assets are potentially exposed to a flood or severe storm-related hazard.

Exposure

High

Low

Next Steps

To date, NEMAC has completed the Coastal Resiliency Assessment for the entire east coast, gulf coast, and west coast of the continental United States. Now NEMAC is working with NFWF to expand the Assessment to include Puerto Rico and the U.S. Virgin Islands, Hawaii, and Alaska, and these regions will be completed in 2019. NEMAC is also developing a web-based interactive mapping tool that will allow NFWF staff and other decision makers to interact with key assessment data to identify, and derive exposure values and hub scores for, potential areas for project sites.
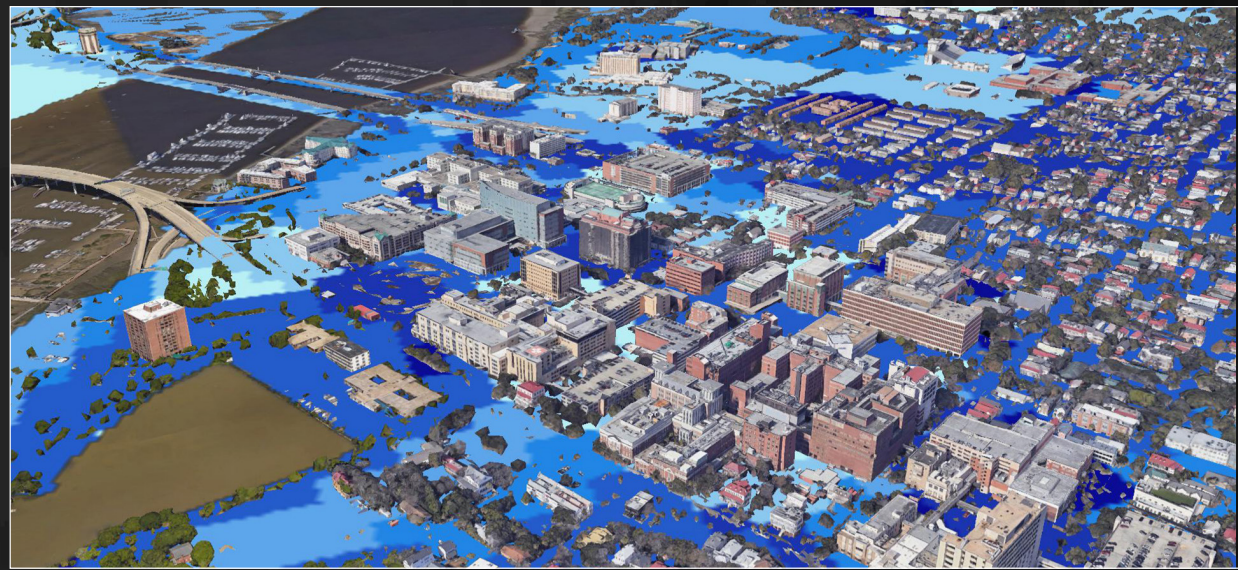
Case Study: Exposure in Charleston's Hospital District
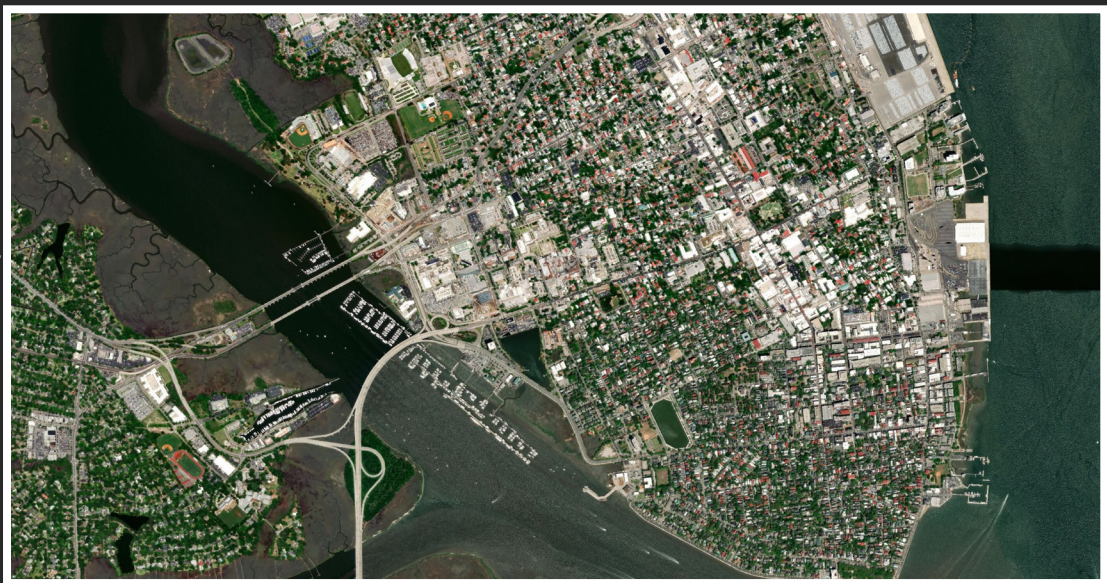
Charleston, South Carolina


Community Asset Index

Several hospitals are located on the low-lying western side of the Charleston peninsula, along the Ashley River.

Hospitals are included in the Critical Facilities input to the Asset Index; their approximate sizes and locations are easily identified.

Threat Index

This area of Charleston is prone to a number of flood hazards, as suggested by the brighter red color on the map.
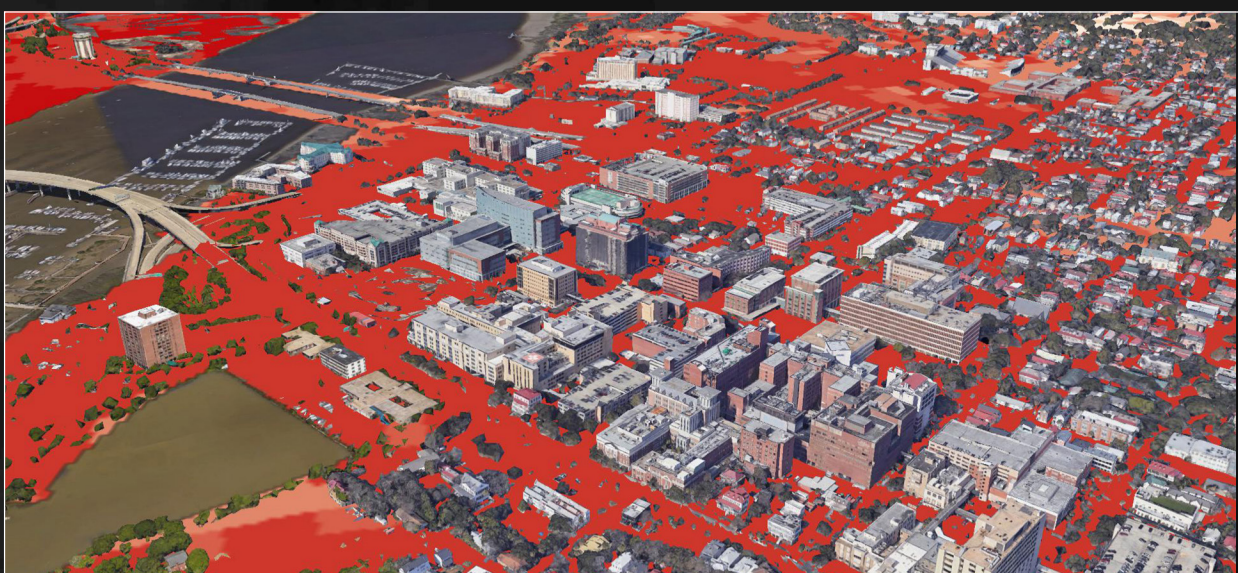
Out of the six Threat Index inputs used in the region, two are very high in this area: Storm Surge and Areas of Low Slope.

Community Exposure Index

As a result of the presence of a number of hospitals and other assets and the high Threat Index value, the Exposure Index is calculated to be potentially *high* or *very high* throughout the area.

Armed with this information, city planners can help improve resilience in this area of Charleston. Additionally, hospital staff can take steps to improve the adaptive capacity of hospital buildings to better handle future flood events.