Coastal Vulnerability Index (CVI) Assessment
Suffolk County, New York

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Introduction

- CVIs analyze stressors affecting the coastal zone, zone sensitivity to stressors, and zonal adaptive capacity (Santos et. al., 2013).
- Theieler and Hammer-Klose's CVI identifies vulnerable coastal areas based on physical parameters (Gorokhovich et. al., 2013).
- Physical CVIs can be combined with social indices to include socioeconomic parameters providing a more inclusive view of the coastal zone and coastal communities (Thatcher et. al., 2013).
- The purpose of this assessment was to generate a CVI as a resource for county and local governments, coastal zone managers, and policy makers, within the study area. The CVI will allow stakeholders to identify areas and communities most at risk and will facilitate threat mitigation and preventative planning.
- Suffolk County was chosen as the study area as it has an expansive coastline, low elevation, and high population.

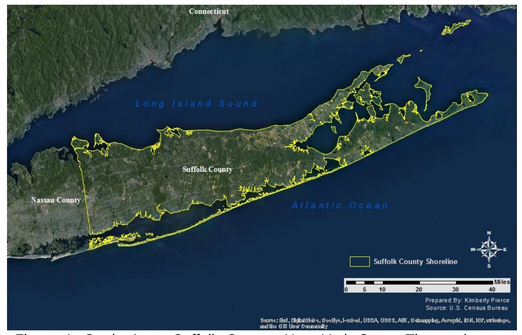

Figure 1. Study Area: Suffolk County, New York State. The study area encompasses the county boundary defined by the 2010 U.S. Census.

Methods

- Parameters were selected to provide a generalized view of vulnerability based on known coastal sensitivity, elevation, and proximity of social and economic resources to the coastal zone.
- Physical parameter attribute values were ranked on a 1 – 4 scale of increasing risk. Rank values were based on ranks proposed by (Gorokhovich et. al., 2013).
- Social parameter manipulations were based on methods used by (Thatcher et. al., 2013). Social rankings were assigned based on numerical scaling of data.

Figure 2. Workflow for index creation.

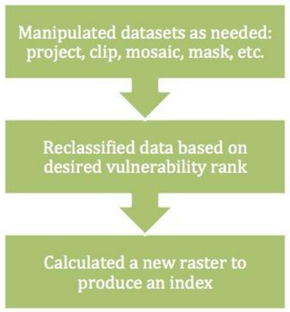

Table 1. Raster identification and use in index

Raster Name	Equation Identifier	Description
Reclassed_DEM	a	Elevation
Reclassed_ESIP	b	Environmental Sensitivity
Reclassed_Landuse	c	Land use and cover
Reclassed_Parcels	d	Property Category
Reclassed_POP	e	Population

Table 2. Coastal vulnerability index equations

Coastal Vulnerability Index	Equation
Equally Weighted	a+b+c+d+e
Physically Weighted	(0.3*a) + (0.2*b) + (0.4*c) +(0.05*d) +(0.05*e)
Socially Weighted	(0.05*a) + (0.05*b) + (0.1*c) +(0.3*d) +(0.5*e)

Results

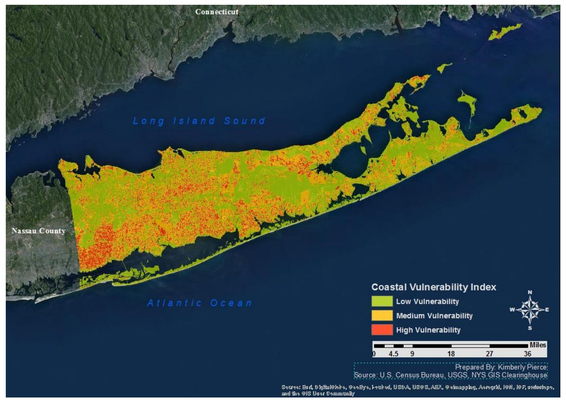

Figure 3. Suffolk County Coastal Vulnerability Index. This figure shows the threat distribution throughout Suffolk County when all parameters are equally weighted. This indexing method is useful in determining generalized vulnerability within the study area.

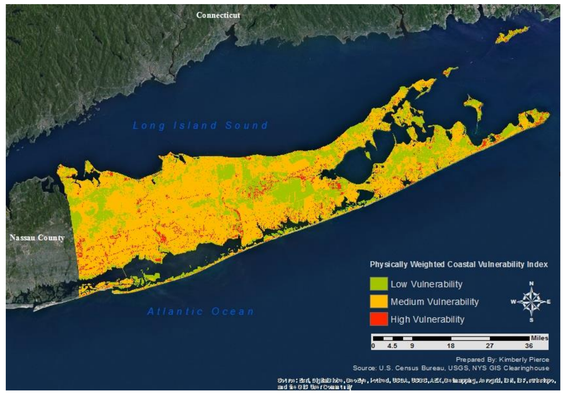

Figure 4. Suffolk County Physically Weighted Coastal Vulnerability Index. This figure shows the threat distribution throughout Suffolk County when physical parameters are given priority. This indexing method is useful in determining which physical characteristics make an area most vulnerable.

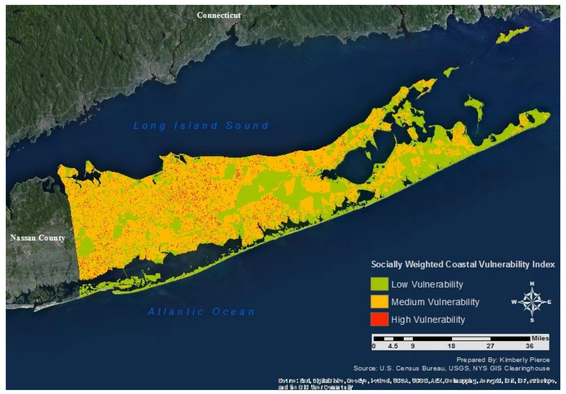

Figure 5. Suffolk County Socially Weighted Coastal Vulnerability Index. This figure shows the threat distribution throughout Suffolk County when social parameters are given priority. This indexing method is useful in determining which communities are most vulnerable.

Results Summary

- Suffolk County's south shore and western areas are the most vulnerable areas in each analysis. These regions experience the highest coastal vulnerability when all index parameters have the same weight.
- Equally weighting all parameters provides the best outlook for Suffolk County. This weighting system, though it exhibits the highest polarization of vulnerability ranks, has the largest expanse of low vulnerability areas out of the three analyses.
- When physical parameters are given priority weighting, the majority of the County receives an index ranking of "Medium Vulnerability". This is likely due to the overall low elevation within Suffolk County. The highest elevation within Suffolk County is only 401 feet (122 m) above sea level (Suffolk County Government, 2013).
- When social parameters are given priority weighting, the western portion of the County receives a higher vulnerability ranking than the eastern end of the County. This is due to higher population densities within the western expanse of Suffolk County.

Conclusions

- CVI analysis is highly customizable and has a wide range of use for coastal zone planning and threat mitigation. Methodology should be matched to selected parameters.
- The methodology used in this analysis produced results consistent with anticipated outcomes that reflect known patterns of coastal damage from previous coastal storm events.
- Further analysis of the coastal vulnerability of Suffolk County, NY is needed to ensure a comprehensive understanding of the county's coastal zone.

Recommendations

- To ensure that the vulnerability of the county's coastal zone is adequately understood future studies should incorporate additional physical, socioeconomic and demographic parameters.
- Up-to-date datasets which include recent changes due to coastal storms need to be created and made available to stakeholders.
- It is necessary to consider availability of data for the selected analysis area. Lack of data may necessitate expansion of the study area to ensure accuracy given dataset resolution.

References

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5. U.S. Census Bureau. (2013, June 27). *State & County QuickFacts: Suffolk County, NY*. Retrieved November 24, 2013, from U.S. Department of Commerece: http://quickfacts.census.gov/qfd/states/36/36103.html