

Physical Vulnerability Index

Summary

The Center for Coastal Resources Management at the Virginia Institute of Marine Science has developed a Physical Vulnerability Index (PVI) for the Chesapeake Bay region. PVI provides a broad perspective on the vulnerability of the Tidewater region, creating a composite measure of general flood impact rather than the threat of any one particular storm track. While there have been a number of efforts to categorize physical risk, the analysis behind this physical vulnerability index allows for application at a variety of scales such as the county or US Census tract level.

Calculating physical risk for geopolitically defined boundaries generates values that can be directly tied to relevant socio-economic data, increasingly identified as a critical element of overall coastal vulnerability. The PVI draws on data sources that are generally widespread or replicable across different areas, which should allow transfer beyond the Chesapeake Bay region for use in coastal management at multiple scales. The capability to calculate vulnerability values at both the relative and absolute levels allows exploration of how vulnerability differs within various spatial contexts.

The physical vulnerability index focuses on elevation as the percent of area under 10 ft mean sea level, and volume/area of area under 10 ft (inverse), land use (developed lands), relative wave exposure (calculated using NOAA's WEMo tool), and tide range (inverse). While the other factors are common in the literature, incorporating the “developed land” further focuses the study on the application at human community scales. Vulnerability calculations that did not naturally have a maximum for 1 were standardized against the highest value in the area. The final scores were calculated at the census tract scale in order to connect to socioeconomic data.

CITATION:

Center for Coastal Resources Management (CCRM). 2017. Physical Vulnerability Index. Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, Virginia.
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