

Coastal Vulnerability Assessments for National Park Service Infrastructure: Examples in the Carolinas

Tormey, Blair, Katie Peek, and Rob Young

Western Carolina University, Program for the Study of Developed Shorelines

The Program for the Study of Developed Shorelines, in partnership with the National Park Service (NPS), has developed a new approach for assessing the natural hazard and climate change vulnerability of NPS infrastructure. This vulnerability assessment (VA) protocol standardizes the methodologies and data used, allowing managers to compare the vulnerability of assets across local, regional, and national levels.

Standard practice for VAs includes three metrics: exposure (degree to which a system will experience a stressor), sensitivity (how a system fares when exposed), and adaptive capacity (ability of a system to sustain itself by adapting). The new protocol includes only exposure and sensitivity in the vulnerability score for each asset; adaptive capacity is evaluated separately. The rationale is that infrastructure does not have intrinsic adaptive capacity, like that of a natural system (e.g., salt marsh). Adaptive capacity for infrastructure depends on external influences, including cost, use, politics, historic value, and park mission. In fact, with an infrastructure VA, the adaptive capacity assessment helps managers identify potential actions for reducing the exposure or sensitivity of an asset and, in turn, its vulnerability.

Coastal parks were chosen as a starting point for the VAs because of the availability of geo-referenced data for exposure mapping, as well as the clear trend for climate change stressors (e.g., sea level is rising in most locations). This methodology need not be applied solely in parks, but could also be utilized in municipalities and other communities. Furthermore, the general VA protocol could be modified to assess other natural hazards and climate stressors.

The protocol has been applied at multiple coastal national parks within the southeastern US, including five from the Carolinas: Cape Hatteras National Seashore, Fort Raleigh National Historic Site, Wright Brothers National Memorial, Cape Lookout National Seashore, and Fort Sumter National Monument. Ultimately, the asset-specific VA results can be used by NPS managers in developing short- and long-term adaptation strategies for the parks.