

## **ANALYZING THE IMPACTS OF SEA-LEVEL RISE ON COASTAL PROPERTY AND ECOLOGICAL RESOURCES**

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**KEYWORDS:** sea-level rise, climate change, coastal property, ecological services, inundation, shore protection, wetland, GIS

Scientific research shows that climate change will likely accelerate the rate of sea-level rise (SLR) along much of the U.S. coastline. Rising sea levels will aggravate the stresses that coastal areas are facing, including flooding, erosion, wetland loss, and environmental degradation. Discerning the impact of SLR on coastal development and ecosystems requires an understanding of rates of sea level rise, the vulnerability of the physical landscape, options for responding, and the corresponding economic implications. Property owners will incur losses from inundated property and/or the costs of constructing and maintaining seawalls and other shoreline protection devices. Neighboring coastal wetlands and other habitats will also be exposed to rising waters. Some wetlands may be able to accrete in place or migrate inland. Other wetlands and habitats, however, are or will be surrounded by development and would be unable to migrate inland. Consequently, a significant quantity of the nation's coastal habitat and their ecological services could be lost.

In this panel session, we will present new analytic frameworks for estimating the economic impacts of SLR on both coastal property and ecological resources. The frameworks employ GIS to structure and overlay available data (including coastal elevations, parcel-level property value data, land use and zoning, wetland categories, and ecological resources) using a 150-meter grid cell network. Through MS Access-based interfaces, users can select from preloaded regions (e.g., Ocean County, NJ) and SLR scenarios as well as revise default response and unit cost parameters. The property and ecological analysis tools then report estimates of property and ecological service costs in both graphical (map and chart) and tabular form.

Specific discussions will include:

**Project Motivation:** Information on the background and goals of this work, including the application of the analytic frameworks at both the national and local-levels.

**Methods and Illustrative Results for the Coastal Property Analysis:** The inputs and methods employed to evaluate the lands likely to be threatened by relative sea level rise, identify the economically efficient response (i.e., abandon, elevate, armor) for each cell of the analysis, and estimate the corresponding economic impacts. Example results will be provided for the New Jersey coastal shore

**Methods and Illustrative Results for the Ecological Services Analysis:** The framework for estimating SLR-induced changes in coastal habitats as a result of sea level

rise and assessing the corresponding economic impacts. We will illustrate the estimated impacts by applying both contingent valuation techniques and cost estimates for potential compensatory restoration projects using habitat equivalency analysis (HEA).

**Local-Level Application:** To illustrate the application of this framework, the last presenter will share the results of an effort to apply these analyses at the local level. In addition to illustrating the process of gathering the site-specific inputs, the presenter will provide comparative results showing the potential impacts under varying sea level rise scenarios and different anticipated responses.

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