Local community verification of sea-level rise exposure risks in the North Atlantic Region: Insights from an assessment of property tax revenue in coastal New Jersey

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I. Introduction

This study projects municipal tax exposure to sea-level rise (SLR) in four New Jersey counties: Monmouth, Ocean, Atlantic, and Cape May. According to Kopp et al. (2014), it is likely (67% probability) that relative SLR at Atlantic City, New Jersey will exceed 1’ by 2050, 3’ by 2110, and 6’ by 2170 under representative concentration pathway (RCP) 8.5, corresponding to continued fossil fuel-intensive growth (IPCC 2013). In the figure below from R.E. Kopp, larger areas correspond with higher probability that the respective SLR exceedance will occur within the consistently color-coded year range.

Concern among economic exposure to sea level rise and storm surge is a topic of growing public and policy concern (Neumann et al. 2014), and there is a need for more local level assessments of property value and tax base exposure like the Frazier et al. (2010) study in Sarasota County, Florida. This paper describes a new method to do this including verification using Superstorm Sandy observations such as local knowledge about inundation impacts.

II. Methods

Methods include spatially overlaying NOAA Coastal Services Center sea-level rise data (SLR) with State of New Jersey parcel data for 1’, 3’, and 6’ sea level rise scenarios, in all assessing about one million parcels for exposure.

The study projects net property value and annual municipal tax revenue exposed to rising seas by linking New Jersey tax records with the parcel exposure data. Parcels with greater than 0 percent physical exposure were considered exposed. The 0 percent threshold is supported by preliminary verification methods based on Superstorm Sandy inundation derived from high water marks, an effort organized by FEMA. As part of our SLR exposure verification, we also visited places where parcel-level aerial damage assessments disagreed with the Sandy inundation extents for further insight.

III. Results

Total property value for the four counties is roughly $290 billion with $261 billion being taxable. Total annual property tax revenue for all four counties is about $4.7 billion. Property value and annual property tax revenue exposed to 3 feet of sea-level rise for the four counties is roughly $58 billion and $662 million, respectively. Figure A and Table B provide exposure information for 1’, 3’, and 6’ of SLR for the four counties. Figure C through Figure G illustrate preliminary local verification methods supporting the 0% physical exposure threshold.

B. Sea-Level Rise Property Value and Tax Exposure

<table>
<thead>
<tr>
<th>County</th>
<th>Net Property Value</th>
<th>Total Taxable Property Value</th>
<th>Municipal Taxable Revenue Exposed to 0’ SLR</th>
<th>Municipal Taxable Revenue Exposed to 1’ SLR</th>
<th>Municipal Taxable Revenue Exposed to 3’ SLR</th>
<th>Municipal Taxable Revenue Exposed to 6’ SLR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monmouth</td>
<td>$30,923,215,498</td>
<td>$28,046,723,565</td>
<td>$2,801,230,423</td>
<td>$2,128,160,318</td>
<td>$1,527,913,009</td>
<td>$1,063,088,003</td>
</tr>
<tr>
<td>Ocean</td>
<td>$34,330,615,276</td>
<td>$31,356,675,323</td>
<td>$3,363,677,323</td>
<td>$2,523,501,032</td>
<td>$1,925,923,306</td>
<td>$1,406,942,942</td>
</tr>
<tr>
<td>Atlantic</td>
<td>$30,251,967,777</td>
<td>$27,860,855,267</td>
<td>$2,909,919,267</td>
<td>$2,247,442,191</td>
<td>$1,732,830,979</td>
<td>$1,294,227,317</td>
</tr>
<tr>
<td>Cape May</td>
<td>$34,598,923,348</td>
<td>$31,474,102,410</td>
<td>$3,454,102,410</td>
<td>$2,660,801,983</td>
<td>$2,141,524,776</td>
<td>$1,680,340,477</td>
</tr>
</tbody>
</table>

C. Sandy Parcel Physical Exposure Levels

D. Local Verification at Sandy Model Discrepancy Areas in Brick, NJ

F. Sandy Model Accuracy Based on Exposure Levels (with Mask)

G. Masked Sandy Model Error Matrix (>0% Exposure)

IV. Conclusion

This study finds that annual property tax revenue exposed in Ocean County ranks highest under 1’, 3’, and 6’ sea level rise (SLR) scenarios among the four counties, up to about $464 million under the 6’ scenario. However, percentage tax revenue exposed in Ocean County is only highest under the 1’ scenario at 14% exposed. Cape May has the highest percent tax exposed under the 3’ and 6’ scenarios at 27% and 66%, respectively.

Preliminary verification methods support the 0 percent physical exposure threshold applied to derive the above SLR tax exposure estimates. Next steps include using the more recent, FEMA-verified, aerial damage assessment dataset and accounting for protection and accommodation measures in FEMA flood zones by analyzing parcels with differing requirements separately. An exposure assessment based on building footprint data is recommended for future work.

V. References


VI. Acknowledgments

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