How Critical is Access to Key Facilities (and Vulnerable Populations) in a Flood Event?

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Objectives

• Improve understanding of vulnerability and resilience for communities

• Establish and demonstrate a method for evaluating a community’s transportation resilience

• Make available a scalable methodology
Case Study Area – Dyer County, TN

- River valley community with history of flooding
- Population ~34,000
  - 24% below age 18
  - 17% over age 65
  - 15% have a disability
  - 10% with no health insurance
  - Approx. 17% in poverty
Approach

• Perform initial flood loss assessment using Hazus for a range of scenarios
• Evaluate Hazus results, building damage estimates, and essential facility inventory in comparison with other sources of information
• Assess impacts of flood scenarios with a focus on vulnerable populations and transportation systems
Hazus Inundation Estimates
Comparison: Hazus (Level 1) vs FIRM

100-Year

500-Year

100-Year Hazus Flood
100-Year FIRM Flood

500-Year Hazus Flood
500-Year FIRM Flood
Building footprints from Microsoft building footprints made available in 2018

Note: Building footprints below 950 ft² were excluded from analysis, no distinction was made between residential or commercial/industrial
Vulnerable Populations (Age Over 65)
Vulnerable Populations (Low Income)
Roadway Impacts

62% inundated

<table>
<thead>
<tr>
<th>Road Type</th>
<th>Length (miles)</th>
<th>% Affected</th>
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<tbody>
<tr>
<td>County</td>
<td>41.8</td>
<td>84%</td>
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<tr>
<td>Interstate</td>
<td>30.5</td>
<td>100%</td>
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<tr>
<td>Common Name</td>
<td>451.0</td>
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<td>State Recognized</td>
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<td>111.3</td>
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<tr>
<td>Not Categorized</td>
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</table>
ArcGIS Network Analyst was used to compute baseline service areas, defined as the area that can be reached within 16.1 km (10 miles) of an essential facility.
Conclusions

• Understanding community vulnerabilities can be improved by augmenting with additional data sets
  • Hazus underestimates Flood extent, damaged buildings, and essential facilities (in a Level 1 analysis, which is most common for communities with limited resources)
• GIS analysis can be used to identify transportation system impacts and network disruptions
• Knowing that your essential facilities are “safe” may not be enough
Thank you!

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