Integrated Asset Management: Dealing with Neglected Infrastructure and Vacant Properties in Legacy Cities

Conference on Innovations in Collaborative Modeling
June 4, 2015
Kellogg Center, MSU, East Lansing, MI
Presentation Outline

• Challenges in Legacy Cities
• Land Use & Infrastructure Solutions
• Saginaw Green Zone Case Study
• Using Modeling in Integrated Decision Making
• Next Steps
History: LegacyCities

- **Outmigration**
  - Suburbanization mid- to late-20th century
  - Poorest residents less mobile

- **Blight**
  - High urban unemployment and poverty rates
  - Foreclosure, abandonment, and dilapidation

- **Infrastructure & Vacancy**
  - Expensive, high-capacity infrastructure for now sparse populations
  - Hazardous 20-60% urban residential vacancy
Two Municipal Dilemmas

1. **Infrastructure repurposing**
   
   How to make service delivery more efficient to serve a smaller, more dispersed population?
   
   - e.g. street lighting, sewer systems, road and sidewalk maintenance

2. **Land repurposing**
   
   What to do with thousands of abandoned properties?
   
   - Aim to boost property values, create safer communities
## Infrastructure Repurposing Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Example(s)</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| Invest in new, more efficient infrastructure | • Cluster sewage systems  
• Single-operator trash collection | • Low future costs                              | • High upfront cost  
• Difficult to revert                                |
| Right-size existing services  | • Gravel roads  
• Planned disrepair of sewer sections                | • Low future costs                              | • High upfront cost  
• Reversion feasible                                   |
| Planned shrinkage             | • Incentives for resident relocation                  | • Low future costs                              | • Political and legal resistance                   |
| Zoning changes                | • Urban-rural demarcation line                        | • Permanently inhibits sprawl                   | • Political and legal resistance  
• Negative impact on some residents                     |
<table>
<thead>
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</tr>
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</table>
| Open space                   | • Low cost/maintenance  
• Non-contiguous land OK                               | • No productive use                                                           |
| Parks and recreational area  | • Moderate maintenance  
• Encourages walkability                                      | • Some upfront costs  
• Contiguous land only                           |
| Community gardens            | • Fresh, healthy food for locals  
• Fosters sense of place                                      | • Community maintenance difficult to ensure  
• Land may be contaminated                          |
| Commercial agriculture       | • May create local jobs  
• Removes public responsibility                                   | • Detracts from “residential”  
• Pesticide and water use  
• Contiguous land only                           |
| Alternative energy           | • Environmentally friendly                                            | • High upfront costs  
• High security & maintenance  
• Contiguous land only                           |
| Green infrastructure         | • Moderate maintenance  
• Walkability/attractiveness  
• Environmentally friendly                                | • Land may be contaminated  
• May inhibit/remove roadways                           |
Saginaw Green Zone

- City of Saginaw, MI, has lost 50% of its population over the past 40 years, and 25% of its land is vacant.
- Saginaw Green Zone (350 acres with highest concentration of vacancy) was designated as Green Reserve Area.
- Worked with EPA Smart Growth to identify strategies to stabilize neighborhood and envision a new economic future.
## Scoring Matrix

<table>
<thead>
<tr>
<th>Criteria</th>
<th>&lt;25%</th>
<th>25-49%</th>
<th>50-74%</th>
<th>75-100%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Occupancy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>score:</td>
<td>0-24</td>
<td>25-49</td>
<td>50-74</td>
<td>75-100</td>
</tr>
<tr>
<td><strong>Private Ownership</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>score:</td>
<td>0-24</td>
<td>25-49</td>
<td>50-74</td>
<td>75-100</td>
</tr>
<tr>
<td><strong>Sewer Size</strong></td>
<td>S&lt;=12&quot;</td>
<td>12&quot;&lt;S&lt;=24&quot;</td>
<td>24&quot;&lt;S&lt;=36&quot;</td>
<td>36&quot;&lt;S</td>
</tr>
<tr>
<td>score:</td>
<td>25</td>
<td>50</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td><strong>Consumption</strong></td>
<td>0&lt;=F&lt;=1</td>
<td>F&gt;1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>score:</td>
<td>(F^3)*100</td>
<td>100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Street Class</strong></td>
<td>Off Road</td>
<td>6-7</td>
<td>4-5</td>
<td>1-3</td>
</tr>
<tr>
<td>score:</td>
<td>0</td>
<td>10-20</td>
<td>30-60</td>
<td>80-100</td>
</tr>
</tbody>
</table>

**Criticality Score = αOccupancy + βOwnership + σSewer Size + δConsumption + τStreet Class**
Land Use: Vacancy Rates
Land Use: Ownership Rates

Legend
Unit: %
- 0 - 24
- 25 - 49
- 50 - 74
- 75 - 100

Green Zone Boundary
Land Use Greening Decisions
Land Use Greening Decisions
Land Use Greening Decisions
Infrastructure: Sewer Size
Infrastructure: Sewer Consumption
Infrastructure: Street Class
Infrastructure: Probability of Failure
Risk = Probability of Failure * Criticality Score * Cost
Risk = Probability of Failure * Criticality Score * Cost
Infrastructure Sewer Decisions

Risk = Probability of Failure * Criticality Score * Cost

Still some pockets of occupancy
Next Steps

• Other Variables
  • Political/institutional factors
  • Social factors & public involvement
  • Environmental factors
  • Cost factors

• Variable Weights

• Iterative Decision Making Over Time
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