Integrating Hazard Mitigation Into Long-Range Transportation Planning

PTAC Meeting
December 11, 2008
Welcome and Introductions

Mark Gumula
Charlotte County-Punta Gorda MPO
Agenda

- Review of Proposed Scenarios
- Review of Hazards to be Addressed
- Review of Storm Surge, Sea Level Rise, and Non-Coastal Flooding Scenarios
- Table Top Exercise
  - Identify areas for protection, accommodation, avoidance, retreat and relocation
Review of Proposed Scenarios

Harrison Higgins
Florida State University Department of Urban and Regional Planning
Scenario Planning

A “game” in which stakeholders develop alternative futures for a given geographic area

- Possible
- Probable
- Desirable
Scenario Planning Process

- Identify Stakeholders
- Create steering committee
  - PTAC
- Establish Principles and Values
  - How does the community mitigate hazards?
- Develop Scenarios
- Evaluate the Scenarios
  - TDM, HAZUS, ECM
- Choose a Preferred Scenario
- Implementation
  - LRTP and Comprehensive Plan Policies
Scenarios

- **Geography**
  - Charlotte County

- **Time Horizon**
  - 2100 Hazard Mitigation
  - 2050 Land Use Transportation
  - 2035 LRTP Update

- **Number of Scenarios**
  - 4
4 Proposed Scenarios

- Scenario 1: Comprehensive Plan as Adopted
  - Growth as directed by the adopted comprehensive plan to the year 2050

- Scenario 2: Comprehensive Plan Updated
  - Growth as directed by the revised comprehensive plan to the year 2050
Scenario 3: Protect and Accommodate (Hazard Mitigation)

- Growth as directed by the revised comprehensive plan to the year 2050

- Hazards mitigated through
  - inundation protection
    - ground surface elevation; construction of sea walls, bulkheads, revetments, or levees; or other means
  - accommodation
    - elevation of the structure on pilings; various flood-proofing measures, beach re-nourishment, or other means
  - avoidance
    - of development of vulnerable vacant or non-urbanized land through down-zoning, transfer of development rights, fee-simple acquisition, relocation of urban services area boundary, or other means
Scenario 4: Protect, Accommodate, and Retreat/Relocate (Hazard Mitigation)

- Growth as directed by the revised comprehensive plan to the year 2050

  - Hazards mitigated through
    - inundation protection
    - accommodation
    - avoidance
    - relocation
      - of existing improved land uses or transportation system components
      - through rolling easements, fee-simple acquisition, (cessation of public services (water and/or sewer), abandonment/removal of transportation facilities, or other means
Review of Hazards to be Addressed by Project

Link Walther
Continental Shelf Associates
Flooding and Sea Level Rise Vulnerability Scenarios

Dr. Robert Deyle
Florida State University Department of Urban and Regional Planning
Which Non-Coastal Flood Zones?

<table>
<thead>
<tr>
<th>Return Frequency</th>
<th>Annual Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-year</td>
<td>4%</td>
</tr>
<tr>
<td>50-year</td>
<td>2%</td>
</tr>
<tr>
<td>100-year</td>
<td>1%</td>
</tr>
<tr>
<td>200-year</td>
<td>0.5%</td>
</tr>
</tbody>
</table>
## Which Storm Surge Zones?

<table>
<thead>
<tr>
<th>Category</th>
<th>TS</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind Speed (mph)</td>
<td>39-73</td>
<td>74-95</td>
<td>96-110</td>
<td>111-130</td>
<td>131-155</td>
<td>&gt;155</td>
</tr>
<tr>
<td>Storm Surge Elevation (ft)</td>
<td>≤ 3</td>
<td>4-5</td>
<td>6-8</td>
<td>9-12</td>
<td>13-18</td>
<td>&gt;18</td>
</tr>
<tr>
<td>Annual Probability for Charlotte County (1900–2005) – All</td>
<td>n/a</td>
<td>2%</td>
<td>3%</td>
<td>4%</td>
<td>2%</td>
<td>n/a</td>
</tr>
<tr>
<td>Annual Probability for Charlotte County (1900–2005) – Direct</td>
<td>n/a</td>
<td>1%</td>
<td>n/a</td>
<td>2%</td>
<td>1%</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Storm Surge vs 100-Yr Flood Zones
Storm Surge: Haze Peninsula
Storm Surge: No. Charlotte Harbor
## Projected Global Sea Level Changes: 1990 - 2100

<table>
<thead>
<tr>
<th>Source</th>
<th>Causes</th>
<th>Range (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPCC (2007)</td>
<td>thermal expansion (TE) + glaciers (GM)</td>
<td>0.2 – 0.6</td>
</tr>
<tr>
<td>IPCC (2007)</td>
<td>TE + GM + ice sheets @ current rate</td>
<td>0.3 – 0.8</td>
</tr>
<tr>
<td>Pfeffer et al. (2008)</td>
<td>TE + GM + ice sheets @ accelerated rates</td>
<td>0.8 – 2.0</td>
</tr>
</tbody>
</table>

1 meter = 3.3 feet
Which Sea Level Rise Scenarios for 2050 and 2100?

<table>
<thead>
<tr>
<th>Plan Horizon</th>
<th>Sea Level Rise From 1990 through Plan Horizon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2050</td>
</tr>
<tr>
<td>2050</td>
<td>0.25 m [0.8 ft]</td>
</tr>
<tr>
<td></td>
<td>0.75 m [2.5 ft]</td>
</tr>
<tr>
<td>2100</td>
<td>0.5 m [1.6 ft]</td>
</tr>
<tr>
<td></td>
<td>1.5 m [5.0 ft]</td>
</tr>
</tbody>
</table>
Approximate 1-Meter SLR
1-Meter SLR: Haze Peninsula
~1-Meter SLR: N. Charlotte Har
~1-Meter SLR: Punta Gorda
Approximate 2-Meter SLR
~2-Meter SLR: Haze Peninsula
~2-Meter SLR: N. Charlotte Har
~2-Meter SLR: Punta Gorda
Tabletop Mapping Exercise

Dr. Tim Chapin
Florida State University Department of Urban and Regional Planning
Today’s Mapping Exercise

Purpose: For the three primary waterfront sections of the county, identify areas that fall into major categories for responding to changes in storm surge and sea level rise:

1. At-risk areas to be protected through the hardening of the waterfront or coastline (Protection Zones)
2. At-risk areas where infrastructure & development will remain, but with investments that reflect the impacts of SLR, such as elevation (Accommodation Zones)
3. At-Risk areas where infrastructure and development will be abandoned and/or relocated in the future (Retreat/Relocation Zones)
Resources Available to You

At each of the three tables you will find for your area:

1. **Existing Land Use and Future Land Use Base Maps**, with Roads, Railroads, and the USA Boundary. The land uses are generalized to major categories.

2. **Several Acetate Overlays**
   - Tropical Storm Surge Zone (~1 meter SLR)
   - Combined TS/Category 1 Surge (~2 meter SLR)
   - TS through Cat 5 Storm Surge Zones
   - Hydrants (as a proxy for water/sewer infrastructure)
Example TS Storm Surge Overlay
Resources Available to You

At each of the three tables you will find for your area:

1. **Existing Land Use and Future Land Use Base Maps**, including Major Roads, Railroads, and the USA Boundary. The land uses are generalized to major categories.
Resources Available to You

At each of the three tables you will find for your area:

1. **Existing Land Use** and **Future Land Use Base Maps**, with Roads, Railroads, and the USA Boundary. The land uses are generalized to major categories.

2. **Several Acetate Overlays**

3. **Small 8½ X 11 Maps of Other Hazards**
   - A and VE Flood Zones
   - Wildfire Hazard areas
FEMA Flood Zones A and VE relative to the Urban Service Area.
Resources Available to You

At each of the three tables you will find for your area:

1. **Existing Land Use and Future Land Use Base Maps**, with Roads, Railroads, and the USA Boundary. The land uses are generalized to major categories.

2. **Several Acetate Overlays**

3. **Small 8½ X 11 Maps of Other Hazards**

4. **Blank Acetate and Markers** upon which to work with these materials to identify areas for Protection, Accommodation, Retreat/Relocation
Exercise Timeline

Stage 1: Overview and Group Charge (~10 minutes)

Stage 2: Group Work at Tables (~45 minutes)
- Classify At-Risk Areas in your sector for: Protection, Accommodation, Retreat/Relocation
- Develop a broad set of principles that guide the group’s recommendations

Stage 3: Reporting of Results (~25 minutes)
- Present mapped findings
- Describe core principles
Primary Outputs from the Exercise

Today’s Outputs

1. **Obtain Mapped Output** from the three groups as to priority areas for Protection, Accommodation, and Retreat/Relocation.

2. **Insights into the Decision-Making Process** behind the identification of these areas. What factors are stakeholders and planners considering when making these recommendations?

Longer-Term Output

3. **Development of a Set of Principles** to help Charlotte County, and other jurisdictions, respond to SLR and storm surge in how they pursue land planning and invest in their transportation systems.