Principles for Integrating Planning for Hazard Mitigation and Land Use

Agenda

• Project Overview
• Basics of Hazard Mitigation Planning and Comprehensive Planning
• Comprehensive Plans and Hazard Mitigation Plans: Comparative Analysis
• Comprehensive Plans and Hazard Mitigation Plans: Best Practices for Coordination
• Best Practices for Planning to Achieve Disaster Resilient Communities
Project Background

- U.S. Department of Housing and Urban Development (HUD)
  - Georgia Department of Community Affairs
    - 2008: Awarded CDBG Disaster Recovery Assistance grant funds
    - 2011: Awarded supplemental grant through the Disaster Recovery Enhancement Fund (DREF)
      - Forward Thinking Land Use Planning
      - Disaster Resilient Building Codes
Project Background

• **Forward Thinking**
  Hazard Mitigation Planning and Land Use Planning
  
  – Increase awareness of hazard mitigation
  
  – Enhance consistency among various required planning documents

Consistency/Coordination/Integration

Project Background

• **Why?**
  
  Consistency
  Coordination
  Integration
  
  – Local plans need to work together
    • Comprehensive land use planning (local and regional)
    • Hazard mitigation planning

A hazard is a disaster waiting to happen!
**Project Background**

**Opportunities and Benefits of Integrating Hazard Mitigation into Local Planning**

**Opportunity**
- Comprehensive Plan Update

**Benefits**
- Promotes consistency between plans
- Increases the visibility of mitigation goals, objectives and policies
- Guides future development and land use
- Improves coordination between planners and emergency managers

...help manage risk by how **YOU** choose to:
- Plan,
- Design, &
- Build

**Disaster Resilient Communities**
Project Background

• Disaster Resilient Communities
  – Prepare for
  – Respond to
  – Recover from

Restoring a community more quickly to a pre-disaster condition

Project Background

• Question:
  – Why would someone build a house with the first floor so high?

• Answer:
  – They didn’t. In 1977, they raised the house 10 feet because Peachtree Creek flooded the first floor in 1975 & 1976
Project Background

Atlanta neighborhood becoming disaster resilient

“My neighbors must think I am crazy!”

High water mark
100-year base flood elevation

Maybe he is not so crazy after all..........
Six families in this neighborhood elevated their homes

- Lessons Learned?
  - Regulating where and/or how certain types of development should occur is good planning and a hazard mitigation tool
  - If you don't plan now, you'll pay later

Average cost of elevating residential building (1 foot) = $100/sq. ft. (slab on grade) and $75/sq. ft. (non-slab on grade)
Project Background

• Partnerships
  – Georgia Department of Community Affairs
  – Georgia Emergency Management Agency
  – AMEC Environment & Infrastructure, Inc.
  – Representatives from construction industry and trades associations in GA
  – U.S. Department of Housing and Urban Development
  – Federal Emergency Management Agency
    • FEMA Region IV- Hazard Mitigation Division
    • FEMA Emergency Management Institute
  – Polis Center (Indiana University – Purdue University Indianapolis)
  – Information Technology Outreach Services- UGA
  – Georgia Department of Natural Resources Floodplain Mapping Program

Project Background

• Project Goals
  1. New Disaster Resilient Building Codes
  2. Community Plan Analysis Reports
  3. New DCA Community Planning Institute Workshop: Hazard Mitigation & Land Use
  4. Hazard Mitigation Planning Best Practices Guidebook for Georgia Communities
  5. New or revised modules to DCA's Model Code
  6. GIS: FEMA HAZUS – MH training and multi-hazard risk assessments
Communities Impacted

• Disaster Declaration from 2008:
  2. Georgia Severe Storms and Flooding – May 11, 2008

20 Counties:

- Bartow
- Bibb
- Burke
- Carroll
- Crawford
- DeKalb
- Douglas
- Emanuel
- Floyd
- Fulton
- Glynn
- Laurens
- Jefferson (2x)
- Jenkins
- Johnson
- McIntosh
- Polk
- Treutlen
- Twiggs
- Wilkinson

Communities Impacted

• Georgia Severe Storms and Tornadoes (DR – 1750)
  - 11 tornadoes (EFO-EF3)
  - 3 fatalities
  - More than 950 homes and businesses heavily damaged or destroyed
  - More than $1.3 million in federal assistance to help survivors recover
  - More than $1.8 million in federal assistance to help local governments recover
  - More than $1.7 million in SBA financial assistance

March 14-15, 2008
Communities Impacted

• Georgia Severe Storms and Flooding (DR – 1761)
  – 20 tornadoes (EFO-EF4)
  – 2 fatalities
  – More than 500 homes and businesses heavily damaged or destroyed
  – More than $2.4 million in federal assistance to help survivors recover
  – More than $9.4 million in federal assistance to help local governments recover
  – More than $2.5 million in SBA financial assistance

May 11, 2008

Communities Impacted

• Total Hazard Events by County:
  – Most of the 2008 Disaster Declaration Counties experienced between 100 and 366 hazard events between 1952 & 2008

Source: 2011 Georgia Hazard Mitigation Strategy (GEMA)
Communities Impacted

• Flood Hazard
  – Definition:
    
    A general and temporary condition of partial or complete inundation of 2 or more acres or of 2 or more properties

Communities Impacted

• Flood Events by County:
  – Each 2008 Disaster Declaration County experienced flood events between 1952 & 2008 (majority had 20 or fewer, but some more than 20)

Source: 2011 Georgia Hazard Mitigation Strategy (GEMA)
Communities Impacted

• Severe Storm Hazard
  – Definition:

  Combination of straight line winds and thunderstorms (lightning and hail) sometimes accompanied by tornadoes

Communities Impacted

• Wind Events by County:
  – Each 2008 Disaster Declaration County experienced between 7 & 44 wind events between 1952 & 2008

Source: 2011 Georgia Hazard Mitigation Strategy (GEMA)
Communities Impacted

• Thunderstorm (Lightning & Hail)
  Events by County:
  – Each 2008 Disaster Declaration County experienced multiple thunderstorm events between 1952 & 2008 (majority had 60 to 230)

Source: 2011 Georgia Hazard Mitigation Strategy (GEMA)

Communities Impacted

• Tornado
  – Definition:
    A violently rotating column of air in contact with the earth’s surface (larger tornadoes may not have a funnel shape but may look more like a large cloud)
• Tornado Events by County:
  – Most 2008 Disaster Declaration Counties experienced between 7 and 25 tornado events between 1952 & 2008

Source: 2011 Georgia Hazard Mitigation Strategy (GEMA)
Hazard Mitigation Planning

• Mitigation
  – The Code of Federal Regulation defines Hazard Mitigation as “any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards.” (44 CFR 201.2)

Hazard Mitigation Planning

• Mitigation:
  – Continuous process that occurs before, during, and after a disaster event
Hazard Mitigation Planning

• Why Is Mitigation Planning Important?
  – Disasters can happen anytime and any place
  – The number of natural disasters is increasing each year
  – Mitigation helps reduce the cost of events

Tornado touchdown in GA

Sound Investment:

– On average, for every $1 spent by FEMA on Mitigation the nation gains about $4 in future benefits (due to more efficient post-storm cleanup and rebuilding).

Source: 2006 Study by National Institute of Building Sciences (NIBS)
Hazard Mitigation Planning

- Disaster Mitigation Act of 2000 (DMA 2000)
  44 CFR 201.6 Local Plans
  - Public Law 106-390 provides the legal basis for FEMA's mitigation planning for state, local and tribal governments
  - States, counties and their municipalities must have an approved Hazard Mitigation Plan in order to apply for and/or receive hazard mitigation grant funding

Hazard Mitigation Planning Status:
- State plan approved for 2011 - 2014
- 159 initial county plans approved in 2010
  - First 5 Year Update Cycle
    - All counties have grant funding for updates
    - 108 plan updates approved
    - 51 counties in various stages of plan update
Hazard Mitigation Planning

- DMA Planning Process (4 Phases)
  1. Organize Resources
  2. Assess Risk
  3. Develop Mitigation Plan
  4. Implement Plan & Monitor Progress

- Standard Process
  - Organize
  - Involve the public
  - Coordinate with other agencies
  - Assess the hazards
  - Assess the problem
  - Set goals
  - Review alternatives
  - Draft the plan
  - Implement, evaluate, revise

Comprehensive Planning

- Purpose
  - Identify and prioritize community goals in terms of development
  - Guide public policy
  - Show important relationships among local issues
    - Land Use
    - Transportation
    - Economic Development
    - Housing
    - Public services/utilities

- Benefits
  - Efficient use of tax dollars
  - Smarter economic development
  - Protection of private property rights
  - Transparency (citizens have a voice)
  - Decisions based on short and long-term considerations
  - Informs decisions of any group or individual concerned with growth and development
Comprehensive Planning

• Stakeholders
  – Public at large
  – Local and regional decision-makers
  – Business leaders
  – Civic groups
  – Non profit, faith-based & educational organizations/ institutions
  – Real estate & development community

Comprehensive Planning

• Standard Process
  – Engage community
  – Identify issues
  – State goals
  – Analyze data
  – Evaluate alternatives
  – Prepare work program
  – Adopt the plan
  – Implement and monitor the plan
Comprehensive & Hazard Mitigation Planning

• Differences
  – Purpose
  – Function
  – Communication
  – Outcomes
  – Mandate (1989 GA Planning Act)
  – Preparation (who does it?)

• Commonalities
  – Similar processes
  – Agents of change
  – Skepticism (property rights)
  – Plan ahead
  – Multi-objective
  – Strategic/opportunistic
  – Implementation

Comprehensive & Hazard Mitigation Planning

• Challenges and Missed Opportunities
  – Hazard mitigation plans:
    • Often developed without active participation of local community development and/or planning staff
    • Often include strategies focused on structural projects vs. non-structural measures (i.e. local land use or policy alternatives)
    • Generally stand-alone documents that don’t always link to other community-based plans
Comprehensive & Hazard Mitigation Planning

- Opportunities:
  Collaboration and Integration
  - Community Planners & Emergency Managers
  - Comprehensive Plans & Hazard Mitigation Plans
    - Can manage known hazard risks in existing planning framework
    - Can work toward achieving development patterns that don’t increase risk & can encourage redevelopment that reduces risk

Questions
Objective

- Identify opportunities for coordination of land use planning and hazard mitigation planning
- Compare Plans (*2008 Disaster Declaration areas = 20 counties*)
  - Local Comprehensive Plans (joint & stand-alone)
  - Regional Plans
  - Adopted Hazard Mitigation Plans
Objective

• Incorporate Findings into Community Reports
• Major Report Sections:
  – How To: Principals for Integrating Land Use Planning and Hazard Mitigation
  – Key Findings
  – Recommendations

Report Section 1

• How To: Principals for Integrating Land Use Planning and Hazard Mitigation Planning
  – Role of Local Plans
    • Hazard Mitigation Plan identifies risks and level of preparedness in near-term
    • Comprehensive Plan can mitigate longer-term risks by promoting suitable development patterns
Report Section 1

• How To: Principals for Integrating Land Use Planning and Hazard Mitigation Planning
  – Role of Local Plans
  – Public Participation in the Planning Process
    • Community discussions about natural hazards
    • “Everyone” is at the table – local staff & elected officials

Report Section 1

• How To: Principals for Integrating Land Use Planning and Hazard Mitigation Planning
  – Role of Local Plans
  – Public Participation in the Process
  – Planning Cycles & Plan Updates
    • Do mandated planning deadlines align?
Report Section 1

• How To: Principals for Integrating Land Use Planning and Hazard Mitigation
  – Role of Local Plans
  – Public Participation in the Process
  – Planning Cycles & Plan Updates
  – Mapping Makes a Difference
Report Section 2

• Key Findings
  – Summary table represents “Connects” and “Disconnects”
    Where?
  – Here: (review criteria per FEMA hazard mitigation planning requirements):
    • Hazard Mapping
    • Natural Hazard Discussion
    • Land Use, Critical Facilities, Infrastructure & Utilities
    • Planning Process
    • Vulnerability & Mitigation Review
    44 items reviewed in each plan

Report Section 2

• Review Criteria: *Hazard Mapping*
  – 100-year Flood
  – Repetitive Loss
  – Tornado Touchdowns
  – Dam Inundation
  – Other Hazards
  – Land Use (existing & future)
  – Critical Facilities, Infrastructure & Utilities
Report Section 2

• Review Criteria:  
  **All Maps**
  - **High** Detail  
    (Parcel-based, Comprehensive Road Network, Official FIRM, Floodplain category)
  - **Medium** Detail  
    (Comprehensive Road Network, Official FIRM, Floodplain category)
  - **Low** Detail  
    (Not Parcel-based, No Comprehensive Road Network, Not Official FIRM, No Floodplain category)

Report Section 2

• Review Criteria:  
  **Natural Hazards Discussion**
  - Flood
  - Severe Storm
  - Tornado
  - Repetitive Loss

• Review Criteria:  
  **LDCIU Discussion**
  Land Use, Development, Critical Facilities, Infrastructure & Utilities (LDCIU)
  - Land Use (existing and future)
  - Redevelopment
  - Density & Population
  - Land Use Policies
  - Critical Facilities, Infrastructure, Utilities (Definition, List, Policies & Procedures)
Report Section 2

• Review Criteria: *Planning Process Discussion*
  – Public involvement summary
  – Participants identified
  – Timeframe
  – Meetings (number/type)
  – Notification tools

• Review Criteria: *Vulnerability & Mitigation Review*
  – Economy & Tax Base
  – Vulnerable Populations
  – Cultural & Historic Resources
  – Hazard Mitigation Measures

• Review Criteria: *Overall*
  – Level of Detail
    • High
    • Medium
    • Low
  – 2 or more “Low” means Opportunity for Improvement
Report Section 3

• Recommendations
  – Most common issues:
    • Hazard and Land Use Mapping
    • Hazard Identification
    • Critical Facilities / Infrastructure & Utilities
    • Review of Mitigation Measures
  – Guidance for counties, cities and regional commissions
  – Who can assist (DCA, RCs, GEMA, FEMA)
  – Relationship to new 2013 Minimum Planning Standards
  – Additional resources

COMPREHENSIVE PLANS & HAZARD MITIGATION PLANS: BEST PRACTICES FOR COORDINATION
Best Practices – Coordinated Planning

• Community Report Findings
  – Most common issues:
    • Mapping (hazards & land use)
    • Hazard Identification
    • Critical Facilities / Infrastructure & Utilities
    • Review of Mitigation Measures

Best Practices – Coordinated Planning

Mapping
• Goals
  – Hazard maps should inform development policy (future land use map)
  – Future land use maps should identify areas not suitable for certain types of development based on known hazards
Best Practices – Coordinated Planning

Mapping

• Issues
  – Hazard Mapping
    Level of Detail
  – Future Land Use Mapping
    Level of Detail

• Opportunities
  – Parcels, Roads, DFIRM, Depth Grids, Hazus
  – Parcels, Roads, Floodplain Designation

Help? DCA, RC

Best Practices – Coordinated Planning

Mapping

• Planning Requirement?
  – Hazard and land use maps in HMPs? **RECOMMENDED**
  – Hazard maps in comp plan update? **NO**
  – Land use (future) map in comp plan update? **YES**

• Planning Recommendation (comprehensive plan update)
  – Add “floodplain” category to future land use/development map
  – Include or incorporate HMP by reference
Best Practices – Coordinated Planning

Hazard Identification

• Goals
  – Discuss the impact of natural hazards on health, safety and welfare
  – Develop recommendations and policies that will result in more disaster resilient communities

Best Practices – Coordinated Planning

Hazard Identification

• Issue
  – Level of Detail

• Opportunity
  – Public meetings (comp plan and/or comp plan/HMP process)
  – HMP information

[Help] DCA, RC
Best Practices – Coordinated Planning

Hazard Identification

- Planning Requirement?
  - Addressed in hazard mitigation plans? **YES**
  - Addressed in comp plan updates? **NO**

- Planning Recommendation (comprehensive plan update)
  - Add HMP goals to Community Goals section
  - Discuss Natural Hazards in Needs and Opportunities section
  - Add HMP actions to work program (CWP)
  - Include or incorporate HMP by reference
  - Hazard Mitigation element (optional)

Best Practices – Coordinated Planning

Critical Facilities, Infrastructure & Utilities

- Goal
  - Protect facilities, infrastructure and utilities that are:
    - Essential to the health and welfare of the population
    - Especially important following a disaster
Best Practices – Coordinated Planning

Critical Facilities, Infrastructure & Utilities

• Issue
  – Inconsistent definition ("community facilities" vs. "critical facilities")

• Opportunity
  – Common definition ("community facilities" to "critical facilities")

Best Practices – Coordinated Planning

Critical Facilities, Infrastructure & Utilities

• Planning Requirement?
  – Addressed in hazard mitigation plans? **YES**
  – Addressed in comp plan updates? **NO**

• Planning Recommendation (comprehensive plan update)
  – Add HMP goals to Community Goals section
  – Discuss Critical Facilities in Needs and Opportunities section
  – Add HMP actions to work program (CWP)
  – Include or incorporate HMP by reference
  – Hazard Mitigation element (optional)
**Best Practices – Coordinated Planning**

**Review of Mitigation Measures**

- **Goal**
  - Review existing plans and regulations (and potential changes or additions) to support hazard mitigation goals

- **Issue**
  - Level of Detail

- **Opportunity**
  - HMP recommendations
  - Evaluate local codes, policies, plans

**Help:** RC, FEMA, DNR
**Review of Mitigation Measures**

- **Planning Requirement?**
  - Addressed in hazard mitigation plans? **YES**
  - Addressed in comp plan updates? **NO**

- **Planning Recommendation** *(comprehensive plan update)*
  - Amend work program (CWP) to include needed changes, including HMP recommendations
  - Include or incorporate HMP by reference
  - Hazard Mitigation element (optional)

---

**Planning Process**

- Involve/coordinate variety of staff and data
  - Planning & Development / Comp Plan
  - Emergency Management / HMP
- Discuss natural hazards in public meetings/activities
- **Align HMP and comp plan deadlines** *(work with DCA)*
BEST PRACTICES FOR PLANNING TO ACHIEVE DISASTER RESILIENT COMMUNITIES

Mitigation Review

• Select What Works Best for Your Community
  – Review measures in the six mitigation categories
    1. Prevention
    2. Property Protection
    3. Natural Resource Protection
    4. Emergency Services
    5. Structural Projects
    6. Public Information

![Diagram]

- Lamp doesn’t work
- Replace bulb
- Replace base
- Replace lamp
Mitigation Category #1

• Preventative Measures
  – Activities that keep a problem from getting worse

Examples
  – Mapping and data
  – Open space Preservation
  – Planning and zoning
  – Development regulations
  – Building codes
  – Maintenance (drainage)
  – Coastal setbacks

Mitigation Category #2

• Property Protection Measures
  – Activities usually undertaken by a homeowner on a building-by-building or parcel basis

Examples
  – Acquisition
  – Relocation
  – Building elevation
  – Retrofitting
  – Insurance

Relocation of historic home
Mitigation Category #3

- Natural Resource Protection
  - Activities that preserve or restore natural areas or natural functions of floodplains and watershed areas

Examples
- Wetlands protection
- Erosion & sediment control
- Natural area preservation & restoration
- Water quality improvement

Mitigation Category #4

- Emergency Services Activities
  - Measures taken during an emergency to lessen its impact

Examples
- Critical facilities protection
- Hazard threat recognition, warning & response
- Post-disaster mitigation policies
Mitigation Category #5

• Structural Project Activities
  – Activities that keep the hazard away from an area

Examples
  – Reservoirs
  – Levees & floodwalls
  – Diversions
  – Fire breaks
  – Channel modifications
  – Storm drain improvements

Mitigation Category #6

• Public Information Activities
  – Efforts to advise property owners, potential property owners and visitors about hazards and ways to protect themselves

Examples
  – Map information
  – Outreach projects
  – Real estate disclosures
  – Library & social media
  – Technical assistance
  – Environmental education
Mitigation Options

• Consider Options
  – Adapting to the hazard
  – Altering the hazard
  – Averting the hazard
  – Avoiding the hazard

Mitigation Options

• Complete a Comprehensive Review
  – Consider all options
    (discuss why some measures work and why others don’t)

  • Will it work?
  • Is it cost-beneficial?
  • Is it affordable?
  • Is it legal?
  • Is it fair?
  • Do people want it?
  • Is funding available?
  • Are there administrative burdens?
  • Is it politically acceptable to community leaders?
  • Is it environmentally sound?
Best Practices Research
• Sources and Additional Information
  • APA – PAS Reports
  • FEMA – Mitigation Reports and Success Stories
  • NFIP – Community Rating System
  • State Governments Innovative Approaches
  • Local Governments’ Implementation
BEST PRACTICES - FLOOD

Best Practices - Flood

PREVENTATIVE

Floodplain Regulations
Best Practices - Flood

Establish Basic Standards:
• Freeboard

– The National Flood Insurance Program (NFIP) requires that the lowest floor of residential structures be elevated to or above the base flood elevation (BFE).

Establish Basic Standards:
• Freeboard

– Non-residential structures: elevated or floodproofed to or above the BFE
– Attached garages and utilities: elevated or use flood-resistant materials
Best Practices - Flood

Consider Higher Standards:

• Protect existing and future development that exceed the minimum criteria of the National Flood Insurance Program (NFIP).

• The minimum NFIP standards provide a great deal of flood protection, but damage can still result:
  ▪ Estimates of flood heights are subject to various errors and are sometimes low
  ▪ The next flood can always be higher (exceeding the 100-year event)
  ▪ Urbanization and changes in the watershed
  ▪ Filling and other development in floodplain can reduced storage and conveyance capacity

Best Practices - Flood

Consider Higher Standards:
• Prohibition of Fill

  – Reduces floodplain storage capacity and has a negative impact on drainage
  – No CLOMR-F or LOMAR-F
Best Practices - Flood

Consider Higher Standards:

• Compensatory Storage

  – Remove an equal amount of fill from floodplain to maintain floodplain storage and conveyance capacity

Best Practices - Flood

Consider Higher Standards:

• Other:
  – Prohibition of Buildings
  – Cumulative Substantial Improvement
  – Protection of Critical Facilities (500-year or 1’ above)
  – Local Drainage Protection (No Adverse Impacts – NAI)
  – Enclosure Limits
  – Coastal A-Zones
Best Practices - Flood

Available Standards for Adoption – State Models

- Floodplain Regulations Found in Local Flood Damage Prevention Ordinance
  - State DNR model ordinance
    - Revised June 2012 per FEMA recommendations
    - NFIP participants required to update local ordinance within 6 months of:
      - Receiving notification of changes to Federal or State laws or regulations that necessitate amending the ordinance
      - Receiving new flood data/maps by FEMA

- DCA model ordinance (2007)
  - Higher standards (compared to 2012 DNR model)
    - Lowest floor of residential structures elevated 3’ above BFE
    - Cumulative substantial improvement standard
Best Practices - Flood

Available Standards for Adoption – Regional Models

- Floodplain Regulations Found in Local Flood Damage Prevention Ordinance
  - Metropolitan North Georgia Water Planning District
    - 15 counties, 90+ cities
    - Model ordinance (2006)

- State DNR model ordinance for coastal communities (2012)
  - Coastal High Hazard Areas, V-Zones

- Georgia Coastal Counties Mapping Project
  - Updated DFIRMs (2014)
Best Practices - Flood

Protect Floodplain Functions

- River banks (bank stabilization and building setbacks)
- Wetlands
- Riparian buffers
- Dunes

Basic Principles

- Protect Floodplain Functions & Natural Resources

Some Natural Functions of Floodplains

<table>
<thead>
<tr>
<th>Water Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural flood and erosion control</td>
</tr>
<tr>
<td>Provide flood storage and conveyance</td>
</tr>
<tr>
<td>Reduce flood velocities</td>
</tr>
<tr>
<td>Enhance flood resilience</td>
</tr>
<tr>
<td>Protect wetlands</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Basic Principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promote vegetation growth through rich alluvial soils</td>
</tr>
<tr>
<td>Maintain fish habitat</td>
</tr>
<tr>
<td>Maintain bird habitat</td>
</tr>
<tr>
<td>Provide nesting and feeding grounds</td>
</tr>
<tr>
<td>Create and enhance wetland habitat</td>
</tr>
<tr>
<td>Protect habitats for rare and endangered species</td>
</tr>
</tbody>
</table>

National Wildlife Federation: Protecting America’s Floodplains

Flood control

- Stabilize banks
- Build levees
- Build floodwalls
- Drainage systems

Flood prevention

- You can prevent floods by building levees on your property, or by buying insurance for your property.

Flood recovery

- You can help your community recover from a flood by volunteering to help clean up your property.

Flood insurance

- You can help your community recover from a flood by buying insurance for your property.

Flood control

- You can prevent floods by building levees on your property, or by buying insurance for your property.

Flood prevention

- You can help your community recover from a flood by volunteering to help clean up your property.

Flood insurance

- You can help your community recover from a flood by buying insurance for your property.

Flood control

- You can prevent floods by building levees on your property, or by buying insurance for your property.

Flood prevention

- You can help your community recover from a flood by volunteering to help clean up your property.

Flood insurance

- You can help your community recover from a flood by buying insurance for your property.

Flood control

- You can prevent floods by building levees on your property, or by buying insurance for your property.

Flood prevention

- You can help your community recover from a flood by volunteering to help clean up your property.

Flood insurance

- You can help your community recover from a flood by buying insurance for your property.

Flood control

- You can prevent floods by building levees on your property, or by buying insurance for your property.

Flood prevention

- You can help your community recover from a flood by volunteering to help clean up your property.

Flood insurance

- You can help your community recover from a flood by buying insurance for your property.
Best Practices - Flood

Available Standards for Adoption – State Models (DCA)

• Natural Resource Protection Ordinances
  – Water Supply Watersheds
    • Stream buffer/setback requirements
  – Wetlands
    • Suitable/unsuitable uses
  – Protected River Corridors
    • Buffer zones /land use requirements

Best Practices - Flood

Available Standards for Adoption – State Models (DCA)

• Natural Resource Protection Ordinances
  – Mountain Protection
  – Soil Erosion (see 2009 Model Soil Erosion, Sedimentation and Pollution Control Ordinance, Georgia Soil and Water Conservation Commission)
  – Grading
  – Hillside and Ridgeline Protection
Best Practices - Flood

Available Standards for Adoption – Regional Models

• Stream Buffer Protection Ordinance
• Coastal Riparian Buffer Ordinance
• Natural Resources Protection Ordinance for Coastal Georgia
• Wetlands Ordinance for Coastal Counties

Best Practices - Flood

Community Rating System (CRS) Participation
Best Practices - Flood

• Participate in the Community Rating System Program (CRS)

  – FEMA Mitigation Program (higher standards, insurance tool, premium reductions)

Best Practices - Flood

PROPERTY PROTECTION

Flood Resistant Construction
Best Practices - Flood

- Adopt DCA Disaster Resilient Building Codes (OPTIONAL)
  - Appendices to IBC/IRC
  - Flood damage resistant materials
  - Location of materials
  - Fasteners and connectors used for materials

Stormwater Regulations
Best Practices - Flood

• Encourage Green Infrastructure (GI)
  – Uses natural processes to manage stormwater
  – Citywide/countywide, GI is a system of natural areas that provides flood protection, cleaner water, etc.
  – For a neighborhood or site, GI stormwater management systems mimic nature by soaking up and storing water vs. releasing water
  – GI elements include:
    • Rain gardens
    • Permeable pavement
    • Land conservation
    • Urban tree canopy
    • Bio swales
    • Green roofs
    • Green streets

Best Practices - Flood

• GI Approach Options
  – Local ordinances and guidelines can encourage or require GI for development projects
  – Example: Atlanta-specific supplement to Coastal Stormwater Supplement (CSS), which builds upon GA “Blue Book” (Georgia Stormwater Management Manual/ GSMM) with additional GI practices
Best Practices - Flood

MAPPING

PREVENTATIVE
PROPERTY PROTECTION
NATURAL RESOURCE PROTECTION
PUBLIC INFORMATION

Best Practices - Flood

Hazard Mapping

- Improve Future Land Use Mapping
  - Floodplains
  - Parcel based
  - Comprehensive road network
  - Other Risk areas
Best Practices - Flood

Hazard Mapping

- Recognize Official Flood Insurance Rate Map – FIRM
  - Zone AE = High Hazard Riverine Zone
  - Zone VE = High Hazard Coastal Zone
  - Floodway and Floodway Fringe
  - Zone X = Low Hazard Zone (B or C Zone)

Figure 41b-1. FIRM terminology.

Best Practices - Flood

Hazard Mapping

- Use FEMA’s Hazus (Hazards US) Program
  - Nationally standardized methodology, contains modules for estimating potential losses from earthquakes, floods and hurricanes
Best Practices - Flood

Hazard Mapping

- Hazus
  - GIS technology to estimate physical, economic, social impacts from disasters
  - Users can visualize the spatial relationship between populations and more permanently fixed geographic assets or resources

Hazard Mapping: Hazus Outputs

<table>
<thead>
<tr>
<th>Direct Damage</th>
<th>Earthquake</th>
<th>Flood</th>
<th>Hurricane</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Building Loss</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Essential Facilities</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>High Potential Loss Facilities</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Transportation Systems</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Utility Systems</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Induced Damage</td>
<td>Earth Focusing</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Hazards: Materials Release</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Deterioration</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Direct Loss</td>
<td>Cost of Repair</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Income Loss</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Crop Damage</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Casualties</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Indirect Losses</td>
<td>Shelter Needs</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Direct Losses</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Indirect Losses</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Earthquakes</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Floods</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Hurricanes</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>
Open Space Protection

Best Practices - Flood

- Encourage Open Space Protection  
  (incentives, regulations, and/or acquisition)
  
  – Prevent or minimize development in the regulatory floodplain that obstructs floodwaters or exposes buildings to damage

Land Trust for Tennessee – Nashville 
Cumberland River
Best Practices - Flood

• Open Space Protection Options
  – Cluster Development/Conservation Subdivisions
  – PUD’s
  – Conservation Easements
    (Transfer/Purchase of Development Rights)
  – Greenways

Best Practices - Flood

Available Standards for Adoption – State Models

• Rural Clustering (DCA)
  – Permitted residential development density is clustered
  – Remaining area (40% min.) for agriculture, forest land, open space, and environmentally sensitive areas
Best Practices - Flood

Available Standards for Adoption – Regional Models

• Conservation Subdivision Ordinance
  – Alternative to conventional subdivision development
  – Condense development and preserve open space, including sensitive natural resources
  – Allow “by right” in residential zoning districts to encourage use (vs. a need to rezone)
Best Practices - Flood

• Improve Stormwater Capacity & Drainage Maintenance
  – Undersized stormwater drainage systems and unmaintained surface systems can cause localized flooding

Best Practices - Flood

• Plan and Implement Effective Road and Bridge Projects
  – Build/raise above Base Flood Elevation (BFE) to maintain dry access

Douglas County: Flooding of I-20 (top) and a washed out bridge
Best Practices - Flood

Public Outreach & Awareness

• Expand Outreach and Awareness
  – Educate property owners (mitigation techniques)
  – Increase awareness of flood insurance
  – Flood risk and flood safety
  – Social media
  – HOA meetings
Best Practices - Severe Storms

- Lightning
- Wind
- Hail
Best Practices - Severe Storms

SITE & BUILDING DESIGN STANDARDS

• Improve Site and Building Design Standards
  – Promote or require site and building design standards to minimize wind damage
    • Natural environmental features such as wind buffers
    • Passive ventilation in building design
    • Wind resistant roof shapes
Best Practices - Severe Storms

• Encourage High-Wind Resistive Construction
  – DCA Disaster Resilient Building Code Appendices (optional)
  – IBC/IRC increased construction requirements

Best Practices - Severe Storms

• High-Wind Resistive Construction (IBC)
  – Wind Load
    • Updated Base Wind Speed Map (2012 IBC)
    • Wind Load Options
    • Target Performance and Design Criteria
Best Practices - Severe Storms

• High-Wind Resistive Construction (IRC)
  – One- and two-family dwellings
    • Structural design
    • Fasteners and cladding
    • Fenestration (doors and windows)
    • Roofing

Best Practices - Severe Storms

• Encourage Strategic Tree Selection and Planting
  – Encourage wind resistant tree species through landscape and tree ordinances and/or public outreach materials
  – Extension service

Southern Live Oak (Quercus virginiana)
LSU AG Center www.lsuagcenter.com
Best Practices - Severe Storms

• Encourage Strategic Tree Selection and Planting
  – Native trees with highest wind resistance:
    • Medium to Large: American Holly, Live Oak, White Oak, Southern Magnolia
    • Small: Flowering Dogwood, Crape Myrtle, Yaupon Holly

Best Practices - Severe Storms

• Encourage Strategic Tree Selection and Planting
  – Avoid conflicts with above ground utilities:
    1. Determine half the average mature crown spread of the tree
    2. Add 15 feet to the measurement
    3. Resulting distance is the closest to an overhead power line that the tree may be safely planted

Source: Georgia Forestry Commission
www.gfc.state.ga.us
Best Practices - Severe Storms

• Consider Resiliency of Signs
  – Local sign ordinance provisions
    • Shall be designed, constructed and maintained in accordance with the IBC
    • Shall be designed to withstand the minimum wind loads prescribed in the IBC / or by ______ County
    • Certification of Wind-Load Resistance required to be signed by a certified engineer; examples:
      Carroll County – signs >10 feet
      Glynn County – signs >20 feet
Best Practices - Severe Storms

- Maintain Power Lines & Infrastructure
  - Inspection and maintenance program
  - Over head versus buried lines
  - Tree trimming program

BEST PRACTICES – TORNADOS
Best Practices - Tornadoes

BUILDING DESIGN

PROPERTY PROTECTION

PREVENTION

• Improve Roof Design
  – Promote or require standards to better withstand wind forces
    • Type (hip, gable, flat)
    • Slope
    • Overhang
  – Consider:
    ✓ Roofs with multiple slopes
      (hip \( \approx 4 \) vs. gable \( \approx 2 \))
    ✓ 30º slope
    ✓ No greater than 20 inch overhang
Best Practices - Tornadoes

• Adopt Optional DCA Disaster Resilient Building Code (DRBC) Appendices
  – High-wind resistive construction
  – Residential storm shelters and safe room construction standards
    (stand-alone or internal to a building)

Best Practices - Tornadoes

• Locate Community Safe Rooms or Storm Shelters in Manufactured Home Parks
  – Standards (same as DRBC Appendices):
    • Safe Room: FEMA 361
    • Storm Shelter: International Code Council (ICC) 500
  – Consider as development requirement
  – Federal Tornado Shelters Act
    • CDBG funds can be used to construct tornado-safe shelters in manufactured home parks
Best Practices - Tornadoes

Public Outreach & Awareness

• Expand Outreach and Awareness
  – Watch versus warning
  – Sirens
  – Social media
  – Family plan
  – Language (non-English speakers)
BECOMING DISASTER RESILIENT: NEXT STEPS

Next Steps

• Read Community Report
  
  http://www.dca.state.ga.us/development/PlanningQualityGrowth/programs/dref.asp
  
  – General and specific recommendations
  – Can be useful to any GA community
  – Contacts are there to help
Next Steps

• Be familiar with your plans and their deadlines

• Ideally, update both plans at the same time….

  ask DCA to modify comp plan deadline to be closer to HMP deadline

Next Steps

• Use Comprehensive Plan’s Community Work Program (CWP) to make incremental changes:
  – “Review comprehensive plan goals, objectives and policies to identify those that relate to hazard mitigation (e.g. future development, natural resource protection, community facilities and services, and transportation)”
  – “Coordinate with the County Emergency Management Agency (EMA) on the development of the hazard mitigation plan update”
  – “Include or incorporate by reference the County’s hazard mitigation plan in future updates to the comprehensive plan”
  – “Include Hazard Mitigation element in future comprehensive plan update”
Next Steps

• Update land use and development codes:
  – DCA Model Codes
    http://www.dca.state.ga.us/development/planningqualitygrowth/programs/modelcode.asp
  – DNR Model Codes (flood damage prevention)
    http://www.georgiadfirm.com/communityoff/commdocs.htm

Next Steps

• Update land use and development codes:
  – Metropolitan North Georgia Water Planning District Model Codes
    http://www.northgeorgiawater.org/stormwater/model-ordinances
  – GA DNR Coastal Resources Division (variety of model codes for Coastal GA)
    http://coastalgadnr.org/cm/green/mo
    Kelly.Hill@gadnr.org, 912-264-7218
Next Steps

• Update building codes:
  – Optional DCA Disaster Resilient Building Code (DRBC) Appendices
    [link]
  – Georgia State International Building Code Appendix N Disaster Resilient Construction
  – Georgia State International Residential Code Appendix R Disaster Resilient Construction

Next Steps

• DCA Contacts
  – Project Manager: Elizabeth Smith
    elizabeth.smith@dca.ga.gov
  – Mapping: Terry Jackson
    terry.jackson@dca.ga.gov
  – Disaster Resilient Building Codes: Dee Leclair
    dee.leclair@dca.ga.gov
Next Steps

• GEMA Contacts
  – kelly.keefe@gema.ga.gov
  – brian.laughlin@gema.ga.gov
  – scott.sherman@gema.ga.gov
  – alan.sloan@gema.ga.gov

• Website
  www.gema.ga.gov