Resilient Series: Planning for Flood Resilient Communities

North Central Texas Council of Governments (NCTCOG)
Wednesday, June 13, 2018 at 11:30 AM - 1:30 PM
Resilient Series: Planning for Flood Resilient Communities

Presenters:
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  Director of Planning with Halff Associates, Inc. | Chair of APA’s Sustainable Communities Division
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  Director of Water Resources, North Texas
- Mia Brown, CFM
  Environment and Development Planner, NCTCOG
Agenda

- What is community resilience?
- How do planners interact with community resilience
- Perspective of floodplain manager’s
- Activities at national, state, regional, and local levels
- How do we move forward?
What is community resilience?

Community resilience is the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events.
- American Planning Association (APA)
- Urban Land Institute (ULI)
- U.S. Green Building Council (USGBC)
- American Institute of Architects (AIA)
- Post Carbon Institute

“Hazard mitigation reduces disaster damages and is defined as sustained action taken to reduce or eliminate long-term risk to human life and property from hazards.”
–FEMA Local Mitigation Planning Guide
Types of Resilience

- Economic
- Social
- Environment

**Inputs**
- Growth framework
- Community vision
- Market conditions
- Interconnected, but independent stakeholders

**Outputs**
- Comp Plan
- Sub-Plans
- Regulations
- Application & project review

**Systems Thinking**

**Reoccurring Planning Process**

[Image]
Types of flooding

- Coastal
- Urban / Local / Non-FEMA
- Riverine Flooding
- Flash Flooding
North Texas Flooding
Trinity River

- 1844
- 1866
- 1871
- 1890
- May 26, 1908 – Set in motion the harnessing of the river.

Trinity River Flooding – May 26, 1908

Now the wreckage of a shed or outhouse would move by, followed by a drowned swine or other livestock. The construction forces of the Texas & Pacific worked feverishly to safeguard the long trestle carrying their tracks across the stream. Suddenly, this whole structure turned on its side down-stream, broke loose from the rest of the track at one end and swung out into the middle of the current and began breaking up, first into large sections and then into smaller pieces, rushing madly along to some uncertain destination. [Approximately half a dozen of the workmen fell into the torrent at this point; exaggerated reports of their drowning swept the city.]

— C.L. Moss

1949– Fort Worth Flood

Source: City of Fort Worth Public Library; from David Marshall, TRWD
1957– Village Creek at Mansfield Highway
Source: Unknown
1966 – Dallas Flood at 2500 Block of Eighth Avenue
Source: Unknown
1976 – Pflash Flood, Grand Prairie
Source: Unknown
Texas Flooding 2015: Severe Storms In Texas Cause At Least $27M In Infrastructure Damage, Continuing Trend Of Increasing Natural Disasters
Hurricane Harvey is tied with Hurricane Katrina as the costliest tropical cyclone on record, inflicting $125 billion in damage, primarily from catastrophic rainfall-triggered flooding in the Houston metropolitan area.
The truth is …

... we have heavy rain events, tropical storms, and rain events with enough frequency that we have no choice but to consider how to build more resilient communities.
Talking about resilience? You are not alone!
Where do planners intersect with resilience?

1. Comprehensive Plan
2. Sub-Plans
3. Regulations
4. Application Review & Projects
Comprehensive Plans

- Comprehensive plans can address resilience by:
  - Mapping and analyzing natural resources and areas of hazard and risk
  - Using “systems thinking” when preparing individual plan elements (i.e., how do the different elements work together and affect community resilience)
  - Establishing a proactive growth plan that takes into consideration areas less suitable for intense development
  - Preparing a future land use plan that identifies appropriate areas for development, and if appropriate, protection.
  - Setting policies and long-range goals for growth and infrastructure
  - Developing plan actions that provide guidance towards both near- and longer-term improvements to resilience
  - Provide guidance to more refined sub-plans (e.g., parks master plan, hazard mitigation plan, etc.) that call for further analysis, detail, and action
City of Frisco
Plan contains a full plan element on placemaking and community resilience

City of Plano
Plan references resilience, particularly as it relates to economic resiliency

City of Irving
Plan references resilience, particularly as it relates to changing climatic conditions

City of Denton
Plan references resilience, particularly as community health, economic resilience, and climate change
APA’s Sustaining Places: Best Practices for Comprehensive Plans

- Identified Key Trends for Comprehensive Plans in the 21st Century:
  - Resilience
  - Systems Thinking
  - Community Engagement
  - Equity
  - Implementation
  - Adaptation

- Identified 6 Key Principles:
  - Livable Built Environment
  - Harmony With Nature
  - Resilient Economy
  - Interwoven Equity
  - Healthy Community
  - Responsible Regionalism
Sub-Plans

- Stormwater / Drainage Master Plans (City Engineer / PW staff)
- Floodplain Assessments (FAs)
- Hazard Mitigation Plans (Emergency Managers)
- Parks and Trails (PARD and sometimes PW staff)
- Transportation Master Plans (City Engineer / Economic Development Strategic Plans)
Growing beyond the traditional park model

Traditional Model

Traditional Model - Improved

Today
Sub-Plans - Parks
Don’t forget to think about multipurpose solutions

City of Atlanta – Historic 4th Ward Park

San Antonio – Laddie Place
Sub-Plans - Trails

- Trinity Forest Spine Trail
Sub-Plans – Hazard Mitigation

An investment in mitigation activities can help:

• Reduce harm to property
• Protect life/prevent injury
• Prevent damage to economic, cultural and environmental assets
Sub-Plans – Stormwater Management Plans
It is always easier to be proactive …

Solution: Storage or Conveyance?
It is always easier to be proactive …

Required channel to convey 100-year flood
~ 100 feet wide, ~15 feet deep
It is always easier to be proactive …

- Storage Required to take 100-year flood to 10-year flood
  - 2,400 acre-feet
- House Park Football Field
  - ~2 acres
- UT Tower
  - ~300 feet tall

2,400 acre feet = 800,000,000 gallons!
Regulations

- Zoning and subdivision ordinances
- Parkland dedication ordinances
- Drainage criteria manuals
- Technical Specification Manuals
- Etc.
Application Review & Projects

- Public sector – evaluation of applications & projects
- Private sector – planning and design of projects
Floodplain Manager’s Role

1. Flood Hazard Mitigation
2. Flood Preparedness
3. Flood Response
4. Flood Recovery
What is Flood Hazard Mitigation?

Any sustained action taken to reduce or eliminate long-term risk to human life and property from hazards – Federal Emergency Management Agency (FEMA)
Hazard Mitigation Planning

- Mapping and communication
- Policy and Regulations
- Higher Standards
What is Flood Preparedness?

Short-term actions taken before a disaster to minimize potential impacts of hazards, risks, or vulnerability not previously reduced through mitigation.
Flood Preparedness Planning

- Flood Warning Systems and Gauges
- Evacuation Routes
- Critical Facilities
# Flood Resilience Planning Examples

<table>
<thead>
<tr>
<th>Federal</th>
<th>State</th>
<th>Regional</th>
<th>Local</th>
</tr>
</thead>
</table>
| • National Flood Insurance Program | • Texas Water Development Board  
• Texas Floodplain Management Association | • North Central Texas Council of Governments | • City of Fort Worth |
National Flood Insurance Act of 1968

Congress established the National Flood Insurance Program (NFIP), a nationwide effort to help communities protect against flooding.

NFIP goals are to:

• reduce loss of life and property caused by flooding;
• reduce flood disaster relief costs;
• make federally-backed flood insurance coverage available to property owners that live in participating communities (purchase was VOLUNTARY);
• begin comprehensive floodplain mapping.
Flood Disaster Protection Act of 1973

- Flood insurance is required as a condition of securing a loan from a regulated lending institution on any structure located in the Special Flood Hazard Area (SFHA).

- Required participation by communities in the NFIP as a condition to receive Federal Disaster Assistance.
Flood Insurance Rate Maps vs. Flood Risk Products

FEMA Flood Map Service Center
Find the latest maps by property address or by community.

Flood Depth and Analysis Grids
- Datasets that show depth, velocity, and probability of flood inundation as functions of event's magnitude
- Serves as key inputs to HAZUS Risk Assessment Analyses
- Increases flood risk awareness

HALFF
Texas Water Development Board
State Flood Assessment

Project Goals:

1. Assess flood risks and roles
2. Estimate flood mitigation costs
3. Envision the future of flood planning in Texas
Project goals

- Will provide a comprehensive understanding of existing programs, risks, and needs for floodplain management and mitigation
- Will incorporate broad input from stakeholders
- Will not standardize project evaluations or prioritize projects for funding
Early survey results
Early survey results

My community would most benefit from more state resources directed toward:

- Flood hazard mapping
- Flood modeling
- Central depository of online data
- Stream gages
- Financial assistance for flood mitigation planning
- Financial assistance for flood early warning systems
- Financial assistance for implementation of flood mitigation projects
- Flood emergency response
- Public awareness efforts
- Technical assistance
- I don’t know

Respondents’ Preference
Texas Floodplain Management Association

- A Guide for Higher Standards
  - Freeboard
  - No adverse impacts
  - Floodplain use restrictions
  - Critical Development Standards
- 2015 Higher Standards Survey
  - 308 Survey respondents in Texas
  - 85% require +1 foot of freeboard
  - 37% required mitigation of downstream impacts
Regional – North Central Texas Council of Governments

- Trinity River Common Vision
- Regional Flood Software Program
- Cooperating Technical Partner Program
- 16 County Watershed Management Effort
- Flood Protection Planning Grant
- Integrated Stormwater Management Program
Trinity Common Vision
Trinity River Corridor Interlocal Agreement - 1989

NINE CITIES
Arlington    Farmers Branch
Carrollton    Fort Worth
Coppell       Grand Prairie
Dallas         Irving
               Lewisville

PROGRAMMATIC PARTNERS
NCTCOG Environment & Development
U.S. Army Corps of Engineers
Federal Emergency Management Agency
Texas Water Development Board

THREE COUNTIES
Dallas County
Denton County
Tarrant County

TWO SPECIAL DISTRICTS
Tarrant Regional Water District
Trinity River Authority
Trinity River Common Vision Program
Timeline & Background

1990 Upper Trinity River Basin Reconnaissance Report
Interlocal Agreements signed by member cities & Congress authorizes the Upper Trinity River Feasibility Study (UTRFS). These studies by the Corps of Engineers simulated the cumulative impacts of flooding in the Dallas-Fort Worth area based on different levels of floodplain development.

1990 Flood Management Task Force
Flood Management Task Force formed and CDC criteria developed based on ROD

Manual was produced in 1991. We are currently on the 4th edition

Record of Decision
Results suggest that damages from a major flood could total more than $11 billion if floodplain development is unregulated. A comprehensive floodplain management program could cut losses to $4 billion.

$11B

Corridor Development Certificate (CDC) Manual
Over 100 projects have been permitted along the Trinity River in the Dallas/Fort Worth Metroplex using the CDC process. Models are continuously being refined and updated to reflect new construction and redevelopment.
CDC Program Goals
Corridor Development Certificate Program

**Limits Impact**
Limits (but does not eliminate) the impact of floodplain encroachments for regulated streams on downstream areas

**Review Process**
Establishes a consistent regional criteria and review process

**Funding Stream**
Provides a funding stream for updates and state-of-the-art models and modeling tools
CDC Program Goals
Corridor Development Certificate Program

- Provides Oversight
  Provides oversight for projects constructed in the 100 year floodplain

- Allows Development
  Allows development in the floodplain

- Project Review
  Allows all Flood Management Task Force (FMTF) members to review projects for the entire regulatory footprint
Why is the Trinity River Corridor So Important to Flood Prevention?
East Fork now being added!
What Other Great Stuff is Coming Out of Trinity Common Vision?

- CDC/NFIP Model Consolidation
- May-June 2015 NCT Flood Report
- Trinity Common Vision Print Materials
- Common Flood Warning Software
- Training
- Support of TFMA Statewide Higher Standards
Regional Flood Software Platform – OneRain
John Ivey Higher Standards Award
<table>
<thead>
<tr>
<th>Year</th>
<th>Projects</th>
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</thead>
<tbody>
<tr>
<td>2004</td>
<td>• Joined CTP</td>
</tr>
<tr>
<td></td>
<td>• Created Master Plan</td>
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<tr>
<td>2009</td>
<td>• NCTCOG Participates in Map Mod</td>
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<tr>
<td>2012</td>
<td>• West Fork Trinity and Elm Fork Trinity Discovery</td>
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<tr>
<td>2013</td>
<td>• Village Creek Flood Risk Project</td>
</tr>
<tr>
<td>2014</td>
<td>• Bear Creek Flood Risk Project</td>
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<tr>
<td>2015</td>
<td>• Cedar and Denton Watershed Discovery</td>
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<tr>
<td></td>
<td>• Lynchburg and Irving Creek Flood Risk Studies</td>
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<tr>
<td>2016</td>
<td>• East Fork Trinity Discovery</td>
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<tr>
<td></td>
<td>• Silver Creek and McAnear Creek Flood Risk Studies</td>
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<tr>
<td>2017</td>
<td>• Richland-Chambers Watershed Discovery</td>
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<tr>
<td></td>
<td>• Town Creek and Clear Fork Tributary Flood Risk Studies</td>
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16-County Watershed Management Effort

- These Regionally Recommended Standards in Watershed Management for New Development Within County Regulated Areas were developed by the North Central Texas 16-County Watershed Management Roundtable held on March 14, 2017.
- Presented to the 16-County Watershed Management Forum on July 12, 2017.
- NCTCOG Executive Board endorsed this item in October 2017.
- Several counties have adopted some or all of the standards.
Flood Protection Planning Grant

- Texas Water Development Board Grant 2016
- NCTCOG Pilot Project
  - City of McKinney
  - Warning poles & software
  - 911 Dispatch Centers receive a data feed and is displayed on dispatch maps
**Integrated Stormwater Management - iSWM**

**Why iSWM?**
- Flooding and streambank erosion due to increased runoff
- Water quality concerns / stormwater regulations
- Loss of natural features
- Interest in green infrastructure
- Comprehensive approach needed
- Regional consistency and equity

**iSWM Resources**
- Technical Manual
- Criteria Manual

**Certified Communities:**
- Denton (Silver)
- Grand Prairie (Silver)
- Kennedale (Silver)
- Frisco (Silver)
- Fort Worth (Silver)

**Founding Communities:**

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*Image of a eroded streambank and a map showing the certified communities.*
Fort Worth Stormwater Master Plan

- Presented at Plan Commission Public Hearing on Feb. 28
  - Unanimous support to move forward toward Council adoption

- Simultaneously beginning to outline the processes to implement Local Floodplain Policy Development
What are Local Floodplains?

- Areas of flood risk not shown on FEMA Maps
Local Floodplains

Zoo Creek drains north to the Trinity
Local Floodplains
Local Floodplains

- Orange = Local Floodplain
- 538 properties at risk within green boundary
75% of Repetitive Flood Loss Properties in the City of Fort Worth are outside of the FEMA floodplains
So how do we move forward as planners?
U.S. Population Growth

- Projection: 95+ million people within the next 45 years
- Estimate: Almost 2/3 of the buildings needed are not yet built

Source: U.S. Census Bureau
Comprehensive Planning

- Planning Context
- Economic Development
- Education
- Health
- Housing & Neighborhoods
- Historic Preservation
- Natural Resources
- Parks, Recreation & Trails
- Public Services
- Transportation
- Land Use & Character
- Implementation Program
Moving Forward

Partnering to advance community resilience
Example: APA’s Naturally Resilient Communities

EXPLORE THE DIFFERENT TYPES OF NATURE-BASED SOLUTIONS

RIVERS, STREAMS, AND FLOOD Plains

River systems undergo natural flooding cycles. Floodplains slow down and store floodwaters, reducing erosion and flood risk. LEARN MORE

COASTAL FLOODING & EROSION  RIVER FLOODING & EROSION  URBAN STORMWATER FLOODING
Example: APA’s Naturally Resilient Communities
Contact

Trinity Common Vision, CTP, 16 County Watershed Effort

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Resilient Series:
Planning for Flood Resilient Communities

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