
INNOVATIVE TOOLS TO PLAN SAFE AND SECURE COMMUNITIES

Preparing Effective Risk Assessments

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Some Basic Terminology

Hazard Mitigation - any action that reduces the destructive & disruptive effects of future disasters

Hazard Mitigation Planning – process to help communities identify most effective policies, actions, & tools to decrease risk & potential for future losses

Risk Assessments - estimate the social & economic impact that hazards can have on people, buildings, services, facilities, & infrastructure

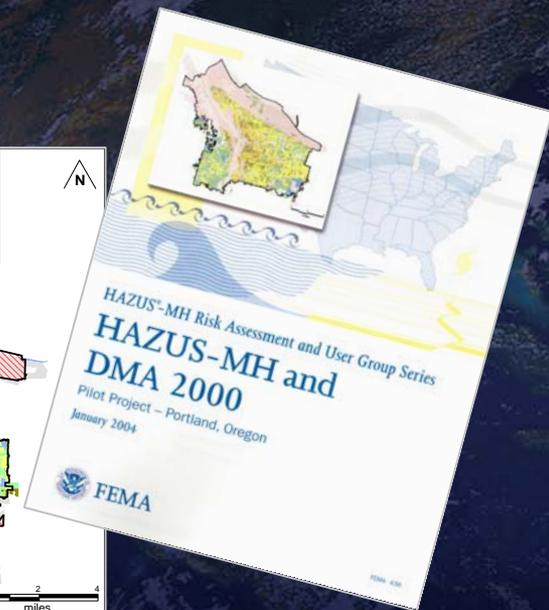
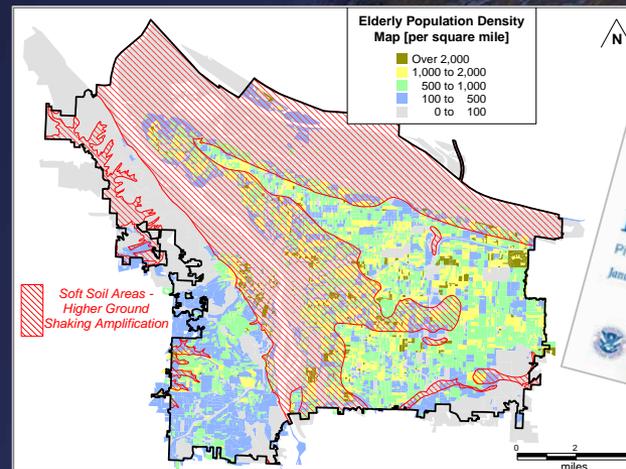


HAZUS-MH Pilot Projects

Pilot Communities

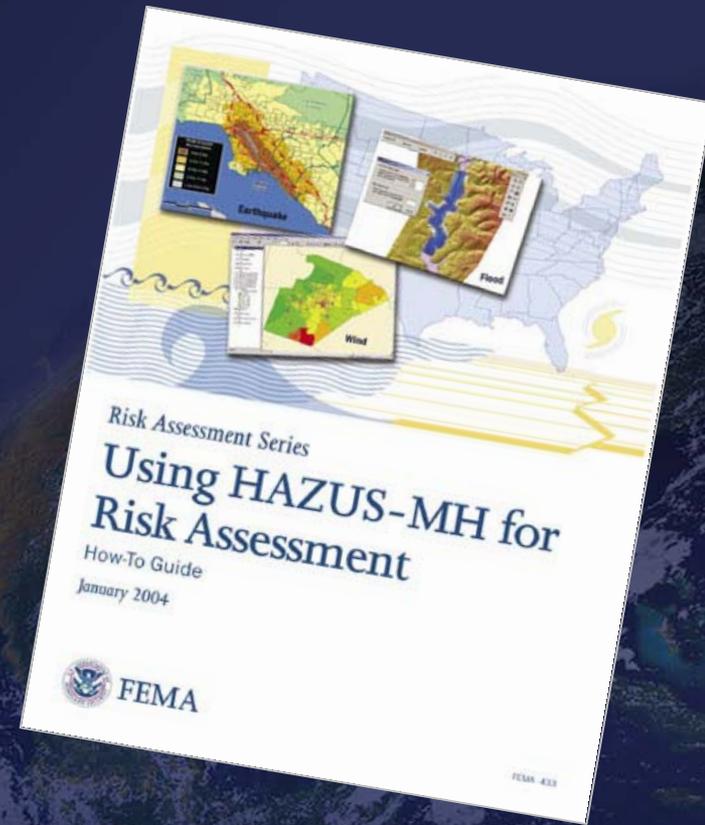
- State of Wyoming
- Marion County, Indiana
- Austin, Texas
- Louisville, Kentucky
- Scottsdale, Arizona
- New York City, New York
- Annapolis, Maryland
- Kansas City, Kansas

- Evaluation & identification of different hazards
- Preparation of mitigation plans
- Providing more defensive cost & loss estimates



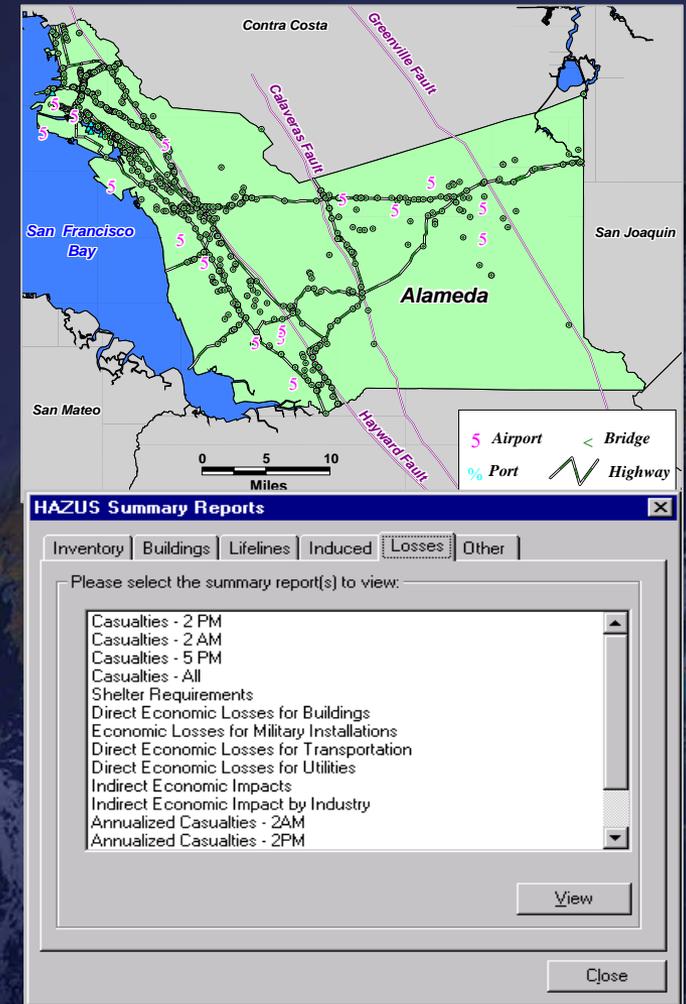
FEMA Tools to Aid Risk Assessments

- State and Local Mitigation Planning How-To-Guide
- HAZUS-MH
- **Using HAZUS-MH for Risk Assessment How-To-Guide**
 - DMA 2000/Risk Assessment Course at EMI (E296)
 - Risk Assessment Tool (RAT)
 - Flood Macro

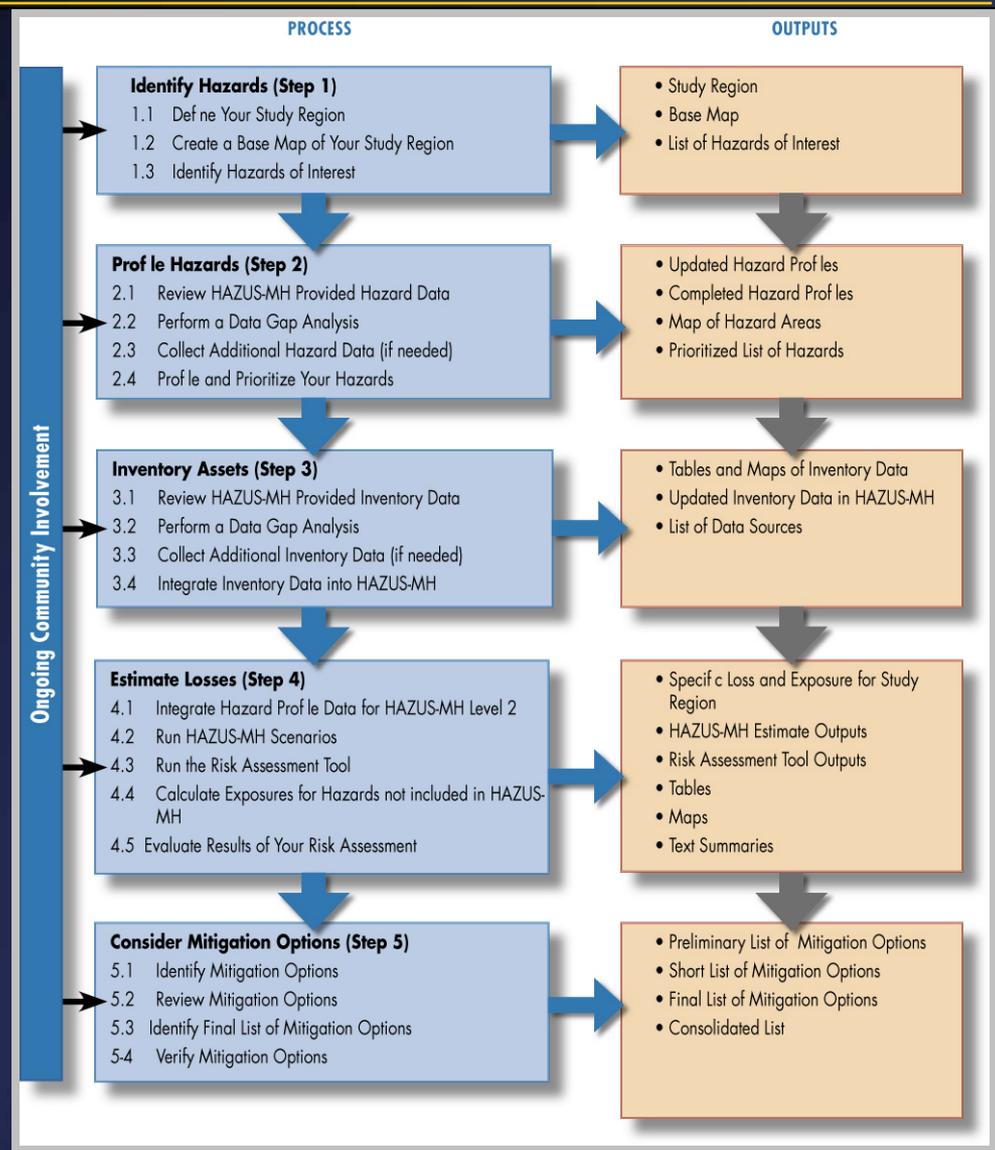


Why Use HAZUS-MH for Risk Assessments?

- Consistent platform & methodology for assessing risk across boundaries
- Framework that can be used to save & update data
- Strong mapping capabilities of hazards & inventories
- Tabular outputs that promote communication & interaction with local stakeholders



RISK ASSESSMENT & HAZUS-MH OUTPUTS



Organize Your Resources

Establishing Your Risk Assessment Team

- Leader - a local planning or emergency management representative
- Experts :
 - engineers
 - natural hazard experts
 - hydrologist
 - geologist
 - GIS specialist
- Business owners
- Residents from different segments of the community
- Federal agency representatives
- Any others



Step 1: Identify Hazards

- Define your Study Region
- Create a Base Map
- Identify Hazards of Interest



Step 2 – Profile Hazards

Hazard event – Specific occurrence

Frequency – How often

Probability – Likelihood (statistical measure)

Duration – Time an event lasts

Magnitude – Severity (technical measure)

Intensity – Effect of an event at a particular place

Hazard areas – Geographic areas within study region

Scenario Wizard

Select Historic Storm Scenario*

This page allows you to select a historic storm scenario. Choose the storm you want to analyze and click next.

*The table below lists historic storms that made landfall in the United States as Category 3 or higher (1900 - 2001)

	Year	Name	Peak Gust (mph)	States Affected	Landfall States
1	1900	UN-NAMED-1900-1	148	LA TX	TX
2	1906	UN-NAMED-1906-5	108	FL AL MS LA	MS
3	1906	UN-NAMED-1906-4	131	NC SC GA	SC
4	1906	UN-NAMED-1906-8	145	FL	FL
5	1909	UN-NAMED-1909-7	137	AL MS LA	LA
6	1909	UN-NAMED-1909-3	115	TX	TX
7	1910	UN-NAMED-1910-4	138	NC SC GA FL	FL
8	1915	UN-NAMED-1915-2	133	LA TX	TX
9	1915	UN-NAMED-1915-5	140	AL MS LA	LA
10	1916	UN-NAMED-1916-1	125	FL AL MS LA	MS
11	1916	UN-NAMED-1916-4	125	TX	TX
12	1917	UN-NAMED-1917-3	118	FL AL MS LA	FL
13	1918	UN-NAMED-1918-1	125	LA TX	LA
14	1919	UN-NAMED-1919-2	147	FL TX	TX
15	1921	UN-NAMED-1921-6	118	FL	FL
16	1926	UN-NAMED-1926-6	158	FL AL MS LA	FL

Region Filter

< Back Next > Cancel

Step 3: Inventorying Assets

Demographics – Population, Employment, Housing

Building Stock – Residential, Commercial, Industrial

Essential Facilities – Hospitals, Schools, Police Stations, Fire Stations

Transportation – Highways, Bridges, Railways, Tunnels, Airports, Ports and Harbors, Ferry Facilities

Utilities – Waste Water, Potable Water, Oil, Gas, Electric Power, Communication Facilities

High Potential Loss Facilities – Dams & Levees, Nuclear Facilities, Hazardous Material Sites, Military Installations



Step 4: Estimate Losses

Basic outputs from HAZUS-MH

	Building Types						Building Occupancies						Essential Facilities				High Potential Loss Facilities and Haz/Mat Facilities			Transportation Systems/Lifelines				Utility Systems														
HAZARDS	Concrete	Pre-cast concrete	Reinforced masonry	Steel	Unreinforced Masonry	Wood	Manufactured Homes	Residential	Commercial	Industrial	Agriculture	Religion	Government	Education	Medical Care Facilities	Fire Stations	Police Stations	EOCs	Schools	Shelters	Dam	Levees	Nuclear Power Facility	Military Installation	Haz/Material Facilities	Highway	Railway	Light Rail	Bus Station	Ports	Ferry	Airport	Potable Water	Wastewater	Oil Systems	Natural Gas	Electric Power	Communications



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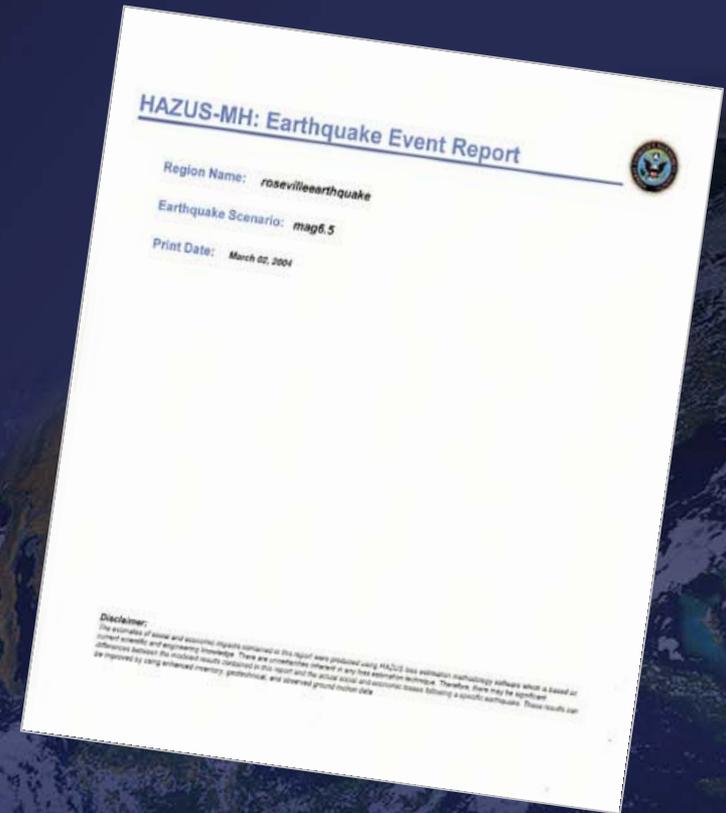
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Step 4: Estimate Losses

Crystal Reports

- Global summary report
- Building Stock Dollar Exposure by Occupancy
- Transportation Systems Dollar Exposure
- Hospitals Functionality
- Building Damage by Count by General Occupancy



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Step 4: Estimate Losses

HAZUS-MH Utility Tools



Flood Macro Wizard

- Automates & expedites the processing of the HAZUS-MH flood loss analysis.

Risk Assessment Tool (RAT)

- To help local mitigation planners to use information from common data queries in HAZUS-MH to support the development of risk assessments.



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Flood Macro Wizard

- Third Party Model complement to HAZUS-MH
- Supports exposure & loss estimation using simplified method
- Can be used for larger areas (counties)
- Runs outside of HAZUS-MH
- Data inputs:
 - flood boundary map (Q3 data, D-FIRM, or user defined map)
 - digital elevation model (DEM)



Flood Macro Wizard (continued)



General Building Stock - Outputs

Total Exposure

- Building Exposure Value
- Content Exposure Value

Building Count

Total Loss

- Building Loss Value
- Content Loss Value

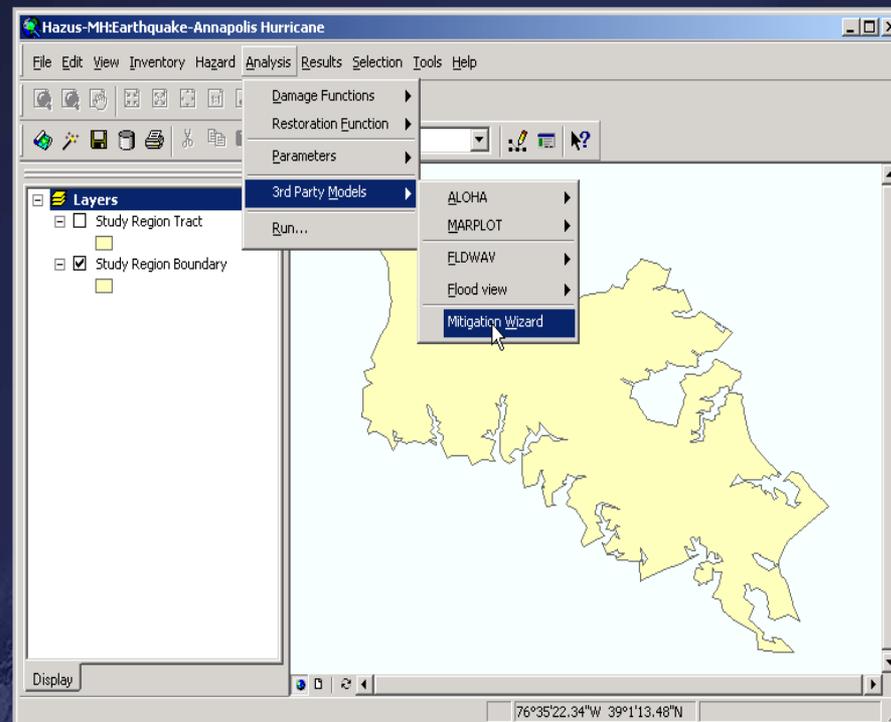
Outputs can be used as a first analysis to help focus your flood case studies on specific locations.

Outputs generally within 10 to 15 percent of HAZUS-MH flood model results.

Risk Assessment Tool (RAT)



- Runs as a third-party complement to HAZUS-MH
- Presents information in formats useful to support risk assessments
- Presents information in separate reports for each hazard
- Run RAT after hazard scenarios are run

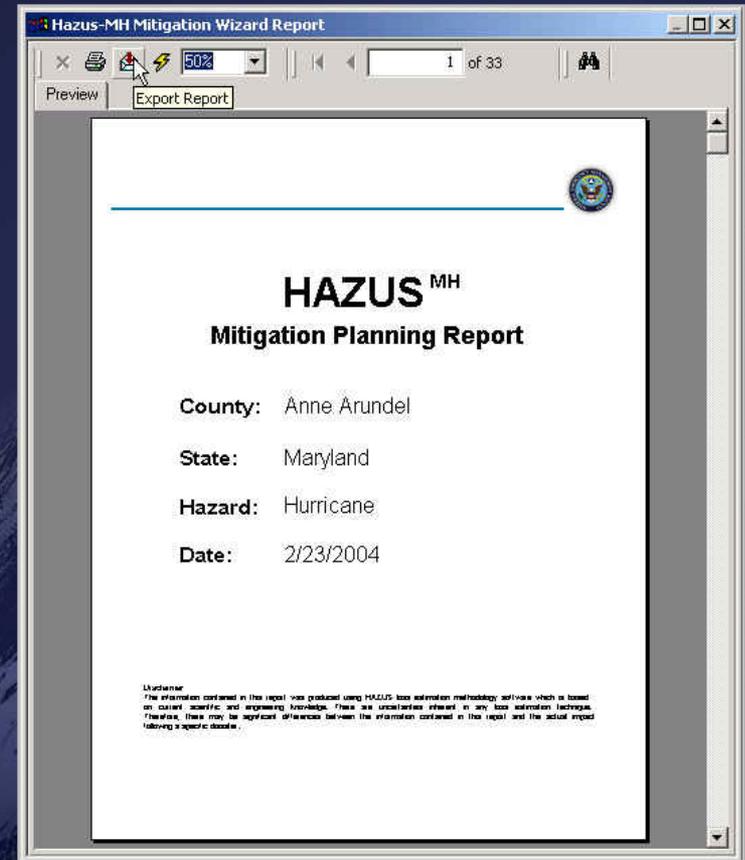


Risk Assessment Tool (RAT) (continued)



Outputs

- Study region maps
- Hazard profile information
- Inventory summary tables
- Loss estimate summaries
- Appendices with facility-specific essential facility data



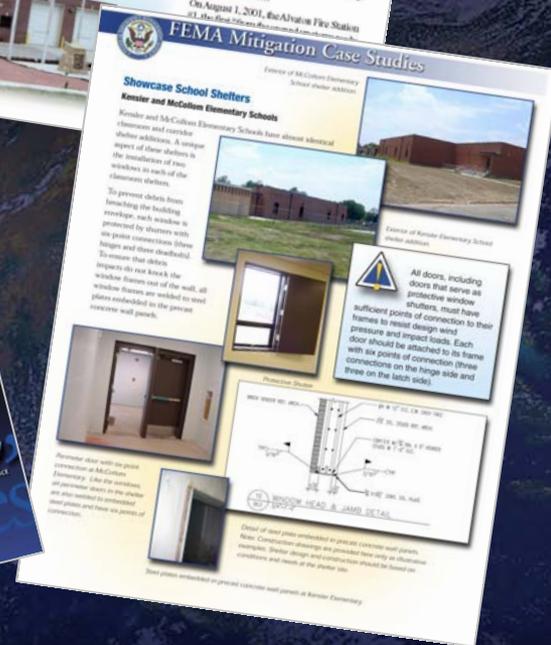
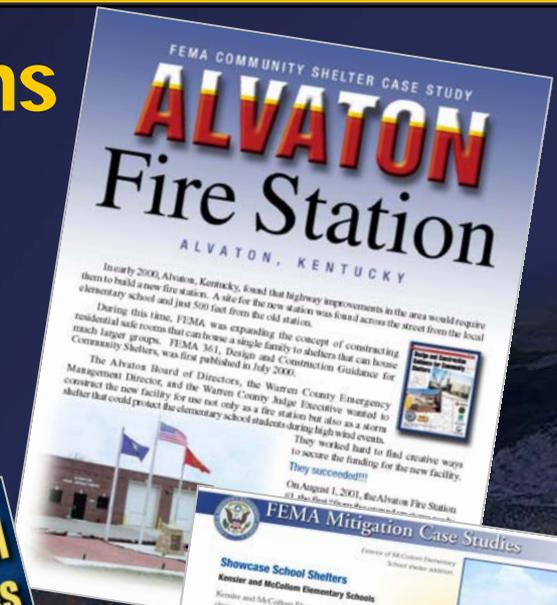
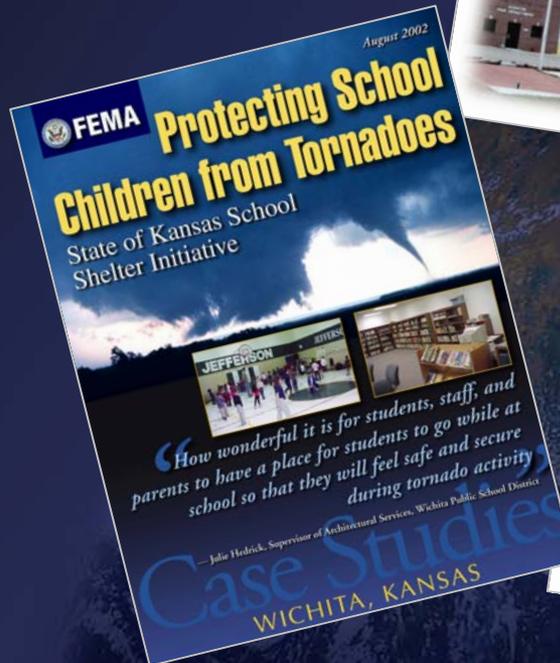
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Step 5: Consider Mitigation Options

- Regulatory Measures
- Rehabilitation of Existing Structures
- Protective and Control Structures



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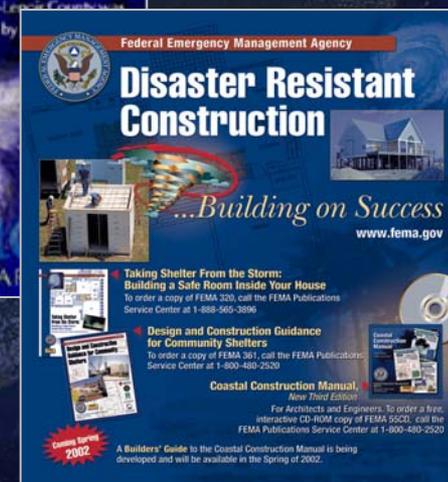
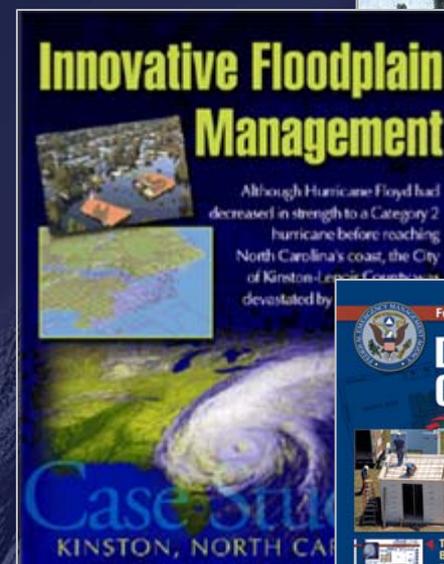
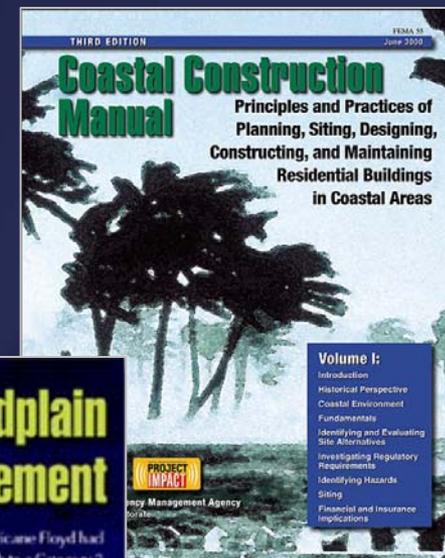
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Step 5: Consider Mitigation Options

Regulatory Measures

- Legislation which organizes and distributes responsibilities to protect a community from hazards
- Regulations that reduce financial and social impact of hazards through measures (insurance)
- New/updated design and construction codes
- New/modified land use and zoning regulations
- Incentives that provide inducements for implementing mitigation measures



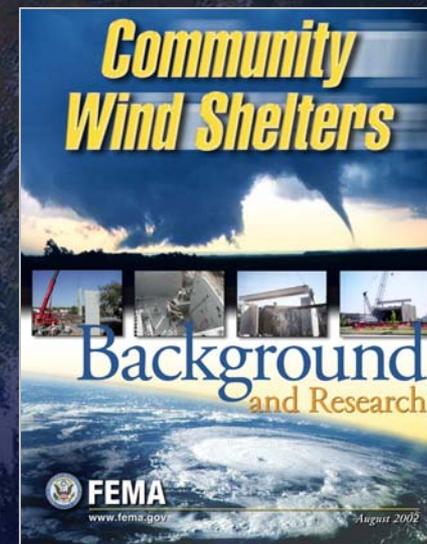
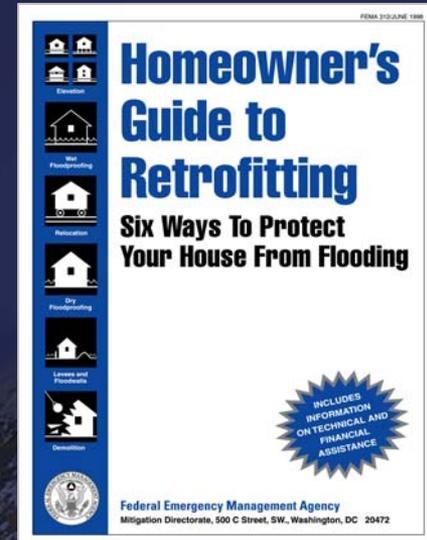
Step 5: Consider Mitigation Options

Repair and Rehabilitation of Existing Structures

- Removal or relocation of structures in high hazard areas
- Repair and strengthening of essential and high-potential-loss facilities

Protective and Control Measures

- Deflect destructive forces from vulnerable structures and people
- Erect protective barriers (safe rooms, shelters, protective vegetation belts)



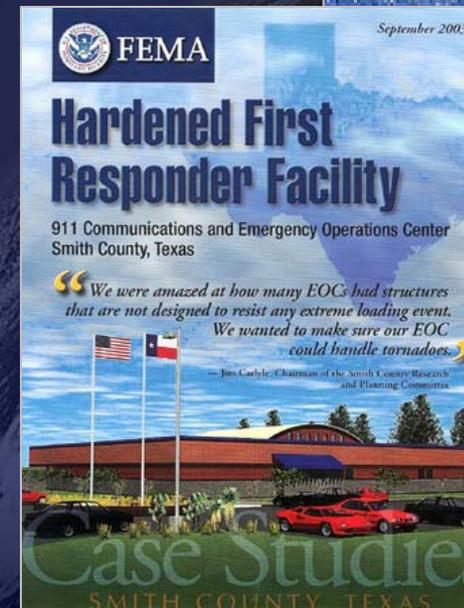
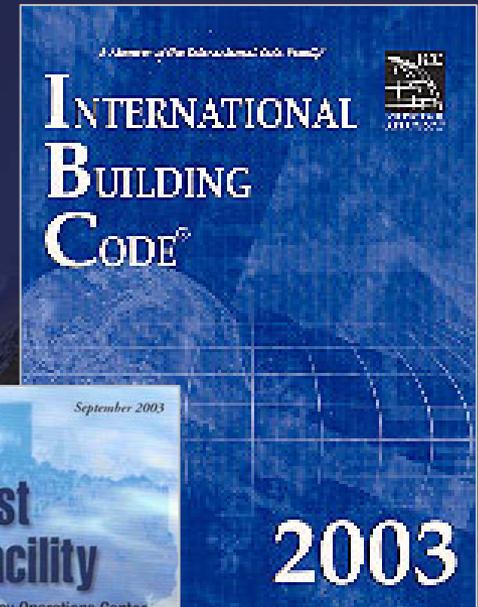
Step 5: Mitigation Measures for Earthquakes

Regulatory

- Building codes
- Master planning regulations

Rehabilitation of Existing Structures

- Raise earthquake resistance
- Retrofitting – hardening
- Strengthen & repair of structural & non-structural elements



Step 5: Mitigation Measures for Earthquakes (contd)

Protective and Control Measures

- Securing around buildings & critical infrastructure
- Stabilizing soils & securing hazardous sites before new construction



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Step 5: Mitigation Measures for Floods

Regulatory

- Guide development outside flood-prone areas
- New development to address flood hazards
- Codes to address rehabilitation of older buildings

Rehabilitation of Existing Structures

- Rehabilitation of older buildings
- Acquisition & demolition
- Relocating intact buildings out of floodplain
- Retrofit of infrastructure



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Step 5: Mitigation Measures for Floods (continued)

Protective and Control Measures

- Decreasing run-off
- Increasing discharge capacity
- Containing, diverting or storing flood water



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Step 5: Mitigation Measures for the Built Environment

- Site
- Architectural
- Structural systems
- Building envelope
- Utility systems
- Mechanical systems
- Plumbing and gas
- Electrical systems
- Communication
- Bridges, highways, railways
- Water, wastewater systems



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Case Study #1 - Naval Facilities Engineering Command (NAVFAC)

Evaluating specific critical building performance during an earthquake

- entire base using limited data
- critical facilities using limited data
- critical facilities using detailed data
- critical facilities using detailed data for rehabilitated buildings
- regional analysis with inventory modified to include soil data & hybrid data for bases



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Case Study #2 - Smithsonian Institutions

Risk Assessment Study for 29 facilities

- Identify all threats to each facility
- Determine vulnerability of people & property to threats
- Conduct an impact analysis
- Determine risk mitigation measures by facility
- Develop a training program to allow personnel to reassess facilities & campuses

