

Local Mitigation Plans and HAZUS-MH

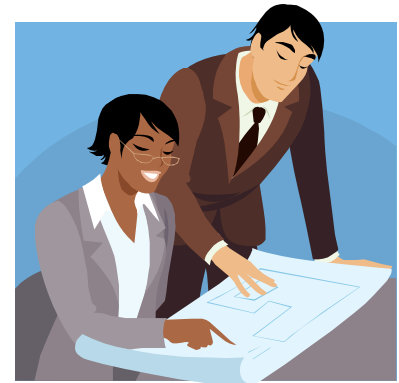
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Mitigation Planning and Local Mitigation Plans (LMPs)

Mitigation Planning is a **process** for states and communities to identify policies, activities and tools to implement actions that reduce or eliminate risk to life and property from a hazard event.

This process has four steps:

1. organizing resources
2. assessing risks
3. developing a mitigation plan
4. implementing the plan and monitoring progress



Why prepare a Local Mitigation Plan?

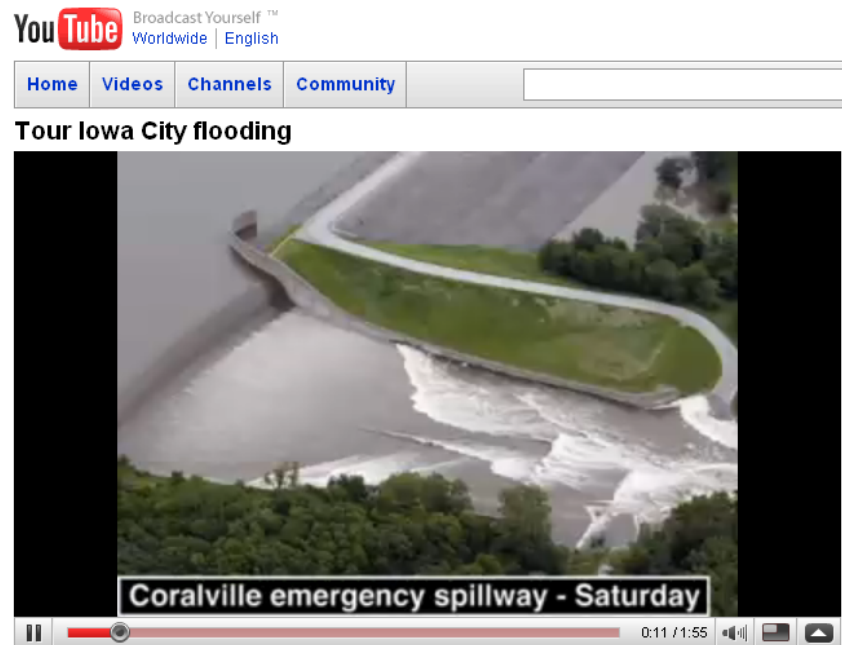
- Reduce loss of life and property due to natural disasters.
- Reduce emotional stress and economic disruption.
- Build a disaster resistant community.
- Qualify community to receive Federal Aid for Mitigation projects from FEMA.

HAZUS-MH: Cornerstone for LMPs

- Customized maps showing hazard risks
- Detailed multi-hazard risk assessments
- Cost-benefit review of mitigation projects
- Fulfill LMP update requirement



Case Study: Johnson County Iowa June 2008



- County EMA & Univ of Iowa pre-flood analysis
- “Crystal Ball” into Iowa River crest in 7 days

Data Collection

- DFIRM, USGS topography, weather service updates and forecasts
- Countywide dataset of buildings made estimates more accurate.
- Daily briefings with Emergency Support Functions (ESF) to fine-tune analysis.

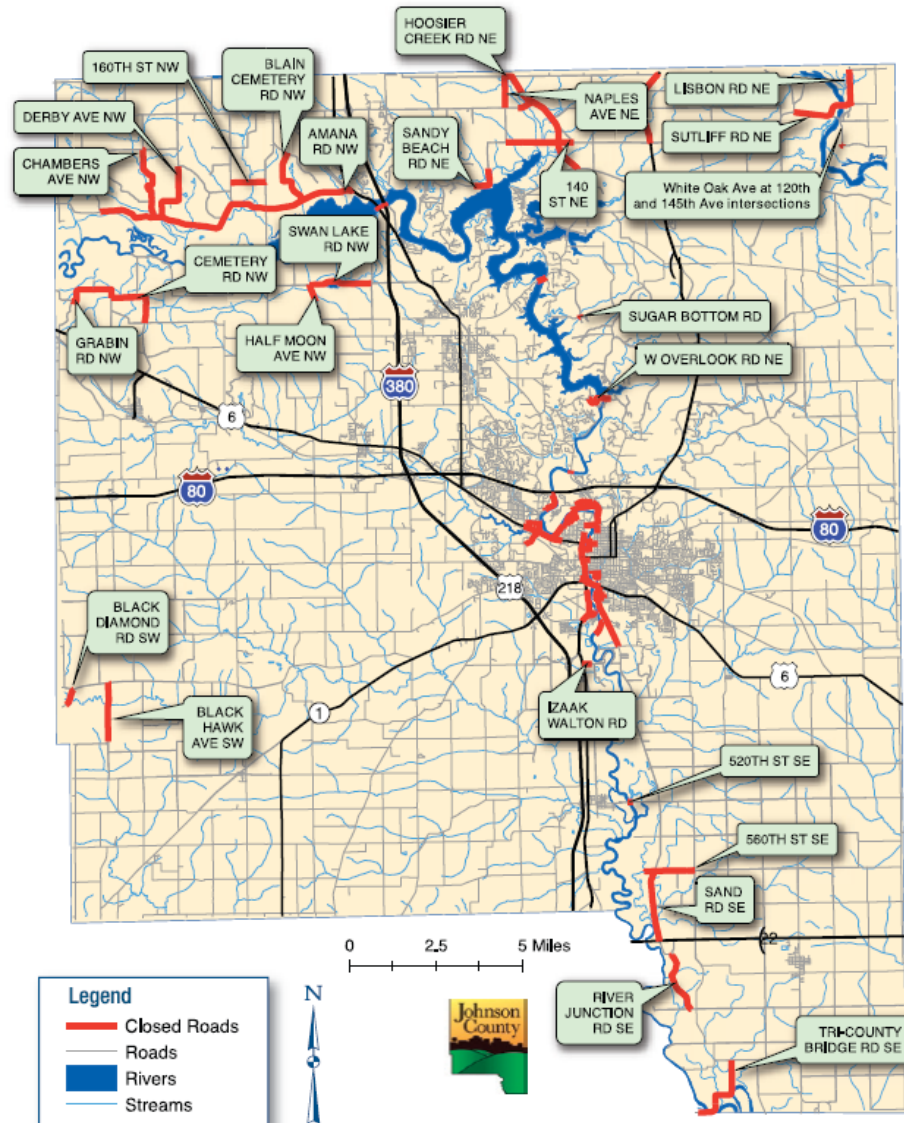
Protecting Critical Facilities at Risk

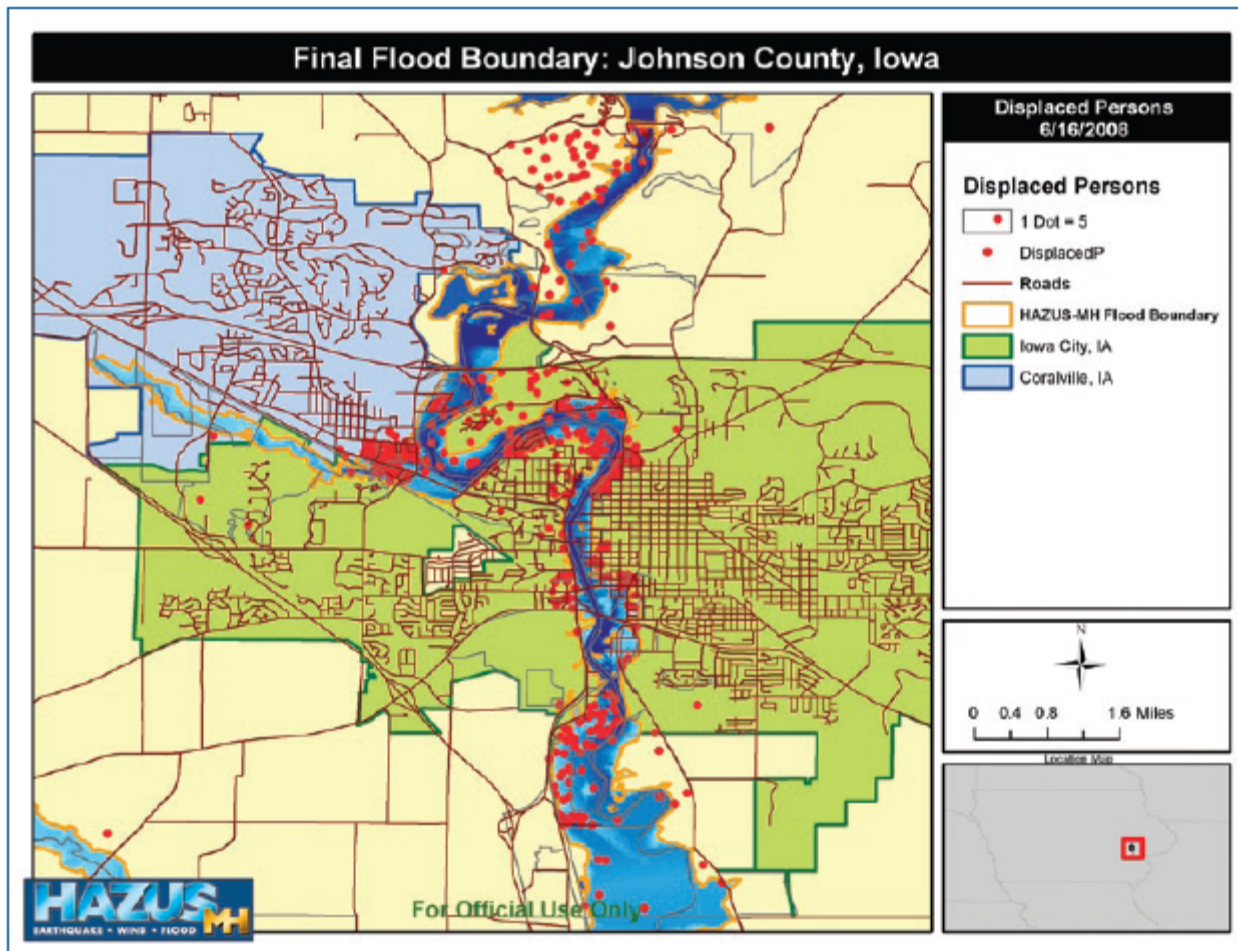
- Loss estimates of displaced households allowed the Red Cross and Salvation Army to plan response
- “Evidence” (ie police records and computer servers) moved from County Admin Building.
- Energy substations at risk
 - Portable substations erected
 - Facilities protected by sandbags
 - house to house meter turnoff/removal.
- Road closure estimates
 - Identify open routes to hospitals
 - Pre-position response teams



Johnson County Road Closures

As of 11:00 a.m., June 16, 2008





Mitigation Measures

- HAZUS estimated 265 buildings moderately damaged and 1,100 households displaced
- Actual results 303 buildings and 1,250 to 1,300 households
 - HAZUS didn't account for cabins and secondary homes.
- HMGP Plan Grant awarded
 - Mitigate issues from sheltering, displaced households, and casualties.

Testimonials

- “The maps provided definitely assisted the Red Cross in expediting delivery of our services after the flood.”
- “The maps and data that you provided FEMA Community Relations were extremely useful, and so far in our experience, they have accurately predicted which structures were damaged by the flood event.



What does HAZUS-MH do?

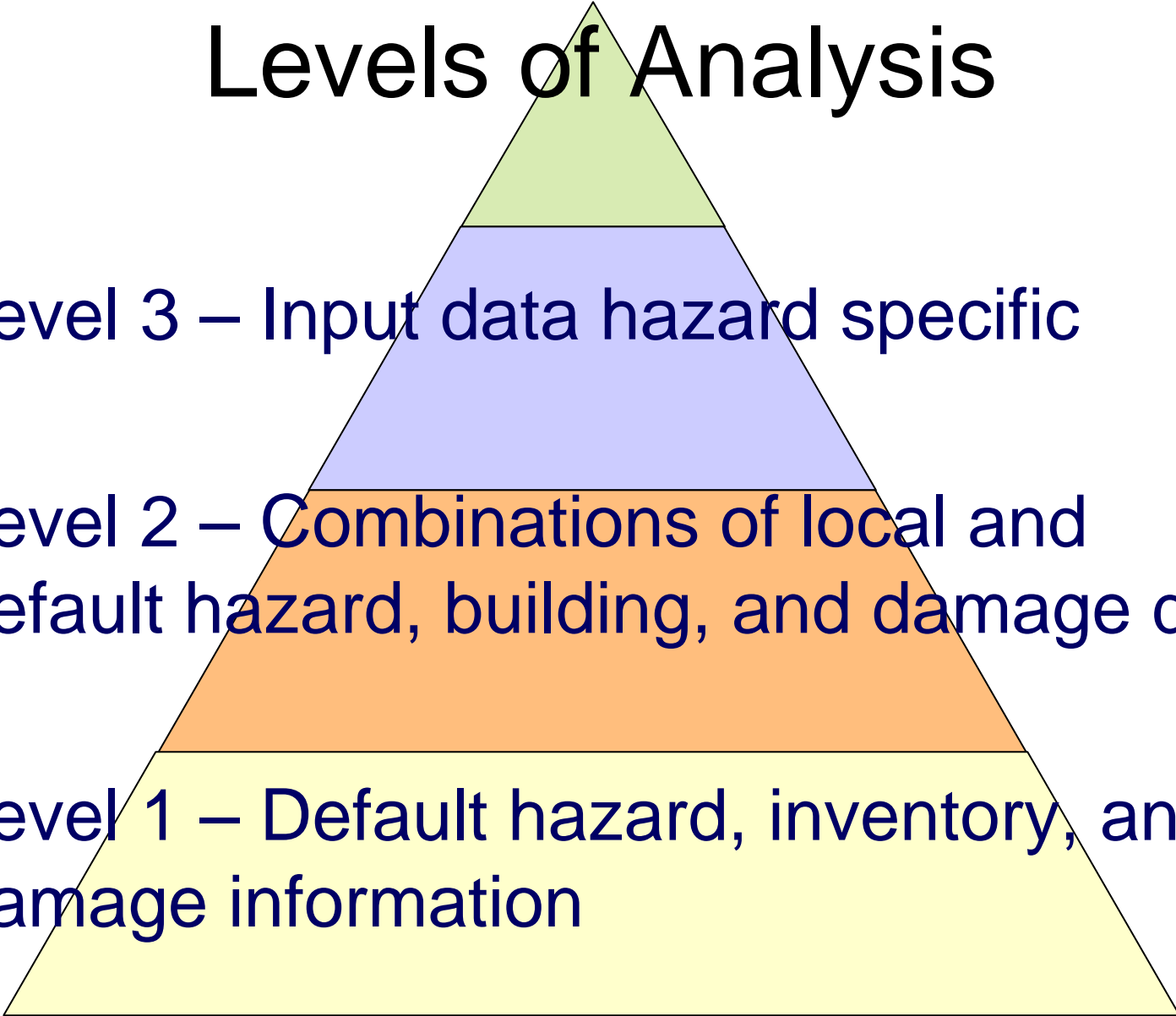
- Estimates social and economic impacts of hurricanes, flood, and earthquake hazards
- Uses damage information to estimate direct dollar losses for:
 - Buildings, Lifelines, Businesses, Regional economy
- Answers 'what if' questions



Under the hood

- HAZUS installation media is free and includes data relevant to entire US.
- Built on ESRI's ArcGIS platform
- Geodatabases using SQL Server technology.
- Limits include 4GB restriction on active database size.

Levels of Analysis

- 
- Level 3 – Input data hazard specific
 - Level 2 – Combinations of local and default hazard, building, and damage data
 - Level 1 – Default hazard, inventory, and damage information

Inventory Components

- Aggregate Inventory
 - Demographics
 - General Building Stock broken down by type (how constructed) and occupancy (how used)
- Site-Specific Inventory
- Hazard Specific Inventory (both aggregate and site specific)



Inventory Sources

- US Census 2000
- Department of Energy Statistics
- Dunn and Bradstreet tabulated data



Comprehensive Database Management System (CDMS)

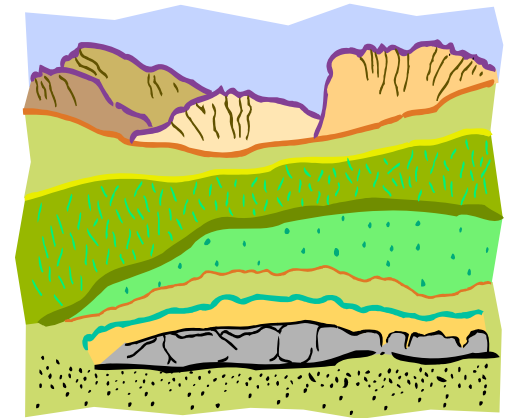
- FEMA tool to integrate locally developed inventory data into HAZUS-MH loss estimation process
- Supports transfer of data into and out of major master statewide databases
- Provides validation of new data into the system
- Allows users to query and print information within the system

Defining a Study Region

- Geographic limits of the spatial data
- Extracted from the default datasets
- Extent limited to approximately 2 counties
- Results from several study regions may be combined for presentation.

Terrain Surface

- Digital Elevation Model directly from USGS National Elevation dataset.
- Study region enlarged and includes extent of intersecting default watersheds.
- User supplied DEMs with filled sinks may be substituted.



Stream Delineation

- Raster outputs include flow direction, accumulation, lengths, and drainage grids per stream segment
- Vector outputs include default watersheds, reaches and stream network



H & H Analysis

- Hydrologic analysis through built-in regression equations
- Rainfall runoff modeling is not implemented
- Output is peak discharge table for return periods of 2, 5, 10, 25, 50, 100, and 500 years
- Hydraulic analysis inputs peak discharge, XS geometries, 1-D flow field and constant Manning's n for sub-critical flow
- Outputs include depth grids, XS, conveyance boundaries, and water elevation points

Flood Model Results - General Building Stock

- By Amount of Damage
 - Occupancy, building type (sq. ft)
 - By count
- By Amount of Damage
 - Full replacement value and depreciated replacement value
 - Building, content, and inventory losses, rental income loss
 - Direct employee output losses and employment loss (days)

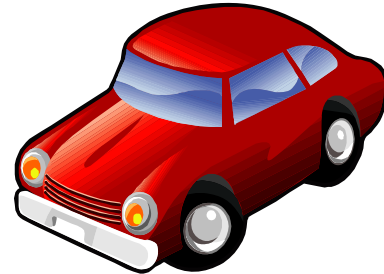
Flood Model Results

- Essential facilities
 - Building and content losses
 - Functionality assessment (yes/no)
 - Restoration time to 100% functionality
- Lifeline losses (for selected components)
 - Losses to structures and equipment
 - Functionality assessment (yes/no)



Other Flood Model Results

- Vehicle Losses
- Agriculture Losses
- Shelter Requirements
- Indirect Economic Losses
 - Income and employment impact with and without aid by market sector
 - Agriculture, mining, construction, manufacturing, transportation, trade, services, government, misc.



Results Format

- Maps, Reports, Tables

Table 4: Building-Related Economic Loss Estimates
(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Building Loss</u>						
	Building	8.11	0.45	0.03	0.01	8.60
	Content	4.24	0.72	0.04	0.04	5.04
	Inventory	0.00	0.01	0.01	0.00	0.02
	Subtotal	12.35	1.18	0.08	0.05	13.66
<u>Business Interruption</u>						
	Income	0.00	0.65	0.00	0.02	0.68
	Relocation	0.00	0.00	0.00	0.00	0.00
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.51	0.00	0.07	0.58
	Subtotal	0.00	1.16	0.00	0.09	1.25
<u>ALL</u>	Total	12.35	2.34	0.08	0.14	14.91

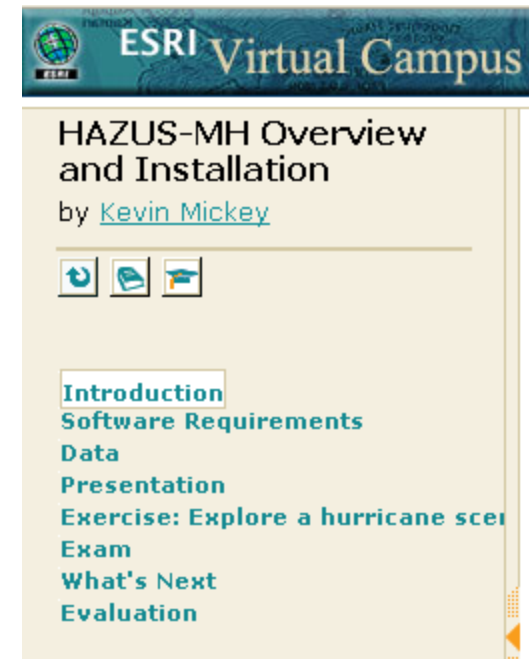
Training Opportunities



- Instructor-led courses at EMI & Regionally
 - ArcGIS for Emergency Managers
 - Basic HAZUS-MH
 - Comprehensive Data Management
 - HAZUS-MH for Hurricanes; ...Floods; ...Earthquakes
 - Application of HAZUS-MH for Risk Assessment
 - Application of HAZUS-MH for Disaster Operations
 - DMA 2000 Risk Assessment
- HAZUS-MH Expert Certificates (Professional & Practitioner)

Training Opportunities (cont.)

- HAZUS-MH Online Training from ESRI
 - Hurricane Loss Estimation
 - Losses from a Riverine Flood Hazard
 - Earthquake Loss Estimation
 - Integrating User-Supplied Hazard Data into Flood Model
 - HAZUS-MH for Decision Makers
 - Flood Model Output and Applications
 - Podcasts



Support Groups

- Conferences

- Booth at National Conferences (ESRI, APA, ASFPM, NACO, etc)
- HAZUS Annual Conference in Raleigh/Durham, NC Aug. 10-12, 2009

- Regional User Groups

- <http://www.usehazus.com>
- Wiki
- Best Practices

