HAZUS-MH
Natural Hazard Loss Estimation

“Risk MAP—powered by HAZUS”
Risk MAP Vision: To reduce losses of life and property through effective local mitigation activities enabled by quality flood hazard data, risk assessments, and mitigation planning.

Key Program Goals:
- Address Gaps in Flood Hazard Data
- Support Development of Hazard Mitigation Plans
- Provide an Enhanced Digital Platform
- Align Mapping, Assessment, and Hazard Mitigation Planning
- Develop Synergies
- Ensure Measurable Increase in Public Awareness
1. Identify Risk
2. Assess Risk
3. Communicate Risk
4. Mitigate Risk
HAZUS-MH is a powerful risk assessment software program for analyzing potential losses from floods, hurricane winds and earthquakes. In HAZUS-MH, current scientific and engineering knowledge is coupled with the latest geographic information systems (GIS) technology to produce estimates of hazard-related damage before, or after, a disaster occurs.
HAZUS-MH Features

GIS Technology
HAZUS-MH Features

GIS Technology
Nationwide Databases
HAZUS-MH Features

GIS Technology
Nationwide Databases
Nationally Standardized Loss Estimation and Risk Assessment Methodology
HAZUS-MH Features

Physical Impacts
Economic Impacts
Social Impacts

GIS Technology
Nationwide Databases
Nationally Standardized Loss Estimation and Risk Assessment Methodology
GIS Technology

- Spatial Relationships
  - Layers
  - Computations
- Risk Communication
  - Risks
  - Solutions
Nationwide Databases

- 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
HAZUS-MH: Analysis Levels

- **FIT** (Flood Information Tool)
- **CDMS** (Comprehensive Data Management System*)
- **BIT** (Building Inventory Tool)
- **InCAST** (Inventory Collection and Survey Tool)

* The CDMS Tool replaces the BIT and InCAST Tools in HAZUS-MH 2.0

- Level 1 and 2 analyses can usually be performed by emergency services or planning staff
- Level 3 analysis typically requires technical expertise

FEMA
The CDMS is a complimentary tool to HAZUS-MH that provides users with the capability to update and manage statewide datasets.

Currently, HAZUS-MH users are required to undertake a large amount of manual effort to incorporate new data into the statewide datasets according to their predefined formats. The CDMS will streamline and automate raw data processing, the conversion of external data sources into HAZUS-MH compliant data, and the transfer of data into and out of the statewide datasets. Processing site-specific level and aggregate information at the census block and tract levels will be supported. All new data brought into the system will be validated.
Once data are imported into the statewide datasets, the CDMS will allow users to query, sort, export and print information.
# HAZUS-MH Methodology

<table>
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<th>Earthquake</th>
<th>Flood</th>
<th>Hurricane</th>
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<td>Ground Motion</td>
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<td>Ground Failure</td>
<td>Discharge Velocity</td>
<td>Pressure</td>
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</table>

## Direct Damage
- General Building Stock
- Essential Facilities
- High Potential Loss Facilities
- Transportation Facilities
- Lifelines

## Induced Damage
- Fire Following
- Hazardous Materials Sites
- Debris Generation

## Direct Losses
- Cost of Repairs/Replacement
- Income Loss
- Crop Damage
- Casualties
- Shelter and Recovery Needs

## Indirect Losses
- Supply Shortages
- Sales Decline
- Opportunity Costs
- Economic Loss

*Generic Output*
Benefits of Using HAZUS-MH

- Standardized Methodology
- Widely used
- Training available
- Established Users Groups
RISK Assessment VS RISK Identification
- South Carolina Emergency Management Division Web Portal
- Florida Emergency Management Division Web Portal
- HAZUS-MH Annualized Earthquake Loss (AEL) Study
FEMA is compiling a National Average Annualized Flood Loss assessment using HAZUS-MH.
Virtual courses are available for HAZUS-MH. These on-line courses compliment the classroom training held throughout the year around the nation.

- HAZUS-MH for Decision Makers
- HAZUS-MH Overview and Installation
- Introduction to Using HAZUS-MH to Assess Losses from a Riverine Flood Hazard
- HAZUS-MH Flood Model Output and Applications
- Integrating User Supplied Hazard Data into the HAZUS-MH Flood Model
- Introduction to Using HAZUS-MH for Hurricane Loss Estimation
- Introduction to Using HAZUS-MH for Earthquake Loss Estimation
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Regularly scheduled HAZUS training classes are held at FEMA’s Emergency Management Institute (EMI) located on the National Emergency Training Center campus in Emmitsburg, MD, 75 miles north of DC.

Courses provide instruction in all steps of the loss estimation process, from inventory verification and improvement to running a loss analysis; how to use HAZUS results for mitigation, as well as for comprehensive planning, response, and recovery activities; data management; and useful GIS concepts.
FEMA is launching a new initiative that recognizes emergency managers, GIS professionals and others who complete a structured HAZUS curriculum that has two tracks:

- **HAZUS-MH Trained Professional** – that provides a foundation of basic HAZUS-MH skills plus focused instruction on at least one hazard

- **HAZUS-MH Practitioner Track** – that expands on the HAZUS Trained Professional Track by incorporating specialized training.
HAZUS Trained Professional Track:
Provides a foundation of basic HAZUS-MH skills plus focused instruction on at least one hazard.

- E190 Introduction to ArcGIS (prior GIS experience may substitute)
- E313 Basic HAZUS-MH
- E317 Comprehensive Data Management for HAZUS-MH
- Minimum of ONE of the following: E170 HAZUS-MH for Hurricanes; E172 HAZUS-MH for Floods; or E174 HAZUS-MH for Earthquakes
HAZUS Practitioner Track: Expands upon the HAZUS Trained Professional track by incorporating specialized instruction in topic specific areas.

- E190 Introduction to ArcGIS (prior GIS experience may substitute)
- E313 Basic HAZUS-MH
- E296 Application of HAZUS-MH for Risk Planning
- E179 Application of HAZUS-MH for Disaster Operations
- E317 Comprehensive Data Management for HAZUS-MH
- Minimum of ONE of the following: E170 HAZUS-MH for Hurricanes; E172 HAZUS-MH for Floods; or E174 HAZUS-MH for Earthquakes
Disaster Resilience by Design: Extending HAZUS-MH for Risk-Based Planning & Decision Support in Canada

Murray Journeay, Nicky Hastings, Bert Struiik, Miro Nastev & Malaika Ulmi
## Risk Assessment Frameworks
moving beyond partial solutions

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<tr>
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<th>hazard-risk, vulnerability, resilience</th>
<th>spatial extent &amp; temporal horizon</th>
<th>hazard potential, damages, losses</th>
<th>hazard threats, level of concern</th>
<th>quantitative analysis &amp; modelling</th>
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Legend:
- 1a hazard-risk, vulnerability, resilience
- 2b spatial extent & temporal horizon
- 2b hazard threats, level of concern
- 3a quantitative analysis & modelling
- 3b design, appraisal & evaluation
HAZUS-MH Information

- Visit the HAZUS website: http://www.fema.gov/plan/prevent/hazus

- Annual Users Conference Aug 2012