



FEMA

Flood Risk Assessments Geneva April 25, 2008

Mike Godesky
Program Specialist, Risk Analysis Division
Mitigation Directorate, Federal Emergency Management Agency

Presentation Outline

Flood Map
Modernization

- **Definitions**
- **Flood Risk Assessments**
- **HAZUS**
- **Limitations & Complexities**
- **The Big Picture**
- **Summary**



Hazard Mitigation and Risk Mitigation are not the same thing

- Hazard Mitigation mitigates hazards – such as flood control (levees/dikes, dams, etc...)
- Risk Mitigation mitigates risk – such as elevating structures, avoiding flood hazards, buying insurance, etc...



▪ Flood Risk and Flood Hazards are not the same thing

- Low risk can exist where flood probabilities are high (e.g. in the center of a stream it floods every day, but there is no risk because nothing is there)
- High risk can exist where probabilities are low (e.g. an urban area behind a levee/dike)



Risk = Probability x Consequences

■ Probabilities

- Decided by Nature and understood by few
- Fraught with assumptions and plagued by uncertainty – “Past performance no indication of future value”
- Difficult to communicate effectively

■ Consequences

- Largely within an individuals control
 - Insurance
 - Warning systems
 - Evacuation procedures
 - Elevation of structures



RISK		Probability (Low to High)									
		1	2	3	4	5	6	7	8	9	10
Consequences (Low to High)	0	1	2	3	4	5	6	7	8	9	10
	1	1	2	3	4	5	6	7	8	9	10
	2	2	4	6	8	10	12	14	16	18	20
	3	3	6	9	12	15	18	21	24	27	30
	4	4	8	12	16	20	24	28	32	36	40
	5	5	10	15	20	25	30	36	40	45	50
	6	6	12	18	24	30	36	42	48	54	60
	7	7	14	21	28	35	42	49	56	63	70
	8	8	16	24	32	40	48	56	64	72	80
	9	9	18	27	36	45	54	63	72	81	90
	10	10	20	30	40	50	60	70	80	90	100

12 Someone insured with higher chance of flooding has same risk as someone without insurance and lower probability

40 Probability increases while risk decreases through consequences management
(New map showing increased probability leads to purchase of insurance - reduces individual risk)

Probability drops while risk goes up because consequences are not managed
(Levee "eliminates" floodplain, leads to dropped insurance coverage - increases individual risk)



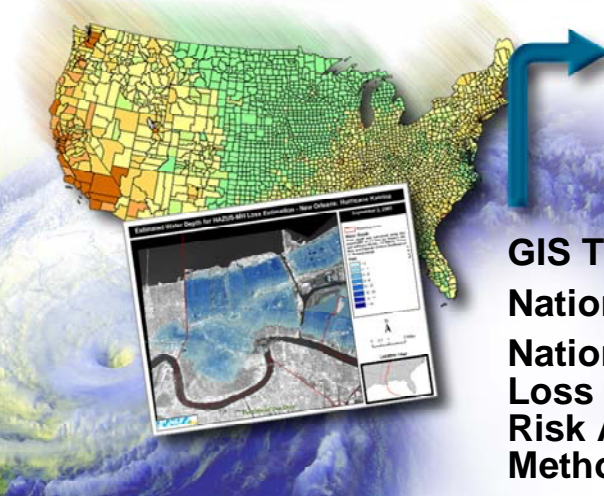
HAZUS

Flood Map
Modernization

- **GIS-based engineering and scientific loss estimation methodology for earthquake, flood, and hurricane wind**



HAZUS-MH: Features



Physical Impacts
Economic Impacts
Social Impacts

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

The image shows a map of the United States with a grid overlay, representing GIS technology and loss estimation methodology. An inset map shows a detailed view of a coastal area with a river and a levee. A blue arrow points from the map to the text on the right.

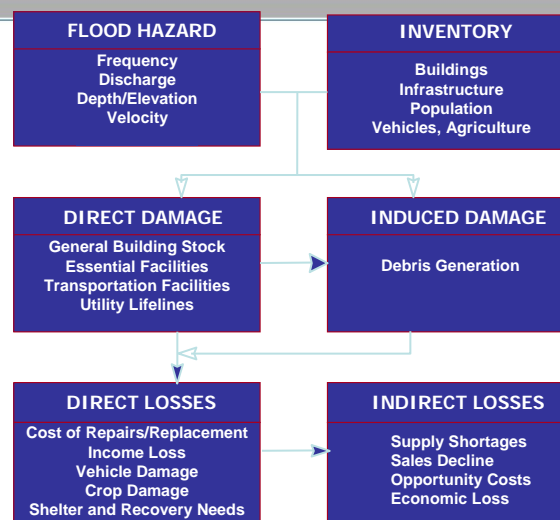
HAZUS-MH: FEMA'S SOFTWARE PROGRAM FOR ESTIMATING POTENTIAL LOSSES FROM DISASTERS

▪ **HAZUS-MH allows you to:**

- **IDENTIFY** vulnerable areas that may require planning considerations (e.g., land use or building code requirements)
- **ASSESS** the level of readiness and preparedness to deal with a disaster before the disaster occurs
- **ESTIMATE** potential losses from specific hazard events, including pre-event, near real-time, and post-event report capability
- **DECIDE** on how to allocate resources for the most effective and efficient response and recovery
- **PRIORITIZE** the mitigation measures that need to be implemented to reduce future losses

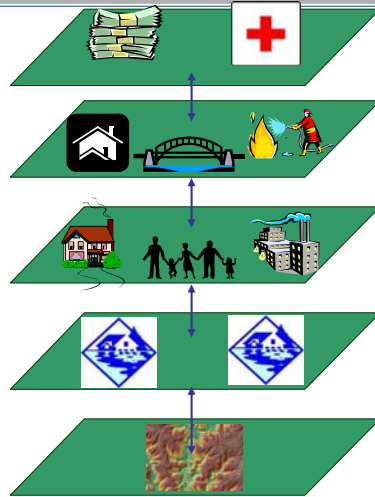


Flood Model Components



Flood Model Methodology

Flood Map
Modernization



- 4. Estimate Losses
- 3. Determine Damage
- 2. Define and Overlay Inventory
- 1. Define Hazard: Flood Surface Land Surface



HAZUS: more information

Flood Map
Modernization

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



Limitations

Flood Map
Modernization

- **Effective Risk Assessment is dependent on:**
 - Data
 - Expertise
 - Funding



Complexities

Flood Map
Modernization

- **There is no one answer:**
 - Insurance Needs
 - Evacuation Plans
 - Economic Loss model
 - Floodplain Management/Planning
 - Risk Communication



Keep your eye on the Goal

Flood Map
Modernization



The Goal of Risk Assessment is to achieve effective Flood Risk Mitigation

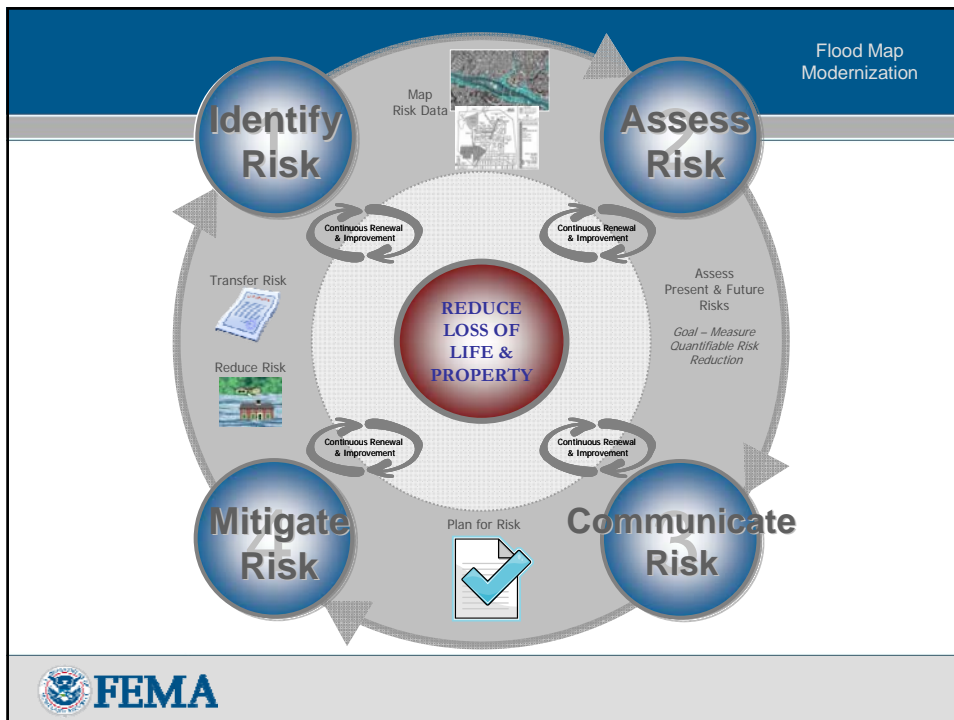


The Big Picture

Flood Map
Modernization

- **Effective flood mitigation has a beginning but never really ends**
- **It starts with flood hazard identification (mapping), moves to risk assessment, which informs a mitigation plan, which leads to action**
- **But things change and adjustments are needed**
 - Hazard changes
 - Demographic changes and new construction
 - Plans must be updated





Flood Map Modernization

Summary

- **Risk = Probability x Consequences**
- **Risk Assessments are:**
 - complex and ever-changing
 - one part in the Risk Mitigation Cycle
 - Must be thorough, but be simple enough to communicate effectively to planners and the public

FEMA

Questions?

michael.godesky@dhs.gov

