FEMA

USGS and FEMA Collaborate to Expand Flood Mapping and Risk Assessment Science

Albany, Georgia Flood Inundation Mapping and Risk Assessment Project

Background

Floods are the leading cause of natural-disaster losses in the United States. The U.S. Geological Survey (USGS) is actively involved in the development of flood inundation mapping across the nation. This work is pursuant to its major science strategy goal of reducing the vulnerability of the people and areas most at risk from natural hazards. Working with partners including the National Weather Service (NWS), U.S. Army Corps of Engineers (USACE), the Federal Emergency Management Agency (FEMA), state agencies, local agencies, and universities, the USGS is providing flood inundation mapping science resources to build more resilient communities.

Introducing RT-FIM

A powerful new tool, called real-time flood inundation mapping (RT-FIM), was created through collaboration between the USGS and FEMA to assist with the Survey Flood Inundation Mapping Science Project. This web-based tool, developed for flood response and mitigation, provides digital geospatial flood-inundation maps that show flood water extent and depth on the land surface. Flood inundation maps that are tied to USGS, real-time stream gage data and NWS flood forecast sites enable officials to make timely operational and public safety decisions during floods, and to better plan for and mitigate the effects of future flood events. USGS pilot projects to evaluate this new technology are currently underway in nine different states.

FEMA and USGS Collaborate for Advanced Loss Estimation

FEMA and the USGS are developing a Web-based module that incorporates Hazus flood loss estimates to the RT-FIM website for Albany, Georgia. Albany was affected by a major flood due to Hurricane Alberto in July, 1994.

References

Musser, Jonathan W., and Dyar, Thomas R., 2007, Two-dimensional flood-inundation model of the Flint River at Albany, Georgia: Atlanta, Georgia, U.S. Geological Survey Scientific Investigations Report 2007-5107, 49 p., Web-only publication at *http://pubs.usgs.gov/sir/2007/5107*

Online Resources

- http://lcat.usgs.gov/albany/
- http://lcat.usgs.gov/albany/Albany_Intro_text.pdf
- http://pubs.usgs.gov/sir/2007/5107
- http://water.usgs.gov/osw/flood_inundation/

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The flood, with a maximum flow of 123,000 cubic feet per second, inundated a large part of the city, caused major losses in property and public infrastructure, and necessitated the evacuation of about 23,000 people (Figure 1). In March, 1998, a second major event also caused substantial flooding, requiring the evacuation of about 14,000 people.

Figure 1 - Broad Avenue Bridge over the Flint River at Albany, Georgia, March 2005, from Musser and Dyar, 2007.

Using the output from a USGS hydraulic model (Musser and Dyar, 2007), the prototype website displays modeled inundated areas corresponding to river stages from 30 to 43 feet at the Flint River at Albany stream gage. Level 1 Hazus analyses (census block resolution) were run using inundation maps for thirteen different stage levels from the USGS hydraulic model. The website allows users to view inundation maps sequentially by moving a guiding cursor. The Hazus loss estimates appear in a separate window, refreshing dynamically as the cursor is moved (Figure 2).

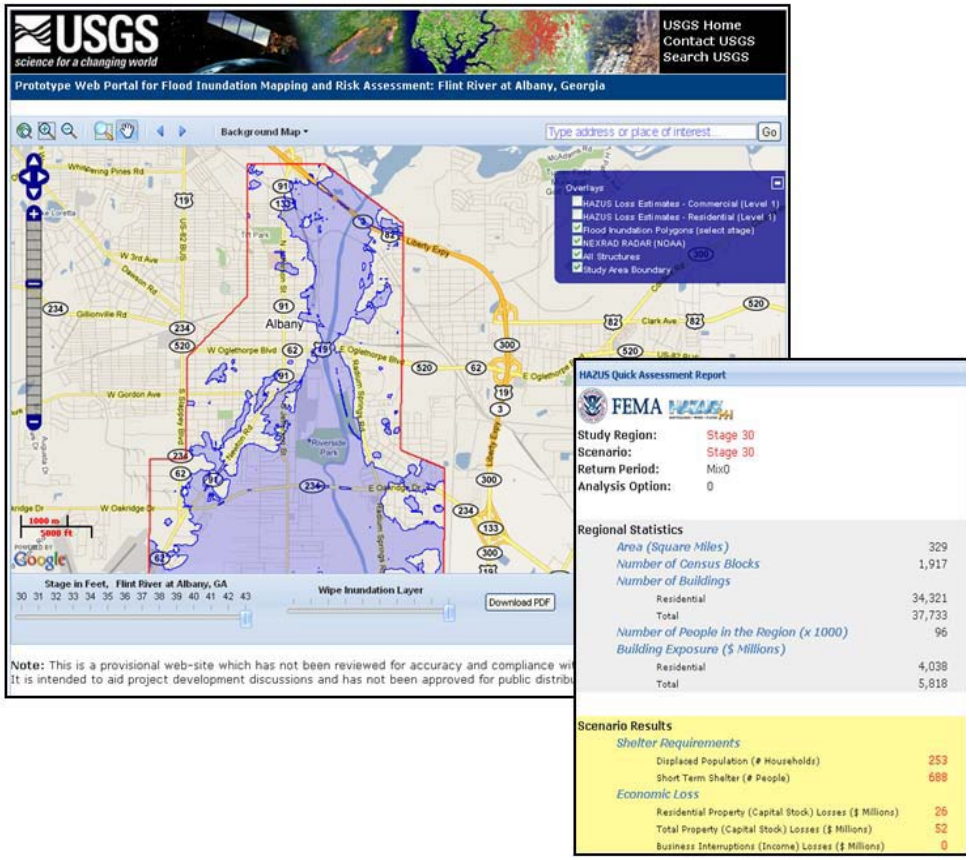

Figure 2 - Screenshot of the Albany flood inundation viewer, displaying the projected inundation for a stage of 43 feet at the Albany gage (123,000 cubic feet per second). The inset panel shows the Hazus level 1 loss estimates. By moving the slider at the lower left corner of the screen, the viewer dynamically loads the inundation polygon corresponding to the selected stage and refreshes the Hazus loss estimates in the side panel.

Expanding the Hazus Flood Module

During the next year, FEMA and USGS will be reviewing the prototype website with emergency managers and other local officials in Albany to get their feedback and make modifications as deemed appropriate. The project will also be evaluating other USGS RT-FIM pilot websites for potential expansion of the Hazus flood loss assessment module. Studies such as this continue to build the credibility of Hazus and in turn will lead to other pilot studies of the same nature (See Figure 3).

Hazus-MH
The flood loss estimation methodology consists of two modules that carry out basic analytical processes: flood hazard analysis and flood loss estimation analysis. The flood hazard analysis module uses characteristics, such as frequency, discharge, and ground elevation to estimate flood depth, flood elevation, and flow velocity. The flood loss estimation module calculates physical damage and economic loss from the results of the hazard analysis.

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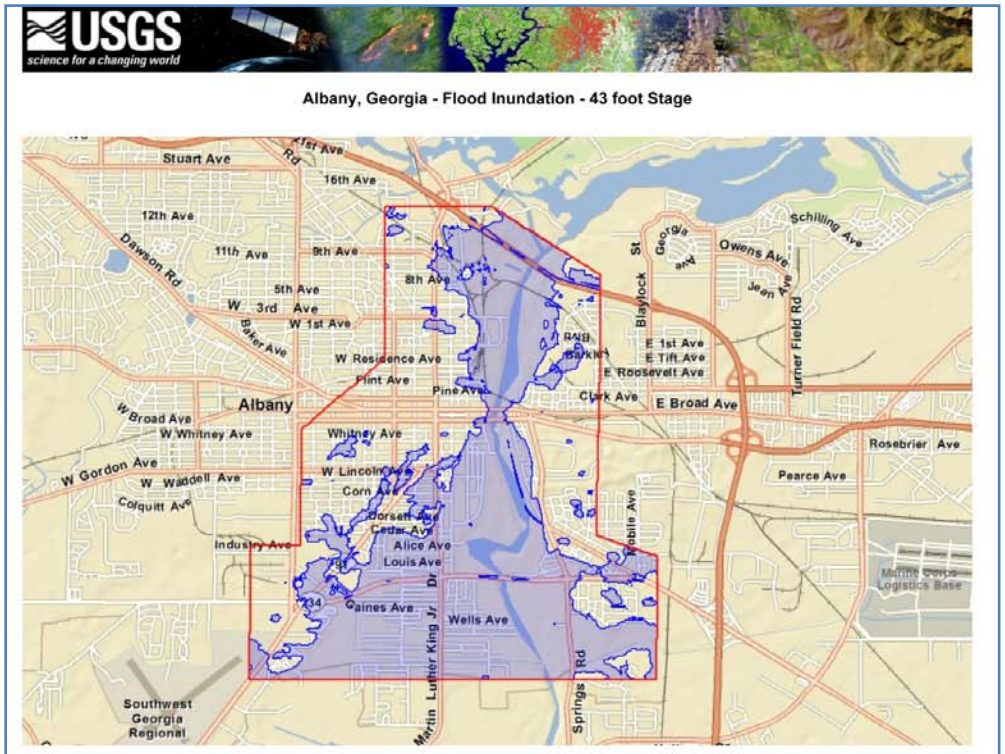

FEMA HAZUS-MH **HAZUS Quick Assessment Report**

Study Region:	Stage 43
Scenario:	Stage 43
Return Period:	Mix0
Analysis Option:	0

Regional Statistics	
Area (Square Miles)	329
Number of Census Blocks	1,917
Number of Buildings	
Residential	34,321
Total	37,733
Number of People in the Region (x 1000)	96
Building Exposure ($ Millions)	
Residential	4,038
Total	5,818

Scenario Results	
Shelter Requirements	
Displaced Population (# Households)	2,716
Short Term Shelter (# People)	7,732
Economic Loss	
Residential Property (Capital Stock) Losses ($ Millions)	238
Total Property (Capital Stock) Losses ($ Millions)	376
Business Interruptions (Income) Losses ($ Millions)	4

Note: This is a provisional web-site which has not been reviewed for accuracy and compliance with U.S. Geological Survey standards. It is intended to aid project development discussions and has not been approved for public distribution.

Figure 3 - Sample printed report, showing map of flood inundation forecasted for 43 ft stage, with corresponding Hazus loss estimates at the bottom.