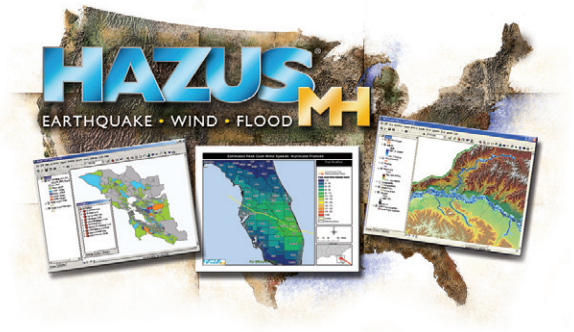
HAZUS User Group Success Story

Proving HAZUS Capabilities for Mitigation and Business Continuity Planning



Jessica Lowther, an Arkansas Tech University graduate student, conducted research for the purpose of encouraging the use of HAZUS-MH for mitigation and continuity of operations planning as well as aiding the state of Arkansas in a better understanding of the threat of tornadoes across the state.

Ms. Lowther conducted a comparative analysis between the default data included within HAZUS-MH and the user-supplied building and inventory data for a tornado strike on the Arkansas Tech University (ATU) campus. Her research asked the question, "Is an organization-specific building inventory data (termed as user-supplied or Level 2) necessary for planning for its survival and continuity of operations after a disaster, or is Level 1 default data sufficient?" In other words, will the quality and quantity of the data and the microanalysis of this user-supplied data greatly impact the hazard modeling results to reasonably advocate its collection and input into the model?

This research was made possible by a partnership with the Arkansas Department of Emergency Management (ADEM) and Arkansas Tech University (ATU). Each organization contributed Level 2 user-supplied data sets for input into HAZUS-MH.

This research was conducted simultaneously to the formation of the Arkansas HAZUS User Group. The purpose of the Arkansas HAZUS User Group (ARHUG) is to facilitate the use of the HAZUS-MH models for flooding and earthquake risk assessment in Arkansas and to form the basis for both pre- and post-disaster decision-making. By bringing together technical, policy, and emergency management specialists, the ARHUG will establish a solid risk assessment resource base for Arkansas.

Tornado Threat Analysis Process

HAZUS-MH does not have the direct ability to model tornadoes. However, a five-step process was used to analyze the impact of a tornado on the Arkansas Tech University campus.

1. The first task, identify and establish the study area, included determining the exact census tracts in which ATU is located. In addition, the appropriate officials employed at each institution were identified to obtain the valuable user-supplied data sets and background information.

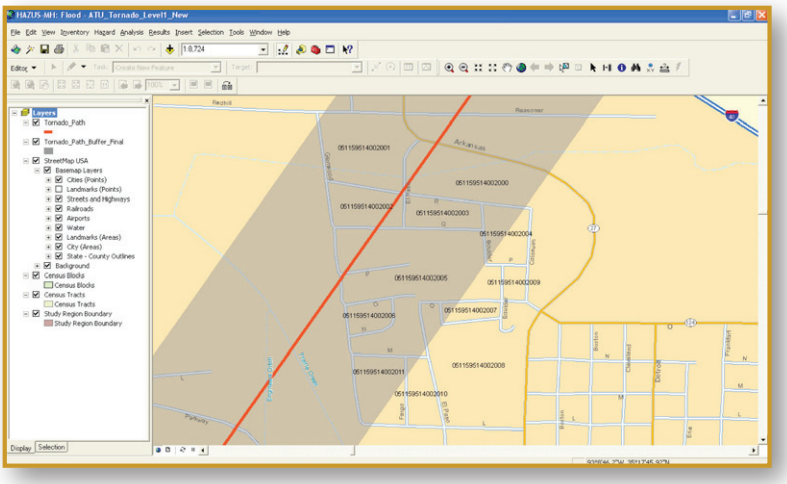
2. The second task was to manually digitize the tornado's path and buffer zone. Using the editing and sketch features, the starting and ending points were placed on the map with a line connecting the two points. The buffer zone was determined to be 400 yards on either side of the tornado's path.

Arkansas Tech University Level 2 Tornado Map

3. The third task was to perform the Level 1 analysis which served as the baseline against which the user-supplied data analysis would be measured. The only way to assess property loss was to determine the percentage of acreage for each census block destroyed within the buffer using the measuring tool within HAZUS-MH, and then use this information in conjunction with the default census data for each census block. Note: This data is misleading because it does not include the exact location of each building concentrated within each of these census blocks and 400-yard buffer.

4. The fourth task was collecting the Level 2 user-supplied building and inventory data from the ATU and ADEM data sources. This included the conversion of the data into a usable format for HAZUS-MH and then inputting this data into the appropriate HAZUS-MH model.

5. The fifth task was performing the Level 2 analysis, which included "heads-up digitizing" to determine building locations. Digital orthoimagery was added as a data layer on the map in order to assess which specific buildings on the ATU campus were within the tornado path. A new point shapefile was then created in order to create a visual point for each campus building. Using the satellite imagery allowed for the creation of specific points (ATU campus buildings) on the map to clearly illustrate which buildings were destroyed in the model. It also aided in determining in which census blocks the buildings are concentrated, especially considering residence halls, the administration building, public safety, and the emergency operations center. This also included beginning the analysis phase of the research project by placing both sets of results in tables in Microsoft Excel for easier analysis and later use in written research.



Numbered Census Blocks, Path, and Buffer for Level 1 Analysis

Research Conclusions

The results between the tornado models were more varied than expected. First, while the Level 1 data indicated that the majority of the building count was concentrated in one census block, the data collected for the Level 2 model showed that the building count was concentrated in a neighboring census block. Second, the ability to digitize the imagery into ArcMap and physically place the points on the map was not only easier since the individual points did not have to be collected by hand walking the campus with a GPS device, but also more accurate for three reasons. First, this method ensured that buildings were not inadvertently missed. Second, the points were placed in the same exact location on each building (middle). And third, the model clearly showed which buildings were in the tornado's path and buffer area and which were not.

Future of HAZUS in Arkansas

The ATU tornado models illustrated that including user-supplied data allows for more precise results and, therefore, better planning. This research confirms the importance of hazard modeling and continuity of operations planning. Arkansas Tech University intends to expand the scope of its research in the future by educating more students, expanding the Arkansas HAZUS User Group and networking with private and public industry in the state of Arkansas.

Damage resulting from a tornado

Contact

Jessica Lowther
705 River Birch Circle
Wetumpka, AL 36093
Phone: 719.494.4368
E-mail: jessica_lowther1@hotmail.com

Ed Leachman, Interim Head
Department of Emergency Administration and Management
Arkansas Tech University
402 West O Street
Dean Hall 110
Russellville, AR 72801
Phone: 479.964.0536
E-mail: eleachman@atu.edu

Arkansas HAZUS User Group
http://www.usehazus.com/arhug