FEMA

Using Hazus-MH Runs to Calculate Debris and Commodity Needs for Hurricanes

Challenge

During the spring of 2007, the Texas Governor's Division of Emergency Management (GDEM) participated in a GAP analysis meeting with representatives from the Federal Emergency Management Agency (FEMA). The GAP analysis included what levels of commodities (ice, water, food) could be supplied by the State as well as the amount of tree debris likely to be produced and the State's ability to dispose of it, following a Category 3 hurricane. The scenario used was based on a hypothetical hurricane coming ashore along the southern coast of Texas.

Tom Le Blanc, Mitigation Program Specialist for and Hazus Support for GDEM, participated in this GAP analysis and was tasked with estimating the amounts of tree debris. Mr. Le Blanc ran the Hazus-MH wind model to estimate hurricane wind damage. Hazus-MR2 loss estimations can be derived based upon the impacts of three natural hazards (floods, hurricane winds and earthquakes) on the built environment and to the populations that live in the communities impacted by the hazard. Hazus-MH outputs estimate damages to buildings and their contents, losses to essential facilities, impacts on transportation and utility lifelines, and impacts on agriculture.

Hazus-MH calculated debris generation in terms of tons of debris. Mr. Le Blanc needed debris estimates in terms of cubic yards. The cubic yard estimate would translate more easily into hands-on disaster

2011 National Hurricane Conference Award Winner

Outstanding Achievement in Mitigation Award

Miguel Pavon, Administrator of the Texas/Mexico Borderlands Information Center for his contributions to Hazus

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To request a copy of the spreadsheet please contact Mr. Pavon or Mr. Le Blanc.

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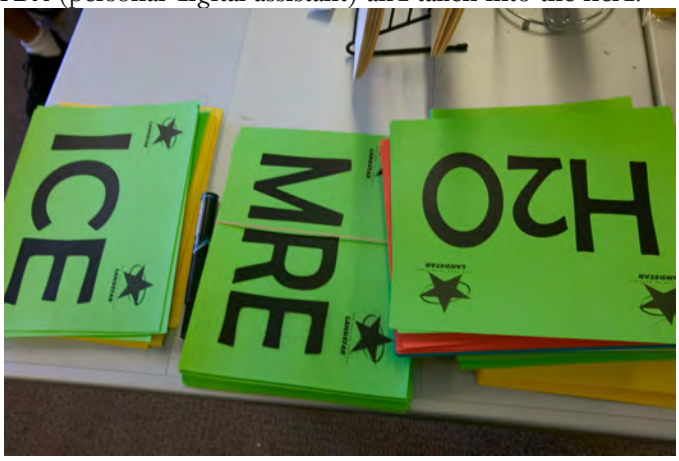
response and recovery information such as the number of trucks needed to remove debris. He spoke with David Pimentel, a geographic names specialist, and also a Hazus user, at the Texas Natural Resources Information Service (TNRIS). Mr. Pimentel recommended consulting with Miguel Pavon, a GIS "modeler" with TNRIS.

Solution

Miguel Pavon recognized that he could take information from Hazus-MH outputs (displaced people, displaced households, and tons of debris) and build upon it. Mr. Pavon used a U.S. Army Corps of Engineers (USACE) model, provided by Mr. Le Blanc that calculates commodities that could be distributed at Points of Distribution (PODs), ice (per bag), water (per bottle), tarps (for temporary roof repair), meals ready to eat (MREs), personnel (for disbursement of supplies), and gallons of fuel needed to supply transportation modes used by people evacuating from a hurricane. Mr. Pavon developed a flexible, user-friendly spreadsheet where specific debris removal and commodity needs could be calculated. The simple spreadsheet design features input fields at the top of the screen, and fields for commodity needs below. The fields become populated as new information is entered. It can be updated rapidly as new predictions and models are generated. The spreadsheet is small enough to be loaded onto a laptop computer or PDA (personal digital assistant) and taken into the field.



Some of the commodity and debris removal needs included in the spreadsheet are:

- How many MREs will be needed each day;
- How many bottles of water and tons of ice to load onto what size trucks;
- How much labor it will take to load them;
- How many trucks are required to carry the loads;
- How many PODs will be required, and
- How many volunteers, workers, and law enforcers are needed to man the PODS, and manage the relief or evacuation effort.

Several formulas, or assumptions, are programmed into the spreadsheet. For instance, it is assumed that three people live in each household and that they require two MREs per person, per day. Another assumption is the number of people evacuating in each vehicle. This is estimated at three and it is esti- mated that they will travel an average of 100 miles and average approximately 18 miles per gallon of gas. These assumptions can be modified to fit actual conditions. Truck capacities are measured based on volume and number of axels and are cross-referenced with projected debris removal needs. Maps and Hazus-MH runs will assist in determining how far outside the perimeter of the projected danger zone the trucks loaded with these emergency supplies should be stationed, and which points of delivery they should travel to once the storm has passed.

Recognizing that debris removal needs differ in urban and rural areas (for example, in rural areas tree debris that does not interfere with public safe- ty—such as downed trees in woods—are typically left to decay), Hazus-MH differentiates between the two environments, producing more accurate debris removal estimates for each.

A key component of the spreadsheet is that the information generated by Hazus-MH and the

commodities spreadsheet are only as useful as the smooth implementation of the Point of Distribution (POD) system. When all levels of disaster response professionals work from the same understanding of the PODs, needed supplies like tents, tarps, two-way radios, traffic cones, and ice trucks get quickly where they are needed most. The spreadsheet outlines three different types of PODs, ranging from Type III (which can serve 5,000 people per day) to Type I (which can serve 20,000 people per day).

Benefits

The commodities and debris spreadsheet can be used for mitigation, response, and recovery. Days prior to the expected arrival of a hurricane, Hazus-MH can be run and its output fed into the spreadsheet to calculate the commodities needed. Members of emergency planning and response communities can then use the information collaboratively to determine how best to meet post-disaster needs.

The spreadsheet is a Microsoft® Excel® file; Hazus users can change the number of households, displaced persons, or amount of debris and the entire spreadsheet adjusts, creating new supply values. For example, estimations of the amount of gasoline needed for an evacuation can be adjusted based on demographics: when estimating gallons of gas needed for an evacuation or response, the user can consider 20 miles-per-gallon cars instead of 18 miles-per-gallon cars if they know there are a high percentage of fuel efficient vehicles in the affected area.

Future

Because it is user-friendly and easily accessible, the commodities and debris spreadsheet developed by Mr. Pavon has the potential to multiply the uses of Hazus-MH. Emergency management professionals can use it to develop stronger, more effective response and recovery plans. This spreadsheet is available to all Hazus users as a public resource.

In the future, GDEM plans to test the commodities spreadsheet against a historical event. In addition, GDEM plans to use the spreadsheet in exercises and response and recovery situations. This tool gives an estimate of supply needs and expands the capabilities of Hazus-MH loss estimates.

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