DHS Science and Technology Directorate

National Hurricane Program Technology Modernization
Hurricane Evacuation Study Tool

Disaster Planning

The Federal Emergency Management Agency's (FEMA) National Hurricane Program (NHP) provides evacuation planning technical assistance to state, local and tribal governments. The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) and FEMA are co-sponsoring an effort to modernize technology components of the NHP. One of these components is the Hurricane Evacuation Study (HES), which provides planning data and impact assessments for coastal regions. This study assesses the vulnerability of critical infrastructure and population to hurricane hazards, taking into account the local population's expected evacuation behavior, and provides guidance to local emergency managers (EMs) for evacuating at-risk population to shelters or other destinations. The key outputs of HES are storm surge risk maps, evacuation zones, planning data and a matrix of evacuation clearance times − which are the number of hours it takes to move the threatened population to safety given various factors such as storm category, tourist occupancy and public responsiveness.

Cost and Time Savings

The current HES process is manual, costly and can take up to several years to complete. To streamline this process, the NHP Technology Modernization effort is developing an automated HES tool that will reduce the cost and time requirements of the HES process by up to 70 percent. This automation will make the process more transparent and efficient, allowing for more frequent updates to hurricane evacuation and response plans. Results of the HES will be more readily accessible, reusable and standardized across the nation, while still allowing customization at the local level, which will improve the nation's overall hurricane preparedness.

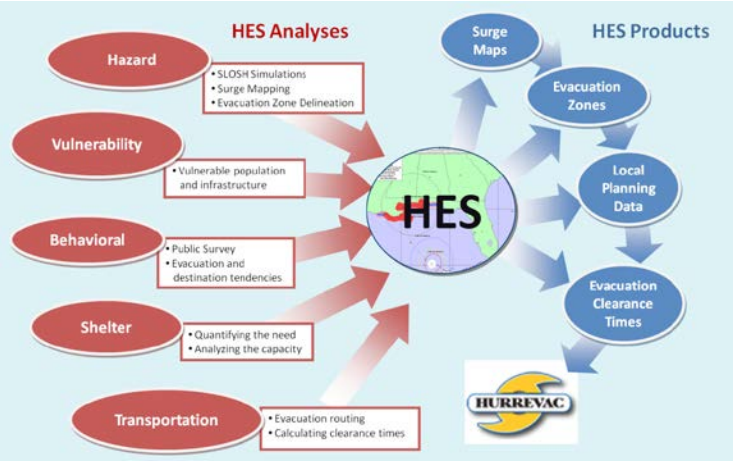
Modeling and Simulation Capability

The HES tool leverages a modular software framework that enables users to link together suites of models and data sources. The HES tool is implemented as a template that links three models:

(1) Hazard Analysis;
(2) Evacuation Zone Generator; and
(3) Transportation Analysis.

The modular framework enables output from one model to be used as input to another, with new models to be added quickly and different models to fit into each slot.

For example, the HES tool uses the Real time evacuation Planning Model (RtePM) <http://rtepm.vmasc.odu.edu/> for transportation analysis, but a different evacuation model such as TIME, a model used by EMs in the state of Florida, could be incorporated and used instead.



Overview of HES Analyses and Products

Adaptable and Guided by National Weather Service Data

The HES tool ingests planning level storm surge flood risk data created by the National Hurricane Center, automatically generates suggested evacuation zones based on inundation risk, and allows the user to edit the suggested zones or draw their own evacuation zones. Evacuation zones, road networks and end-points are passed to a transportation analysis model, along with parameters defined by the behavioral analysis such as evacuation participation rate, evacuee response time and population going to shelters, etc. The transportation analysis yields evacuation clearance times and evacuation data over time such as population remaining in the evacuation area, road congestion and population at each end-point.

Batch Analyses

A user can run an analysis in batch mode with varied inputs. This capability enables the user to perform a sensitivity analysis, which determines how evacuation scenarios might vary with changes in behavior. For example, an analyst can efficiently answer questions such as "How does my clearance time change if fewer people evacuate than expected?" and "How does congestion on the road change if more people go to shelters?"

Homeland Security
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To learn more about National Hurricane Program Technology Modernization, contact Program Manager Darren P. Wilson at darren.wilson@hq.dhs.gov.

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