

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), created in 1985 and revamped by the 2006 Post Katrina Emergency Management Reform Act, helps protect communities and residents from hurricane hazards by providing evacuation preparedness 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 addresses planning 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 typical behavior and provides guidance to local emergency managers for evacuating at-risk population to shelters or other destinations. The key outputs of HES are surge maps, evacuation zones, planning data and a matrix of 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.

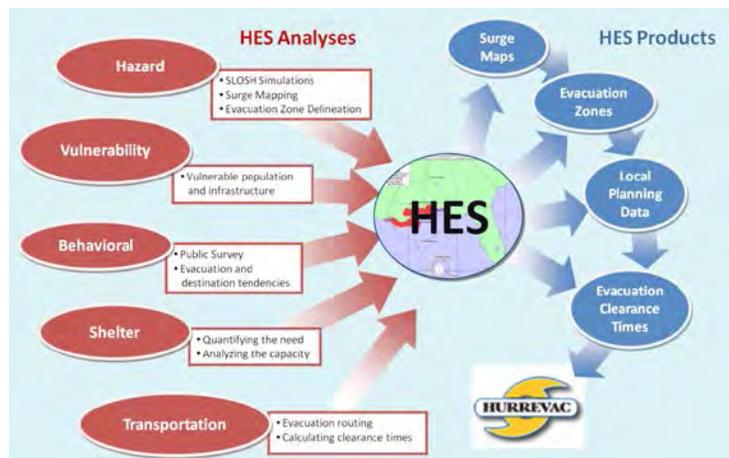
Cost and Time Savings

The current HES process is manual, costly and can take up to several years to complete. To streamline this process, the NHP Technology Modernization Program is developing an automated HES tool that will reduce the cost and time requirements of the HES process by up to 70%. This tool will calculate HES results in real time, making the process more transparent and efficient, which will allow for more frequent updates to hurricane plans and more efficient evacuations. Results of the HES will be more readily 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 SHERPA (SUMMIT for Homeland Emergency Response and Planning Analysis), an existing modeling and simulation capability at Sandia National Laboratories. SHERPA is a modular software framework that enables users to link together suites of models and data sources. The HES tool is implemented in SHERPA as a template that links three models: Hazard Analysis, (2) Evacuation Zone Generator, and (3) Transportation Analysis. The modular framework of

SHERPA 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 RtePM, the [Real time evacuation Planning Model](#) for transportation analysis, but a different evacuation model such as TIME, a model used by emergency managers in the state of Florida, could be incorporated and used instead.



Overview of HES analyses and products

Adaptable, Guided by National Weather Service Data

The HES tool looks up inundation forecast data created by the National Hurricane Center and either automatically generates evacuation zones based on inundation height, or allows the user to 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 rate, response time and population going to shelters, etc. The transportation analysis yields 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 change with changes in behavior. For example, an analyst can efficiently answer questions like “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?”



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To learn more about National Hurricane Program Technology Modernization, contact [Darren, Wilson, Program Manager](#).