Flood Assessment Structure Tool

The Flood Assessment Structure Tool (FAST) rapidly analyzes building-level flood risk using the Hazus flood model methodology. It was designed to make building-specific flood risk assessments quicker, simpler, and more resource effective.

About Hazus

Hazus is a nationally standardized risk modeling methodology that combines expertise from many disciplines to create actionable risk information that increases community resilience. It is distributed as free GIS-based desktop software with a collection of inventory databases for every U.S. state and territory. Hazus identifies areas with high risk for natural hazards and estimates physical, economic, and social impacts of earthquakes, hurricanes, floods, and tsunamis.

The Hazus Program, managed by FEMA's Natural Hazards Risk Assessment Program, partners with other federal agencies, research institutions, and regional planning authorities to ensure Hazus resources incorporate the latest scientific and technological approaches and meet the emergency management community's needs.

Flood Assessment Structure Tool (FAST)

Hazus software leverages Esri's ArcGIS Desktop software platform, which can add a cost barrier for many communities and is inefficient for large or detailed flood analysis projects. The Flood Assessment Structure Tool (FAST) was developed by the Hazus Team as an open source alternative to the flood modeling capabilities in Hazus. FAST combines structure data with flood depth information and damage functions developed by the engineering community to estimate flood impacts for every building in a study area. FAST calculates economic losses, building damages, and debris for approximately 10,000 structures per second. Emergency management initiatives in communities across the U.S. have used FAST to communicate flood risk and identify strategic mitigation opportunities.

> Click here to Download FAST from FEMA's Map Service Center (MSC) Hazus page, and then watch a live walkthrough of FAST to see the tool in action.

FAST Modeling Data Inputs

FAST requires a spreadsheet of geo-located structures with attributes for occupancy type, square feet, first floor height, foundation type, number of stories, and replacement cost. A depth damage function – the mathematical relationship between flood inundation and structure damages – is assigned to each input building according to its vulnerability attributes. Depth damage assignment can be customized prior to running FAST. Structure-level data

that include the vulnerability attributes required for flood risk assessment can be challenging to develop for many communities, but the U.S. Army Corps of Engineers National Structure Inventory and local tax assessor offices are valuable resources to begin data development. Learn more about formatting input building data for FAST from the "ReadMe.txt" file available with the tool media download on FEMA's Map Service Center Hazus page.

FAST also requires a raster dataset (.tiff file) of flood depths measured in feet. Depth grids are often produced by hydrologists and can be found for some communities on the FEMA Map Service Center website, or through other state and local emergency management agencies.
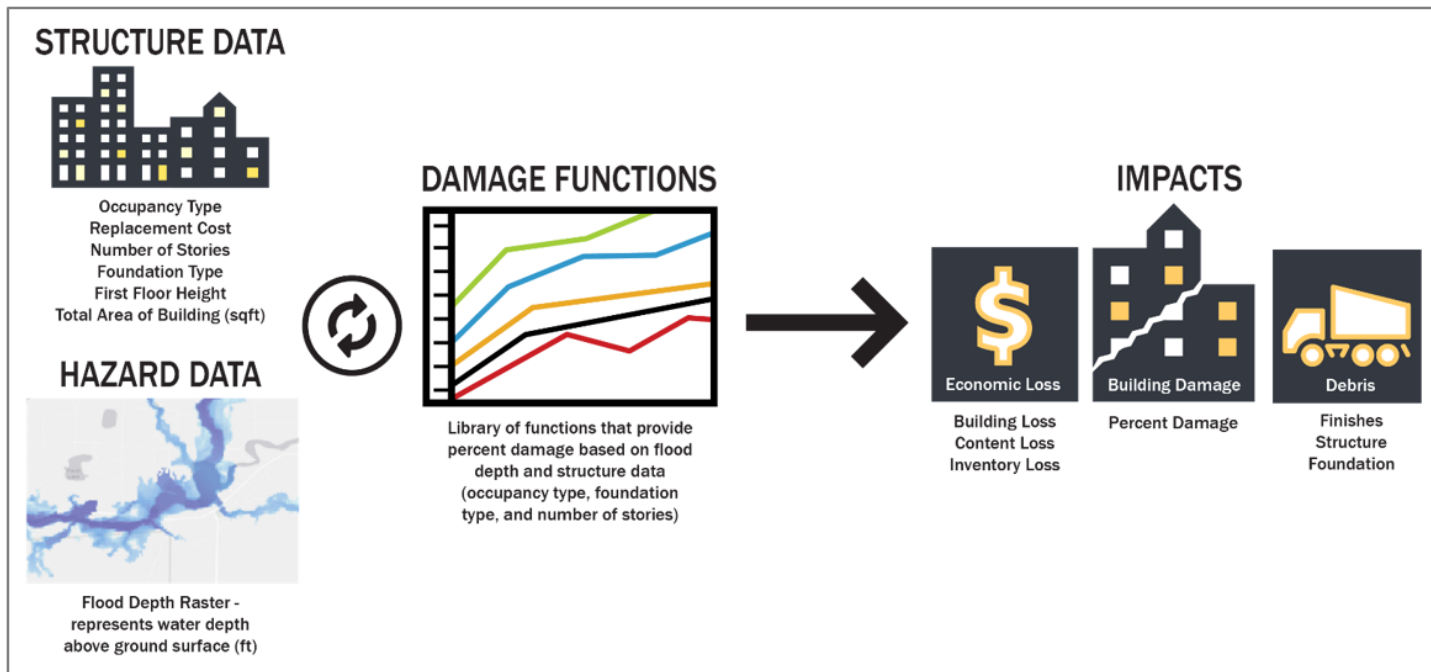
Figure 1. Diagram of FAST methodology.

Average Annualized Loss (AAL) Calculation in FAST

The Average Annualized Loss (AAL) is the mean value of a loss exceedance probability distribution, also known as the expected loss per year, averaged over many years. Estimating the AAL allows users to look at a greater range of event recurrence and/ or storm variability to better define flood hazards and associated risk, as opposed to simply evaluating based on one event, ie.1% (100-yr) risk.

AAL analysis functionality was recently added to the FAST tool in the latest release. With this enhancement, users can now select to run a standard analysis using a single depth grid, an AAL analysis using a 100-yr depth grid and PELV curves, or an AAL analysis using at least three depth grids representing different return periods. Detailed information on the AAL methodology used in FAST can be found in the Flood User Technical Manual and on the FAST "ReadMe.txt" file.

Learn More

For more information on how FAST has been used in previous studies check out the Hazus Success Story on Mapping the Risk Reduction Benefits of Coral Reef Conservation.

Hazus Resources

The Hazus Program offers technical guidance, training, and information about ongoing and recent projects to help stakeholders complete successful risk assessments. Please review the resources listed below for assistance using Hazus and reach out to the Hazus Team with questions.

Self-Guided Course Materials

Sign up for Risk Assessment Guidance

User & Technical Manuals

YouTube Videos

Visit the Hazus Loss Library

Contact the Hazus Team