CASE STUDY FAST – Flood Assessment Structure Tool
New York City

Purpose

This case study is to demonstrate usage of the FAST for the New York City dataset. The NYC dataset is a large dataset with over 800K recs and provides a good case study to assess the speed of FAST.

Challenges

Currently, under Hazus we can perform loss estimations for a flood at block level. A structure-based analysis is possible by preparing and inputting UDF data through CDMS into the state database.

Solution

FAST allows the user to assign flood depth damage functions and analyze their dataset at structure level using OpenSource technologies. The tool functions in two parts: a pre-processing tool and the analysis tool. The pre-processing tool helps the user assign the structure, content and inventory depth damage functions(DDFs) based on Occupancy Type, Foundation Type and number of stories. The analysis tool uses the pre-processed dataset and calculates the losses for each structure and creates a results dataset.

Are there any differences?

The main differences between FAST and the Hazus FL model UDF loss calculations are:

1. Speed: The Hazus flood model takes several hours to calculate losses for the NYC User Defined Facility (UDF) dataset of 800K+ records. It also takes several days to input such a large dataset into the Hazus state database using CDMS.
   FAST processes 10,000 records per second. It achieves a significant improvement in performance by avoiding the geoprocessing and area weighting of the flood depth grid(s) and bypasses the Comprehensive Data Management System (CDMS) for the UDF import process into the state database. It works by querying the flood depth using Python based GDAL libraries at all building locations and implements the Hazus flood loss methodology to calculate the losses. The pre-processing tool preps the data faster as it uses pre-defined tables to assign the appropriate damage function ids.
2. Debris Calculations: FAST provides debris calculations and building repair and replacement times which are not calculated in Hazus currently.
3. Relatively small differences in the losses between FAST and Hazus are due to Hazus rounding the First Floor Height to the nearest 0.5 of foot, which can underestimate losses in many scenarios.*

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*References: https://www.oregongeology.org/pubs/ofr/O-18-04/O-18-04_user_guide.pdf