



US Army Corps
of Engineers®

Flood & Coastal Storm Damage Reduction R&D Program

Flood Damage to Roads

Description

State highway data have been used to construct a regression model for estimating flood damage to roads. This model was supplemented by a Federal Highway model and additional empirical data to refine the damage model. Model development work has moved on to focus on the use of an expert elicitation panel for defining roadway types, damage mechanisms, and damage parameters. Existing traffic models are being evaluated for use in estimating traffic rerouting and delay costs. A computer application will combine the road damage and other cost estimation factors with hydrologic and road network information to estimate the benefits of mitigating road damage.



Road damage from 2006 flood, Delaware County, NY

Benefits

U.S. Army Corps of Engineers economists will have an empirically and expert-opinion based model, with uncertainty data, that can be reliably and efficiently used for estimating a significant flood damage reduction benefit that has usually not been quantified in the past. Road damage information will allow for better formulation of flood damage reduction projects by identifying the extent and geographic distribution of flood damage and subsequent benefits of flood mitigation schemes.

Status	A design document has been prepared that summarizes previous work on estimating road damage and traffic delays, as well as the various tools that could be helpful in estimating key damage variables, including hydrologic characteristics. Options for building the damage estimation model were described as well as options for the software design considerations. It was recommended that the road damage model be constructed as a geospatial tool that will be an add-on feature of the Hydrologic Engineering Center's Flood Impact Analysis Program (HEC-FIA). A prototype demonstration version of a road damage estimation model was released in 2008. In FY'09 the Design Document for the flood damage model was completed along with a prototype spreadsheet model. In FY' 10 developers have completed a project abstract, a strawman describing flood damage mechanisms, and an expert elicitation workshop was planned to review road damage mechanisms, examine roadway types, and specific thresholds for parameters that cause flood damage.
Distribution Source(s)	The product of this work will be available as an add-on to the HEC-FIA program. Supporting documents will be available through the IWR website and the Corps of Engineer Planning SharePoint website.
Available Documentation	The <i>Design Document for Development for a Flood Damage to Roads Model, Flood Damage to Roads Prototype, Flood Damage to Roads Regression Model, and a road damage spread sheet strawman model</i> , have all been completed are available at the Corps of Engineers Civil Works Planning and Policy SharePoint website at: https://kme.usace.army.mil/CoPs/CivilWorksPlanning-Policy/Shared%20Documents/Forms/AllItems.aspx?RootFolder=%2fCoPs%2fCivilWorksPlanning%2dPolicy%2fShared%20Documents%2fFLOOD%20DAMAGE%20TO%20ROADS&FolderCTID=&View=%7bf62e8566%2d4361%2d46d3%2db21e%2dd73eb5e802e8%7d
Available Training	N/A
Available Support	N/A
Application	The output of this work will be used by Corps Districts in estimating expected annual damages to roads for economic evaluation of flood risk management projects and by states and communities in determining the vulnerability of their road networks. The work will also be useful to the Federal Highway Administration in setting highway design standards for flood-prone areas.
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Partners	Hydrologic Engineering Center, the Federal Highway Administration, and the Chicago District and New Orleans Districts of Corps