National Center for Intermodal Transportation for Economic Competitiveness (NCITEC)

http://www.olemiss.edu/projects/cait/ncitec/

Project Progress To Date – January 31, 2013

Project title: Disaster Protection of Transport Infrastructure and Mobility Using Flood Risk Modeling and Geospatial Visualization

Investigators:
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Director, National Center for Computational Hydroscience and Engineering (NCCHE)

Start date: July 1, 2012 **Completion date:** December 31, 2013

Project description and objective:
About 60% of all disasters costing one billion dollars or more in the U.S. were related to weather; most occurred in southeastern states. Weather-related natural disasters include flooding events which cause catastrophic damages to road infrastructure including pavements and bridges. Washing away of bridges and highway disrupt public mobility, freight traffic and supply chain, emergency management, and even disaster evacuation routes. Each year millions of dollars are devoted to emergency funds and mitigation of damaged transport infrastructure. This project addresses the NCITEC theme of efficient, safe, secure, and sustainable national intermodal transportation network that can be made resilient to disasters. Specific focus is on developing technologies to enhance decision support systems for transport infrastructure protection from extreme weather related natural disasters such as floods.

The primary objective is the use of remote sensing and geospatial technologies for modeling and visualization of terrain and built environment, flood risk mapping, and simulation of extreme events for estimating flood disaster impacts on intermodal transport infrastructure network assets. The project objectives will be pursued using the CAIT expertise in geospatial visualization of terrain and built infrastructure led by Dr. Uddin and the NCCHE expertise in flood modeling and flood risk mapping led by Dr. Altinakar. When implemented the geospatial decision support system approach will help to save billions of dollars in cost avoidance of infrastructure destruction and reconstruction, as well as improve efficiency of emergency management operations, and save communities from flood related devastation and displacement from their homes.

Project progress to date:
NCCHE/CAIT researchers identified three candidate study sites. One site in Panola County including Sardis Dam/ Lake and I-55 area is being used for the pilot study. A preliminary flood simulation was conducted by NCCHE using the available ground digital elevation model (DEM) data at 10m resolution and NCCHE's 2D simulation model DSS-WISE. Two road bridges and one railroad bridge are affected by the flood waters. The simulation results were used to create kmz file for viewing on Google Earth (Figure 1).

Results dissemination and products:

2 Journal papers (1 CAIT, 1 NCCHE); 1 Book (CAIT) available in 2013; 4 conference papers/presentations (2 CAIT, 2 NCCHE); one best paper award (Uddin)

Students supported: 2 PhD (1 CAIT, 1 NCCHE); 2 UG (CAIT)

Collaboration: Geospatial industry for in-kind cost sharing, software (CAIT); six government agencies (NCCHE)

Work plan for the next reporting period: 3D extraction of built features using 3D geospatial analysis (CAIT); extreme flooding simulation and impact of built infrastructure elevation data (NCCHE); additional journal papers and presentations.

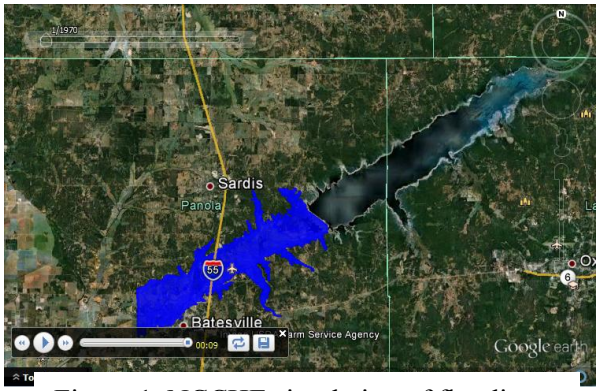

Figure 1. NCCHE simulation of flooding from Sardis dam/lake