DEVELOPMENT OF GIS BASED EMERGENCY EVACUATION AND SHELTERING MODEL FOR DISASTER MANAGEMENT

Jayakumar Indrcanti¹, Srinivas V. Challa¹, Julius M. Baham¹, Chuck Patrick¹, Monika K. Rabarison¹, John Young¹, Robert Hughes¹, Anjaneyulu Yerramilli¹, and Shelton Swanier²

¹Trent Lott Geospatial Visualisation Research Centre, Mississippi e-Centre, JSU, 1230 Raymond Road, Jackson State University, Mississippi 39217, USA
²Strategic Initiatives, Jackson State University, Jackson, MS 39217, USA

Abstract: The problem of determining optimal evacuation paths and shelters out of an area at risk can be modeled as a network flow coupled to area of influence of the disaster. The paper highlights the outcome of the GIS based model to assess the i) Dynamic allocation of shelters based on zoning/ clustering of areas ii) Assessing the surge capacity of shelters iii) Time duration of evacuation process iv) Identification of problematic areas of network. The objective of the network flow evacuation model is to route a given amount of people from a set of source nodes to an area outside the risk zone in the least amount of time, without violating the capacity constraints of the system. Whereas the objective of disaster model is to predict the area of influence using various Geospatial database namely Landuse/Land cover, disaster specific high-end model namely SLOSH output and location of evacuation shelters. These transportation systems include streets and highways that indicate the allowed direction of flow of people or vehicles during the emergency evacuation. Those links have attributes such as capacity (i.e., maximum flow that can traverse the link), geometric characteristics, and travel time and the Shelter identification model uses the area of influence of the disaster, real time disaster information and dynamic factor rating.

Keywords: GIS, evacuation, sheltering model