Flood Assessment and Evacuation Plan Development for Hypothetical Dam Breach at Sinclair Dam Using HAZUS-MH and ArcGIS Network Analyst

John Dees

Affiliation: Undergraduate Student, Institute of Environmental Spatial Analysis, University of North Georgia, Gainesville Campus, 3820 Mundy Mill Rd., Oakwood GA 30566

Reference: McDowell RJ, CA Pruitt, RA Bahn (eds.), *Proceedings of the 2015 Georgia Water Resources Conference*, April 28-29, 2015, University of Georgia, Athens.

Abstract. Dams are an important part of United States' infrastructure, providing many advantages like flood control, water supply, irrigation, hydropower, navigation, and recreation benefits. Despite these benefits, dams also present risks to property and life due to their potential to fail causing catastrophic flooding. Most of the small and medium size dams in USA are old. It is essential for dams for which failure or misoperation probably will cause loss of human life, to develop an emergency action plan for possible evacuation and shelter by understanding the flooding extent downstream, probable loss of lives and properties, and infrastructure to support. Lake Sinclair, created with an earthen dam is a 15,330 acre water impoundment located in Putnam County and Baldwin County, just north and northeast of Milledgeville, Georgia. It is classified as High Hazard dam due to its proximity to populated areas and the damage potential associated with the quantity of water in the impoundment and the surrounding elevation. The objectives of this study are to: 1) approximate the flood extent of a catastrophic dam break at Sinclair Dam using FEMA HAZUS 2.1 soft-ware and 2) identify potential evacuation routes for moving affected populations to local shelters and hospitals in the possible affected areas using Network Analyst Extension for ArcGIS 10.1. HAZUS-MH is an add-on for ArcGIS 10.1. Most of the geospatial data used in this hypothetical dam break model building came with the HAZUS-MH program. It provides locations of facilities, roads, trees, surface roughness, topography, hydrography, and many more including the census data. Other data used in the model building were collected from outside sources. HAZUS modeling was conducted in four basic phases, 1) organize resources, 2) assess risks, 3) develop a mitigation plan, and 4) implement the plan and monitor progress. In this study, the floodplain is approximated using a 200,000 cfs (just less than half the maximum) steady flow. The results obtained from the analyses were the flood zone, number of people to be affected and need evacuation, amount of infrastructure like building, schools, roads will be affected, and many more. These results helped in our Network Analyst based evacuation route development for moving marooned population through unaffected roads to the unaffected schools or other shelter available in close proximity. The final map delineated as a result will support planning people and resource managers to draw up probable plan for safety. However, this project can be improved further with the application of non-steady state flow analysis with HEC-GeoRAS software with HAZUS.