

Development and Application of WRVAT to the Inventory of Dams of Mississippi

Joel S. Kuszmaul, B.J. Gunter, R.M. Holt

University of Mississippi

T. Holtz, A. Singh, J. Pickens

INTERA Incorporated

In response to the U.S. Department of Homeland's Security's identified need to inventory and assess the vulnerability of key resources, an ArcGIS-based tool, Water Resources Vulnerability Assessment Tool (WRVAT) has been developed to house a resource inventory and a vulnerability assessment of dams, surface waters, and groundwater resources of Mississippi. WRVAT separately assesses the intrinsic vulnerability (depends on the properties of the resource), extrinsic vulnerability (depends on external factors acting on the resource), and consequences of a failure. For dams, these factors were assessed using the Condition Indexing Method (CIM) that has been used in a range of regions to assess dam vulnerability. CIM was selected because it is well suited to modifications needed for application to large inventories of dams. In our case, CIM was adapted and applied within WRVAT for all dams in Mississippi. In a joint effort with the Mississippi Office of Dam Safety, our assessment was applied to over 3000 dams of Mississippi. The approach of the Condition Indexing Method was adapted to assess the intrinsic vulnerability of each dam, based on available information about each dam. Extrinsic vulnerability was assessed based on ownership, and susceptibility to such factors as poor maintenance, and previous record of beaver damage to each dam. Finally consequences of a failure were estimated using available inundation maps included in Emergency Actions Plans (when available) or more commonly using a newly developed tool designed to provide a conservative estimate of the area potentially at risk of flooding due to the release of reservoir waters. This tool, Vulnerability Assessment Using Simplifying Assumptions (VADUS) was designed for GIS-based estimation of flooding due to sudden release (or failure) of a dam. The GIS-database used for WRVAT contained multiple layers to represent population density, infrastructure, and major institutions (e.g., schools, hospitals, etc.). The resulting vulnerability assessments cover all of Mississippi, but excluded some of the larger dams where these simplified methods of analysis were not well suited. The final assessment tools are useful for application to a wide range of dams (over 3000 in Mississippi), where prioritizing is helpful in efficiently addressing the most critical needs.

Contact information: University of Mississippi authors:

Dept. of Geology and Geological Engineering, University of Mississippi, University, MS 38677

fax:662 915 5998; tel: 662 915 7498

INTERA Incorporated authors:

INTERA Incorporated, 1812 Centre Creek Drive, Suite 300, Austin, TX 78754

tel: 512 425 2000