ABSTRACT

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Levees exist all over the United States, protecting various forms of development. Many of these levees are more than half of a century old and were initially intended to serve as protection for farmland; however, increases in development and urban sprawl have caused a rise in the number of homes being sheltered by levees that were not designed with the necessary level of protection. A lack of inclusive record keeping and inspection has left many levees in dire need of costly repairs. This study attempts to define a practical and economical means of prioritizing levee repairs based on the economic risk posed by the breaching of impaired levees and the expected improvement costs for returning the levees to a safer condition. A framework for a simplified breach loss analysis is proposed through a case study of five levees in a flood-prone area in central Indiana. Current analysis methods are examined and compared to the proposed methodology.

Results of the case study reveal pitfalls of current standards of practice, a means of analytically prioritizing levee repairs, and future research needs for advancement of the prioritization procedure. The use of an unsteady-flow analysis with storage areas to represent the protected areas is identified as a key component to a realistic characterization of the physical system. Comparisons between breach results, economic costs, and characteristics of the protected areas reveal no apparent correlations, suggesting a need for a ranking parameter. A Priority Ratio is identified in the case study results and suggested for use.