

**Title:****The Visible Benefits And Hidden Costs Of Levee Infrastructure****Summary:**

This presentation will review the issue of flood magnification on several of the large navigable rivers of the central US. Public and media discussions of large floods worldwide frequently suggest that these events are larger and/or more frequent than expected or predicted based on past flood occurrence. River systems and flooding can change over time in response to climate shifts, land-use change, or engineering modifications of the river. Several hydrological parameters show statistically significant increases in flood magnitudes on the Mississippi, Lower Missouri, and other large rivers. Increases in discharge can be interpreted to result primarily from shifts in climate and/or basin land-use/land-cover change.

Along broad reaches of the Mississippi and Missouri Rivers, the largest changes have been associated with systematic shifts in the stage-discharge relationship. These shifts are independent of any coeval changes in discharge probabilities and are instead related to historical modifications of the river channel and floodplain. A principal goal of this research has been to identify the precise causal mechanisms acting in the channel and on the floodplain that have driven the large observed increases in stages on this system. Hydrological, statistical, and geospatial analyses as well as 1D and 2D hydraulic modeling yield coherent results -- the majority of empirically documented flood magnification correlates with large increases in roughness related to construction of river training structures. Additional secondary magnification correlates with progressive levee construction over time. Other modifications such as bridge construction and meander cutoffs are associated with decreases in flood levels, and lock-and-dam construction is associated with small step increases followed generally by long periods of rating-curve stability.

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