

# HYDRODYNAMIC AND SEDIMENTOLOGICAL CONTROLS GOVERNING FLUVIAL LEVEE GEOMORPHOLOGY

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## ABSTRACT

Fluvial levees are familiar features commonly found on the margins of river channels, yet we know little about what controls their height and shape. Due to their shape and sedimentary structure, ancient fluvial levee formations often generate stratigraphic traps for hydrocarbons and are commonly targeted as a natural resource. Despite the familiarity and importance of levees, there is a surprising lack of basic geomorphic data on fluvial levees. Because of this I want to understand: 1) what is the range of cross-sectional shapes for levees? and 2) what geomorphic and hydrodynamic variables control cross-sectional shape? I will address these questions by extracting levee shape from LiDAR data and by collecting hydrodynamic and sedimentological data from reaches of the Tippecanoe River, the White River, and the Muscatatuck River, Indiana, USA. Using this dataset, I will conduct a multivariable regression analysis that will uncover the correlations between the independent variables: channel geometry, suspended sediment concentration, sediment grain size, flow conditions, channel slope, floodplain slope, flooding depth, flooding frequency and the dependent variables: levee height and levee shape. The results of this study will aid in developing models for the controls on levee shape and height along rivers and will help predict the lateral extent of ancient levee deposits in the subsurface in order to more efficiently exploit these stratigraphic units for hydrocarbon resources.

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