TWB USGS Final Report (2018TX518B)

Title:

Evaluating the impact of the Katy Prairie and adding HCAD Plan 5 Reservoir on Flooding of Addicks and Barker Reservoirs in Houston, Texas (Amended Title: *Quantifying risk reduction of flood mitigation measures for an urban watershed in Houston, Texas)*

Products:

1. ***Quantifying risk reduction of flood mitigation measures for an urban watershed in Houston, Texas***. Defended Master's Thesis (April 2019)

Notable Achievements and Awards:

Probabilistic flood risk: quantifying uncertainty in flood hazard estimates and flood risk profiles for an urban watershed in Houston, TX. Presentation at American Geophysical Union Conference, Washington, D.C., December 2018.

Research:

1. Quantifying risk reduction of flood mitigation measures for an urban watershed in Houston, Texas:

Flooding is the costliest natural disaster in the United States. Recently, the increasing occurrence of floods has established the need for new approaches to analyze flood risk of and to quantify benefits of mitigation practices. The purpose of this research was to produce a novel risk-based framework to quantify the impact of flooding on residential structures and to analyze the effectiveness of mitigation strategies in an urban watershed in Houston, Texas. For the purpose of this research, the baseline annualized expected damage, or risk, was determined for the individual, residential parcels within the watershed due to riverine flooding. Then, change in risk for the total watershed and individual parcels were quantified for various mitigation measures including, elevation of structures, buyouts, channel and bridge modifications and detention. As a result of this study, a parcel-level, annual expected damage map was produced for residential homes based on riverine flooding for the watershed. Additionally, maps calculating the reduction in risk due to each flood mitigation strategy were created. Based on the results of this study, the channel and bridge modification had the highest risk reduction, decreasing the risk by more than 90% over a 30-year period, although it had the highest initial investment. Due to the scalable nature of the parcel-level, risk-based approach, additional flood mitigation measures like buyouts and elevation of structures were able to be evaluated for their risk reduction potential unlike in previous studies. The ability for this method to be performed at various temporal and spatial scales allows this method to be widely applicable.