

The Summer Undergraduate Research Fellowship (SURF) Symposium  
2 August 2018  
Purdue University, West Lafayette, Indiana, USA

## Robust Allocation of Funds for Nonstructural Flood Risk Mitigation in Coastal Louisiana

David R. Johnson, Matthew P. Shisler, and Zachariah T. Richardson  
School of Industrial Engineering, Purdue University  
Simón Gómez Sierra  
Department of Industrial Engineering, Universidad de Los Andes

### ABSTRACT

Coastal Louisiana is a critical economic, ecological and cultural asset, acting as a major hub for waterborne commerce, fisheries, and the petrochemical industry, and also as one of the world's unique wetlands. Unfortunately, this rich environment is in great danger from the threat of hurricanes and storm surge flooding. Direct economic losses are estimated to average \$2.7 billion per year under current conditions, and this could increase to \$12 billion a year, or more, within 50 years if nothing is done. To prevent this catastrophe, Louisiana has developed a *Comprehensive Master Plan for a Sustainable Coast*, which plans to spend \$50 billion, over the next 50 years, between structural (e.g., levees, floodwalls) and nonstructural (e.g., elevating houses, floodproofing) protection measures, and coastal restoration projects, to reduce flood risk and reduce land loss. However, the state is still in the process of developing a strategy for nonstructural risk mitigation and to define what mitigation standards should be set in different parts of the coast. Therefore, this project utilizes the risk model currently used to assess flood risk in coastal Louisiana to evaluate the impact of different potential nonstructural strategies on risk reduction, accounting for both equity and economic considerations. We estimate the risk reduction and other impacts achieved by each strategy and evaluate how much they vary over a wide range of uncertain future scenarios. We intend to identify a robust strategy for allocating the state's \$6 billion budget for nonstructural risk mitigation that will improve upon the current strategy recommended in the coastal Master Plan.

### KEYWORDS

Flood risk, nonstructural measures, optimization, robustness, risk mitigation, sustainable coast.