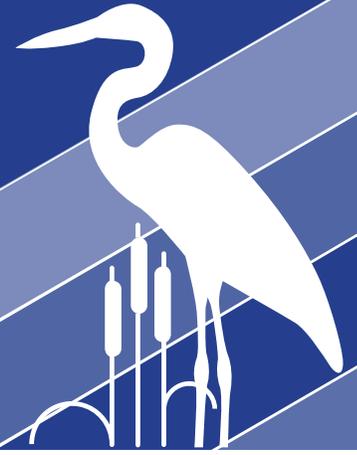


KEEPING WATER WHERE IT BELONGS



The greatest risk to the region's vibrant economy is continued vulnerability to repeated flooding. Flooding costs the region billions of dollars, and unless the region invests more resources in preparing for future floods, costs will continue to rise. While Hurricane Harvey demonstrated the strength of the region's people and its community spirit, the repeated flooding has damaged the region's business recruitment and retention efforts. For example, as a direct result of Hurricane Harvey's flooding, Houston is losing 290 high-tech manufacturing jobs from just one employer.¹

The region's landscape and waterways have limited capacity to absorb floodwaters; the location on the Gulf Coast, its flat topography, and its geology of dense clay soils contribute to its propensity to flood.

The region does not have sufficient drainage infrastructure in place to prevent losses of residences, property, and businesses during the increasingly frequent floods. As the region continues to grow and develop upstream, increased flooding of existing downstream properties occurs. Limited regulation of development, especially in the unincorporated areas where the majority of growth is taking place, allows development in low-lying areas that repeatedly flood. Buying out structures that are repeatedly flooded is more expensive than preventing development in low-lying areas.

Hurricane-related storm surge damages the economy and environment, as evidenced by the destruction on Bolivar Peninsula by Hurricane Ike, where a 22-foot wall of water rolled over the peninsula, wiping away entire communities.



View from the Federal Emergency Management Agency's (FEMA) Urban Search and Rescue Virginia Task Force Two in a Houston neighborhood during Hurricane Harvey flooding.

Photo by FEMA News Photo - Aug 31, 2017

Best Practices for Flood Prevention

Intergovernmental regulation, coordination, and planning

Sufficient infrastructure to prevent flooding

Maintain strong institutions to prevent flooding

KEEPING WATER WHERE IT BELONGS: BEST PRACTICES

Keeping water where it belongs also necessitates sufficient water capacity to meet the needs of a growing population, even during drought conditions. Between 2010 and 2012 the region experienced the second worst drought in southeast Texas history, causing \$5.2 billion in losses statewide.^{2,3} Having sufficient water supply to meet the needs of agriculture and industry would reduce drought damage to the region's economy.

Best Practices for Drought Prevention

Create sufficient reservoir capacity to ensure surface water needs are met

Invest in water conservation measures

Promote voluntary adoption of water conservation technologies by residents and the private sector

Investigate the potential for further development of non-potable water systems (water that has been treated to a standard below that fit for human consumption)



Water conservation measures, such as low impact development , and help reduce the strain, and expense associated with stormwater management and potential drought.

KEEPING WATER WHERE IT BELONGS: BEST PRACTICES

Intergovernmental Coordination and Planning: Chambers County Long-Term Recovery Plan

In 2008, Hurricane Ike devastated Chambers County, destroying basic infrastructure including utilities, fire protection, and healthcare facilities. Saltwater contaminated wells as far as 10 miles inland.⁴ In response, Chambers Recovery Team developed a community driven Long-Term Recovery Plan to identify and prioritize projects with participation from the County and the Cities of Anahuac, Cove, Mont Belvieu, Beach City, and Old River Winfree. The plan identified the need for building codes and land use regulations that “ensure housing is more resilient and sustainable, offers protection from future storms, and is safe and sustainable.”⁵ It also included several projects to improve the infrastructure needed in the county to enhance its resilience to flooding, including expanding levees, creating a drainage plan, and repairing saltwater gates. As a result of the planning efforts, Chamber County and the City of Anahuac have invested in infrastructure to prevent saltwater intrusion into the Lake Anahuac, the City of Anahuac’s water source.

Develop Sufficient Infrastructure to Prevent Flooding: Structural Solutions to Prevent Storm Surge

Galveston Bay is vulnerable to hurricanes coming in off the Gulf of Mexico, as demonstrated by Hurricane Ike’s two-story storm surge. Storm surge from a Category 5 hurricane has the potential to destroy the massive petrochemical complexes in Texas City, Baytown, Pasadena, and the Houston Ship Channel. Such an event would have an incalculable effect on the regional, national, and global economy, and the potential toll on communities and the environment is beyond comprehension. Many possible structural solutions are being investigated. Texas A&M Galveston, Rice University’s SSPEED Center, the Gulf Coast Community Protection and Recovery District, and the Galveston District of the Army Corps of Engineers produced concepts for massive coastal infrastructure to prevent storm surge. Taking inspiration from the Dutch, who have centuries of experience in coastal storm protection infrastructure, the concepts recommend a system to create a series of barriers, levees, gates, and pump stations sufficient to protect the Galveston Bay from the destructive forces of a storm surge. The Corps of Engineers is scheduled to release a recommendation from their storm-surge protection study in 2018. Federal funding for any project depends on the results of the Corps study. Remaining questions of the final design, funding, and implementation need to be quickly resolved to protect communities, businesses, and industry from the potential devastation of storm surge.

Maintain Strong Institutions to Prevent Flooding: Velasco Drainage District

The Velasco Drainage District enhances resilience by providing physical flood protection in the Brazosport area, in the southern part of Brazoria County, by maintaining 50 miles of levees and pump stations. Brazosport is a major industrial and petrochemical complex and an engine of the regional economy. The Velasco Drainage District, established in 1908, creates a strong institution by investing in and retaining staff members who can anticipate issues and understand the workings of the system; coordinating closely and building trust with other entities (such as Brazoria County’s Office of Emergency Management, the Galveston District of the Army Corps of Engineers, industry partners), gaining access to outside resources for effective management; and taking full responsibility for the operations and maintenance of their system, leading to a sense of ownership and avoiding pitfalls that can occur with overlapping jurisdictions.