

## **THE GALVESTON BAY REGION AS AN INTERNATIONAL TEST BED FOR FLOOD RISK REDUCTION**

Robert W. Whalin, Ph.D., P.E., D. CE

Education Director, Coastal Resilience Center of Excellence

Samuel D. Brody, Ph.D.

George P. Mitchell Chair in Sustainable Coasts

Professor & Director, Center of Texas Beaches and Shores, Texas A&M University at Galveston

William J. Merrell, Ph.D.

George P. Mitchell Chair in Marine Sciences

Texas A&M University at Galveston

Coastal floods are the most costly and disruptive natural hazard. A critical need exists for trans-disciplinary inquiry in science and engineering that will lay a foundation for flood risk decision making aimed at increasing coastal community resilience. Texas A&M University at Galveston has established a formal research and education program named the coastal Flood Risk Reduction Program (FRRP) between the U.S. and The Netherlands. This program is funded on the U.S. side by the National Science Foundation under their Partnership in International Research and Education (PIRE) initiative.

The program builds on an existing binational partnership established among multiple researchers in recent years to formalize a comprehensive integrative place-based research and education program that strives to transform the way floods are dealt with in the U.S. and worldwide. Multiple case studies in both countries involve faculty from engineering, architecture, economics and planning. The 1900 Galveston Hurricane is the most deadly natural disaster in U.S. history. Galveston demonstrated amazing resiliency from the 1900 Hurricane and today's local concern regarding mitigation of future hurricane threats makes the Galveston Bay Region an ideal U.S. Test Bed for Evaluation of Flood Risk Reduction Strategies. The Netherlands, a nation with over 25% of its land below sea level (another 25% less than 3 feet above sea level), has a history of devastating floods, flood resiliency and land reclamation from the sea which makes it an ideal international example of flood risk reduction. Within each study region, six sub-case study focal points have been initiated covering both surge-based and precipitation-driven flood challenges. The FRRP will further crystalize an existing collaboration consisting of five participating

institutions with 25 faculty supervising dozens of students. Key U.S. partners include Jackson State University, Rice University and TAMU College Station and Galveston. Dutch partners include Technical University of Delft and Deltares. U.S. researchers have the opportunity to leverage Dutch data, methods, and facilities associated with flood management. The synergy created by working in partnership on case studies helps provide a more comprehensive understanding of alternative approaches to reducing coastal flood impacts.

An integral part of the project is an educational component, where interdisciplinary, binational cohorts of students conduct place-based assessments within the six case studies. The primary goal is to explore “authentic learning environments” that both support and benefit from the research components. Graduate and undergraduate students were competitively recruited from participating U.S. campuses. As part of the application process, students were asked to prepare a research study outline for which they would gather data and information during a two-week trip to The Netherlands. The interdisciplinary 2016 summer cohort of eleven had a wide variety of research study plans since the group spanned four universities and participants ranged from undergraduates to some near completion of PhD dissertations. Each student was mentored by a faculty member at their respective university. The first test of this educational model seems to be very successful. U.S. students departed from Houston on May 21 and returned two weeks later on June 4. The trip was a great experience, especially speaking directly and individually with Dutch Professors, engineering practitioners and visiting most of the large Dutch flood control projects. Very few U.S. students experience this kind of international research exposure.

Each of three JSU students on the trip are enrolled in a three-hour Independent Research graduate course for the summer. Their individual research reports at the end of the summer will constitute the final report for the NSF PIRE trip and the research conducted in support of that trip. JSU students valued the trip highly, the interactions with Dutch students, engineers and practitioners, and the opportunity to view and assess major Dutch flood control projects and to learn how another country and culture deals with flood challenges.