EVALUATION OF HYDRODYNAMIC EFFECTS OF WATERWAY RESTORATION ON AN ESTUARINE ECOSYSTEM

***Megan Kramer**, Mauricio Arias*
University of South Florida, Tampa, FL, USA

Estuaries are hydrodynamically complex for they are influenced by tidal forces, freshwater flows, salinity variations, and often intricate coastal land morphology. Furthermore, many estuaries are subject to constant anthropogenic stresses due to dense coastal populations, which are expected to be exacerbated by changing climate trends. The 1,800 home residential Manchester Waterway community located in Charlotte Harbor, Southwest Florida, is interested in improving boat access by restoring a previous connection between the local waterway and the harbor, separated by a barrier peninsula. The proposed connections aim to reduce boat traffic and travel time through the waterway, which would result in environmental benefits such as reduced fuel consumption, erosion, and air pollution. Additional benefits include improved emergency response time and more recreational opportunities. This study evaluates how connectivity and coastal land morphology influence flow patterns by modeling the effects of the proposed restoration project on water movement between Manchester Waterway and Charlotte Harbor. An unstructured grid, 3D model was developed utilizing Delft3D Flexible Mesh to simulate estuary hydrodynamics under three different connectivity scenarios for both normal and extreme weather conditions. Elevation and model boundary data for Charlotte Harbor were gathered from NOAA and USGS databases. High resolution bathymetry and water level data were collected during field visits within the Manchester Waterway for model calibration and validation using sonar and installed level logger devices, respectively. Results will be compared to current flow patterns to analyze changes in water levels, flow speed and direction, and salinity. As this project is a community driven effort, research findings are regularly communicated with the Manchester community. Model simulation results will aid local decision making for the future of the waterway, and also improve understanding of the major influencing forces in intricate estuarine environments and how these ecosystems may respond to human activities and climate projections.

PRESENTER BIO: Megan Kramer is a second year PhD student in the department of Civil and Environmental Engineering at the University of South Florida. Her research is focused on addressing issues related to coastal sustainability, coral reef restoration, and international development.