

Engineering With Nature

Project Fact Sheet



Title

Wave attenuation of coastal mangroves during extreme water levels at near prototype scales

Background

A number of field investigations have documented wave and surge attenuation by coastal mangrove ecosystems. These studies generally focus on low-energy environments or rely on post hoc observation studies following storms, leading to limited measured data supporting the flood risk reduction benefits of mangroves during extreme events. Due to the unpredictable nature of storm development and difficulty maintaining instrumentation during high-energy energy events, the laboratory offers a controlled environment for systematically assessing the contribution of mangroves to flood protection. However, past laboratory studies of mangroves are generally small scale (e.g., 1:16), and tests at near-prototype scales are critical to gain a better understanding of their performance for feasibility evaluations and incorporation into USACE projects.

Objectives

The objectives are quantify the effects of mangroves on extreme waves and water levels while minimizing scaling impacts.

Approach

In collaboration with Drs. Tori Johnson and Anna Wargula at the U.S. Naval Academy, this research would utilize the 3-m flume, the largest wave flume at ERDC, to explore the wave attenuation afforded by mangrove systems at extreme water levels at near prototype scale (estimated 1:6).

Outcomes

The outcomes of this work include a comprehensive dataset examining the contribution of mangroves to flood protection, specifically their effect on waves and water levels. Additional products include an ERDC Technical Report, professional video production for outreach, a concise communication document for dissemination within the USACE, and a journal article to the broader coastal sciences community.



Mangrove trunk-prop root system in Key West, FL.



Photograph of ERDC 3-m wave flume.

Points of Contact: Mary Bryant and Dr. Duncan Bryant
Mary.Bryant@usace.army.mil, Duncan.Bryant@usace.army.mil
601-634-2074, 601-634-3898