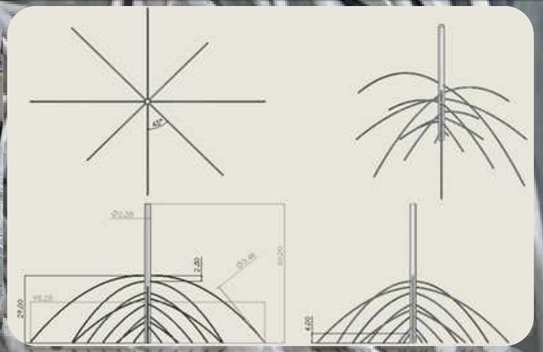
Mangrove Forests for Flood-Risk Management

PROBLEM

- What are the engineering benefits/protective functions of mangroves?
- How should mangroves be represented in existing models?
- How can mangroves be included in future designs?

SOLUTION

- Determine the attributes of mangroves in the US
- Quantify the flood reduction benefits of coastal mangrove systems
- Transition data collected in laboratory measurements into design tools



IMPACT

- Design implementation may reduce coastal storm impacts
- Potential cost savings in maintenance when applied to green/grey infrastructure

- Roughly 500,000 acres of mangroves span Florida coastlines
- During Hurricane Irma, an average of $3,000 in risk reduction benefits were provided per acre of mangroves in front of coastal infrastructure[1]

[1] Narayan, Siddharth & Thomas, Christopher & Matthewman, Joss & Shepard, Christine & Geselbracht, Laura & Nzerem, Kechi & Beck, Michael. (2019). Valuing the Flood Risk Reduction Benefits of Florida's Mangroves.

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WHAT'S NEXT

By evaluating the sediment processes through mangrove forests we aim to inform coastal protection designs that will reduce sediment loss

Oregon State University

APPLICATIONS

- Supports EWN mission of utilizing natural resources to maximum benefit by evaluating mangrove's protective features
- Physical model results can be integrated to inform numerical models and design tools for District use

STATUS

- 72 laboratory tests completed, with results translated to numerical simulations
- Quantifying Storm Protection Benefits of Coastal Mangroves: https://ewn.erdc.dren.mil/?page_id=350
- Tech Note – Engineering With Nature: The Role of Mangroves in Coastal Protection

BENEFITS

- Broaden economic and environmental benefits
- Reduce levels of maintenance following implementation
- Quantify ecological and engineering services of mangroves, adding future value
- Extend design life and cost savings when utilized to protect existing grey infrastructure