Engineering With Nature ®

Quantifying the Benefits of NBS Through Numerical Modeling

MOTIVATION

Nature-Based Solutions (NBS) are increasingly being implemented in coastal management projects, but no standardized methodology exists to quantify the benefits associated with NBS. As a result, there is limited guidance to aid in the optimization of NBS performance, resiliency, and cost effectiveness. In this project, coastal numerical models will be used to quantify the hydrodynamic and financial benefits provided by NBS (specifically reefs, wetlands, and islands).
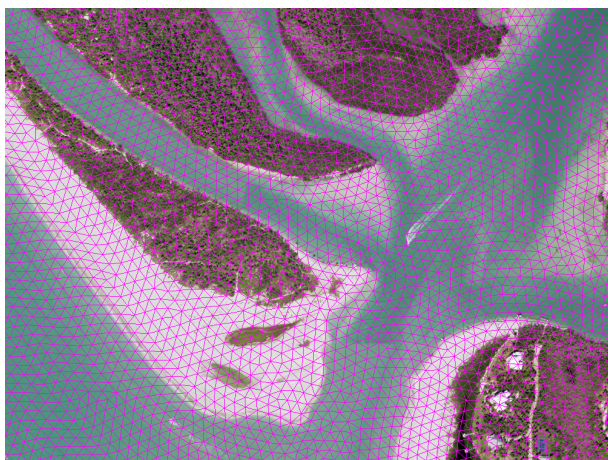
METHODOLOGY

An array of scenarios will be modeled for each feature type for a range of scales and coastal environments to compare differences in water level and wave responses caused by the feature characteristics under extreme events. Various numerical models will be applied to assess the hydrodynamic responses of the test cases, and life cycle risk assessment models will be used to determine the financial benefits associated with the features. This will enable the determination of performance and cost-based benefits of the varying feature designs. The alternatives will be compared with gray infrastructure designs that provide similar benefits to determine the cost benefits of employing NBS versus traditional flood protection measures. Findings will be used to develop general guidance or recommendations to inform future NBS planning and design.

IMPACT

If successful, this project will produce guidance to enable more efficient planning and design of NBS by coastal engineers and practitioners to optimize flood protection capability and maximize cost effectiveness, leading to increased buy-in and implementation of NBS while potentially saving millions of dollars in construction, maintenance, and flood damage costs.

DELIVERABLES

Comparisons of the model results will be collated and synthesized to produce general guidance regarding the design and implementation of NBS features. This guidance and all relevant information about the test cases and benefits analysis methodology will be made available in a series of reports published upon completion of the project.

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