

BARBADOS COASTAL RISK ASSESSMENT AND MANAGEMENT PROGRAMME

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OVERVIEW

Monitoring of coastal environments is critical to understanding the responses of the natural environment to human interventions. The ability to definitively attribute impacts to a development versus those which are part of the natural variation of a dynamic system is a valuable tool to understanding the successes and failures of coastal zone management planning.

The Coastal Zone Management Unit of the Government of Barbados (CZMU) undertook the Coastal Risk Assessment and Management (CRMP) project to define the baseline conditions and risks for the entire coastline of Barbados in order to have this comprehensive database upon which to base future decisions and coastal planning.

This paper will focus on three of the nine baseline studies and the unique approaches used, and challenges encountered, along the way.

COASTAL WATER QUALITY STUDY (CWQS)

The CWQS used a combination of direct field measurements, numerical modeling, and use of algae and gorgonian based bio-indicators to indicate water quality trends. This novel approach was able to identify areas impacted by episodic versus chronic nutrient loading conditions which would not have been possible with direct measurements alone. This information is vital to understanding coastal zone health, which impacts coral reefs, sediment production and the resiliency of the shoreline. The information also permits appropriate planning and decisions to support future mitigation efforts.

NEARSHORE WAVE STUDY (NWS)

The NWS defined wave climates at 40 locations around the island using a Mike21SW model calibrated with over 200 datasets from 50 unique locations. Oceanographic currents were particularly difficult to resolve, yet have a significant impact on nearshore wave heights. Current-induced variations in the nearshore wave conditions were found to cause variations up to 100% in the wave heights, as a result of large scale current-induced refraction in the coastal waters. Additional challenges to this measurement and modeling program included sustained currents over 3 knots to depths in excess of 80 m.

SHORELINE CHANGE STUDY (SCS)

The SCS used historical beach profile data, historical aerial photography, sediment constituent analyses, and a package of Mike21 SW/FM/ST modeling to assess sediment transport and long-term changes to shorelines and beach forms. The SCS included impacts from climate change and assessed the resilience of beaches and coastlines to future storms and sea level rise.

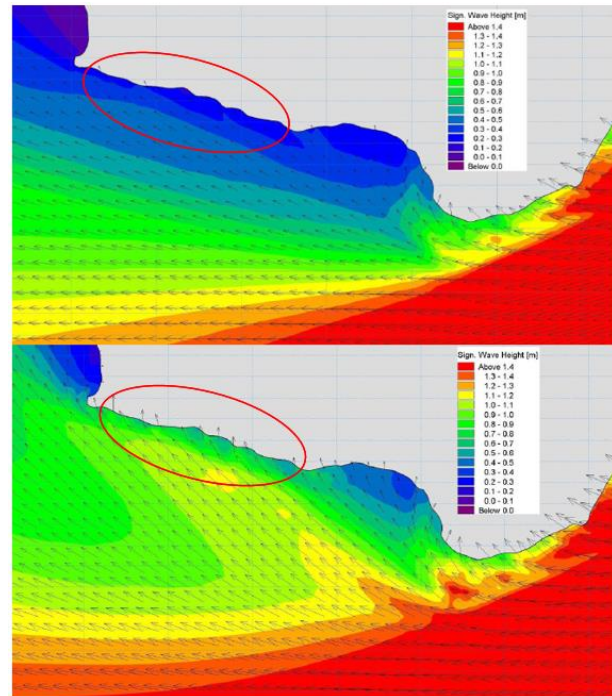


Figure 1 Significant Wave Heights without (top) and with (bottom) current effects

The CRMP has provided Barbados with one of the most advanced understandings of the coastal environment in the Caribbean or for any small island developing state. The data from the CRMP will provide the basis for decades of future assessments and planning initiatives.