

BARBADOS NATIONAL COASTAL RISK INFORMATION AND PLANNING PLATFORM A SOFTWARE SYSTEM FOR HAZARDS, VULNERABILITY & RISK

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OVERVIEW

The Barbados National Coastal Risk Information and Planning Platform (NCRIPP) is a study nearing completion to quantify coastal risk and develop a software system to serve this information country-wide. The NCRIPP follows extensive coastal baseline studies and includes assessment of eight hazards, vulnerability assessment and finally a risk assessment. The software platform is a cloud-based system that includes a large catalogue of assets, hazard overlays, and the ability to calculate damages, and mitigation alternatives.

HAZARD ASSESSMENTS

The first stage of the NCRIPP was to undertake hazard assessments defining return period events for several hazards, including: hurricanes, storm surge, rainfall induced flooding, tsunamis, shoreline erosion, and oil spills. Additional hazards that were studied, which were not coastal-specific included landslides and seismic hazards. Climate change was also considered as a contributing factor in many of these hazards.

Several innovative methodologies were used for the hazard studies, including development of hurricane climatology using a Monte Carlo method with spatially varied hurricane parameters. This method resulted in the generation of thousands of synthetic hurricane events which could be used for wind assessments or for further modeling activities.

Storm surge and wave modeling were undertaken by first screening the hurricane winds through approximate wave and surge modeling approaches. After screening the storms, selected storms were identified for further detailed modeling, using a wide range of numerical models. Hazard mapping was then produced for each of the different hazards; this information was a primary input into the NCRIPP software system. The study included many numerical models for waves, surge, runup, overtopping, overland flooding and oil spill modeling. With many hazards to assess and an island-wide study, it was necessary to develop practical and effective tools for the Barbados coastal environment.

VULNERABILITY AND RISK

National assets including the building stock and many other emergency services and infrastructure were catalogued and their vulnerability to different hazards was identified. This vulnerability assessment could be used for future emergency planning, as well as for leading into the risk analysis. The risk assessment focused on

determining the financial damages that resulted from various hazard events. This was generally completed at a structure level and involved applying damage functions to each structure in Barbados and defining the damage for each event. Damage values were tabulated on a one-hectare grid throughout Barbados to facilitate mapping of the financial damage. Damage maps are available for multiple hazards and multiple return periods; these were compiled into a Risk Atlas, which also included mapping the annual expected damage from all of the hazards.

SOFTWARE PLATFORM

The detailed analysis, modeling, and mapping of hazards was combined with vulnerability and risk and incorporated into an enterprise level geo-database application that is being rolled out for the Government of Barbados. This system will allow coastal planners and emergency response planners to review information and operate in an environment where all the critical infrastructure and hazard information is available. The software system allows for "what-if" analysis and investigation of mitigation approaches.

The Barbados NCRIPP system represents an integrated system for assessing coastal hazards, exposure, vulnerability and risk. It also provides a manner to bring all this information to groups including emergency response personnel, planners, coastal regulators and others. The Barbados NCRIPP system represents a prototype that could serve many small developing island states in their effort to respond to climate change and developing resilient solutions.