

## **ISLAND-WIDE FLOOD HAZARD RISK MAPPING AND ASSESSMENTS IN GRAND BAHAMA**

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Grand Bahama is characterized by numerous low-lying and coastal areas that are highly vulnerable to various forms of flooding, including storm surges, heavy rainfall, and tidal inundation. Situated within the Atlantic hurricane belt, Grand Bahama is particularly susceptible to tropical storms and hurricanes during the Atlantic hurricane season. These meteorological events, marked by intense rainfall, formidable winds, and storm surges, contribute to extensive flooding and consequential property damage. To comprehensively assess the existing coastal flood hazard risks and evaluate the potential impacts of a proposed concept, Applied Technology and Management (ATM), a Geosyntec Company, conducted island-wide mapping efforts focused on coastal storm surge and wave risks.

The methodology involved numerical modelling of historical and theoretical storm events, statistical analyses, analytical wave estimates, and mapping techniques. The ADvanced CIRCulation (ADCIRC) hydrodynamic model simulated storm surges using hurricane wind and pressure fields derived from the Holland parametric model. These fields were calculated using input data, including the storm track and characteristics obtained from the National Hurricane Center database. Subsequent analysis utilized an extreme value analysis (EVA) statistical technique to determine the frequency relationships, specifically for 25-, 50- and 100-year return period surge values. The impact of waves was considered using simplified analytical methods based on depth-limited wave breaking and the depth of storm surge at specific locations. The resulting storm wave heights, atop the storm surge, were integrated to produce the final flood elevation results. The generated flood data was transformed into raster layers for use in Geographical Information System (GIS). This comprehensive approach enhances the understanding of coastal flood hazards and provides crucial insights for informed decision-making and mitigation strategies.

PRESENTER BIO: Dr. So is a water resources and coastal engineer at Applied Technology and Management, a Geosyntec company. He possesses extensive experience in statistical and time-series analysis, field data collection, as well as expertise in storm surge, sediment transport, flood inundation, marina flushing, and water quality modeling.