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Projecting the Current & Future Impact of Storm Surges on Coastal Flood Extent at Pigeon Point, South-West Tobago, through Hydrodynamic Modelling Analyses

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Under climate change, sea levels will continue to rise and the intensity of tropical storms and hurricanes will amplify. Consequently, the incidence rate of high magnitude storm surges may increase which will enhance the probability of coastal flood events in low lying coastal communities. The purpose of this study is to determine the current and potential future areas that may be at risk of flooding from storm surges, of different magnitudes, for the low lying Pigeon Point area of south-west Tobago. The objective of this research is to develop an understanding of the extent of flooding that these events can ensue on low lying coastal areas that are widespread through the Caribbean under current and future sea level conditions. A two-dimensional hydrodynamic flood model was created for Pigeon Point using the model code LISFLOOD-FP by incorporating topographic data of the terrain and sea bed referenced to mean sea level together with tides. This was used to assess the impact of different storm surge levels on the study area. Storm surge scenarios were computed using information acquired from the Saffir-Simpson hurricane scale which provides an estimate of storm surge height based on the category of hurricane, existing projections of global sea level rise and recorded values of high tide for Pigeon Point. Results indicate that the quantity of area likely to flood, in each surge scenario, increases significantly under future projected global sea level conditions compared to current conditions. The potential implications of this on the local population, island's economy and beach geomorphology are examined. Results obtained were incorporated into a Geographic Information System (GIS) to produce current and future flood maps indicating potential inundation extent based on storm surge height to guide coastal flood management programmes in south-west Tobago. We conclude that greater focus should be placed on implementing flood mitigation measures to protect our coasts and coastal communities from the increasing impacts of coastal flood events under climate change.