

ASSESSING AND MONITORING COASTAL EROSION IN WESTERN PUERTO RICO FOLLOWING HURRICANE MARIA: A CASE STUDY

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Puerto Rico's shoreline is experiencing severe and persistent erosion due to extreme weather events such as hurricane Maria, a category 4 hurricane which made landfall on September 2017 and large ocean swells from North Atlantic Winter Storms. These extreme weather events, which are becoming increasingly common, combined with sea level rise and anthropogenic factors, pose a threat to the well-being and economy of coastal communities, a large portion of the island's population. In order to determine the factors that lead to coastal erosion and the magnitude of their impact, it is essential to establish a baseline and monitor coastal erosion. This research gages the impact Hurricane Maria had on the West Coast of Puerto Rico and provides a longitudinal study of shoreline position in this coastal region. The researchers selected four coastal sites that met the following criteria: are currently experiencing coastal erosion when compared to historic documents and are located in the west coast of Puerto Rico. The four coastal sites selected were Crash Boat in Aguadilla; Jobos in Isabela; Villa Cofresí in Rincón; and Playuela, in Cabo Rojo. The first phase of the project included delineating the shorelines for the years 1930, 2010, 2016 and 2017 using the commercial software ArcGIS. The second phase of the project included compiling pre hurricane Maria images that were obtained by deploying Unmanned Aerial Vehicles (UAV) and traditional Remote Sensing methods. A Voxel Imaging developed layer of Puerto Rico after Hurricane Maria was used for pre/post comparison. UAV, Voxel Imaging layer and historical images were combined and analyzed to determine historical trends of these beach sites and Hurricane Maria's impact on them. Results were produced using the Digital Shoreline Analysis System application for ArcGIS. The results indicate the erosion was present at the following sites: Crash Boat with Net Shoreline Movement from Hurricane Maria of -37.296m, Jobos with -3.336m, and Villa Cofresí with -3.507m. Accretion was present at Playuela with NSM of 1.091m. This longitudinal study concludes that significant coastal erosion occurred in Villa Cofresí, Playuela and Jobos between 1930 and 2010. It also concludes that further erosion occurred at Villa Cofresí and Jobos between 2010 and 2016. This research contributes to the body of research by expanding the literature that supports usage of UAVs in coastal monitoring programs and emergency management. By using UAVs, researchers and disaster management teams can obtain valuable information and data, in a timely and economic manner, with minimal risk to coastal communities. Future work should concentrate on the implementation of systematic use of UAV technology in coastal research projects, coastal resiliency and disaster management.