

Rincon, Puerto Rico Shoreline Change Study

SUMMARY:

The aim of the project is to survey the shoreline position between Punta Higüero and Punta Cadena along the west coast of Puerto Rico and compare the results to the most recent GPS-based survey conducted in 1994. Thieler et al. (1995) used the 1994 field survey data, along with analysis of historical shoreline positions from aerial photography, for a comprehensive shoreline change analysis. Their results indicated large areas of severe erosion (up to 3.0 ± 0.2 m/yr) and dramatic changes in nearshore and coastal sedimentation, likely due to the marina construction at Punta Ensenada (Thieler et al., 1995; Fig. 11). The proposed GPS-based survey of the most recent shoreline position will evaluate the shoreline change trends along this section of the coast over the past eleven years, and assess the effects of the Punta Ensenada marina on the downdrift shoreline.

INVESTIGATORS:

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DESCRIPTION:

Historical and the most recent shoreline positions will be entered into a GIS database and superimposed on an aerial photo-mosaic of the west coast of Puerto Rico between Punta Higüero and Punta Cadena. This information, together with field site photographs, will constitute an integral part of the report on shoreline change analysis. Shoreline change data will be archived at the USGS Data Library for future access. The results of shoreline change analyses and accompanying maps and photographs will be formally published as a USGS Open-File Report and will form the basis for future publication in a peer-reviewed technical journal.

START DATE OF PROJECT:

October 1, 2005

END DATE OF PROJECT:

September 30, 2006

TOPIC:

Coastal Erosion Assessments and Loss Reduction Products

APPROACH:

The shoreline survey will be accomplished by walking a backpack-mounted Ashtech RTK GPS system along a shore-parallel wet/dry line. We will also run several shore-normal GPS traverses to obtain topographic profiles at representative locations along the coast. The profiles will begin at upland locations behind the beach, and extend to wading depth in the swash zone. The survey system will include z-surveyor dual-frequency receivers with data logging at 1 Hz. Post-processing of RTK solutions will be performed with Ashtech PNAV program to maximize the positioning solutions to 2-3 cm range. Digital photographs documenting the survey methodology and key coastal features will complement the survey.

IMPACT/RESULTS:

The results of the shoreline survey will be used to construct a geo-referenced shoreline position to be used for comparison with previous surveys and historical shorelines derived from aerial photographs. Specifically, we will calculate rates of shoreline change over the time period 1950-2005. Rates of shoreline change will be computed at 50 m intervals along the coast using the Digital Shoreline Analysis System (DSAS), Version 3.0. (Thieler et al., 2003). The DSAS computes rates of shoreline change using several different analytical techniques, including end-point rate, least squares regression, and weighted least squares regression. Statistical output will be evaluated and the most appropriate rate of change statistic(s) will be used. Shore-normal profiles will be used to characterize the morphology of coastal compartments. The field data and shoreline change analyses will be compiled in a report to the local government of Rincón (published as a USGS Administrative Report).