EVALUATION OF CHANGES IN BEACH MORPHOLOGY ALONG THE LOUISIANA BARRIER ISLAND COAST

L.D. Nakashima[1]

ABSTRACT

The Louisiana coast has been documented as the fastest eroding shoreline in the United States. Rapid submergence and high beach erosion rates are the dominant responses to the seasonal wave climate, storm impacts, sea level rise, regional subsidence, and human activities. The cumulative impacts from three hurricanes, which made landfall in Louisiana in 1985, and Hurricane Gilbert of 1988 produced extreme beach erosion. The magnitude of these effects was expressed in the cross-shore morphology which was transformed from a wide backbarrier marsh — dune terrace/continuous dune — wide backbeach — beach system to a narrow backbarrier marsh — washover sheet/washover terrace and beach. The effects from Hurricane Gilbert ensured retention of this latter cross-shore morphology. These events therefore provided a unique opportunity to monitor the geomorphic response and recovery of the different subenvironments composing these barrier island beaches.

A network of 41 beach profile lines was established in 1985 along straight and curved segments of eroding barrier island coast between Isle Dernieres and Sandy Point. The surveys preceded the 1985 hurricanes and were conducted quarterly through 1988. Efforts were made to quantify the cross-shore variability of beach response in each shoreline segment by analyzing linear and net volumetric changes of the beach profiles.

Results indicate that the morphology of the barrier island coast has not fully recovered from the initial impacts of the 1985 hurricanes. Net erosion and shoreline transgression have been persistent throughout the barrier island systems without exhibiting any systematic variations in linear shoreline change. Any volumetric gains were minimal and they were related to deposition in eolian, washover deposits, the equilibrium position of the beach face was still eroding landward of its former location. This increase in sediment volume, leading to the development of dune and washover terraces, frequently coexisted with beach retreat, therefore indicating that variations in beach morphology are not linearly related to net volumetric and net linear changes.

[1]Louisiana Geological Survey, Box G, Louisiana State University, Baton Rouge, Louisiana 70893. Present address: Woodward-Clyde Consultants, P.O. Box 66317, Baton Rouge, Louisiana 70896