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Sediment budget analysis for sustainable shoreline protection and management

Saviour P Udo-Akuaibit
University of Port Harcourt, Nigeria

An intensive field investigation on the application of sediment budget analysis for sustainable shoreline protection and management was carried out at the updrift and downdrift shoreline adjoining Qua-Iboe River estuary, south-east coast of Nigeria. The study employed variations in beach volumes within a 500 m-littoral cell of sediment compartment, based on daily beach profile surveys, measured over a neap-spring tidal cycle at the shoreline, as the fundamental tool for the analysis. A comparative analysis of the results of short-term beach profile morphologic changes at the shoreline depicted the updrift beach as the sediment source and the downdrift counterpart as the sink. A sediment budget deficit of 1498 m³ per day with an annual sediment budget of 546770 m³ estimated for beach nourishment, due to erosion traced to storm surge incident at the shoreline in 2011, was recorded at the updrift beach. However, result of the downdrift shoreline which revealed a budget surplus of 11190m³ per day with an annual budget estimate of 4084350 m³ was attributed to massive deposit of sediment on the beach. The estimated volumes of sediment in this report were calculated based on a new sediment budget equation: $-(\sum Q_{source} - \sum Q_{sink}) - (R_v \times L) = \text{Residual}$; using local variables, inspired, adapted and modified from sediment budget analysis equation: $\sum Q_{source} - \sum Q_{sink} - \Delta V + P - R = \text{Residual}$ of Rosati and Nicholas (1999) and Rosati (2005). One of the benefits of the new sediment budget equation is the inclusion of sustainability factor ($R_v \times L$) in the equation for efficient and sustainable shoreline protection and management.

Biography

Saviour P Udo-Akuaibit has just defended his MSc Dissertation at the age of 40 years from University of Port Harcourt, Nigeria. He had a Bachelor of Science Degree in Geology and a Post Graduate Diploma in Integrated Coastal Zone Management from the University of Calabar, Nigeria. He has co-authored 6 papers in reputed journals and currently serving as the Editor-in-Chief of the Natural Environment Magazine- a Publication of Graduate Students of Institute of Natural Resources, Environment and Sustainable Development, University of Port Harcourt, Rivers State, Nigeria.

udo.saviour@ymail.com