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SHORELINE CHANGE IN ACCRA, GHANA: PAST, PRESENT AND FUTURE

Modelling shoreline change has enabled future trends in shoreline positions to be investigated in greater detail through numerical modelling. This has become increasingly important given the dramatic increase in coastal development globally and the threat of future sea level rise to coastal investments. Shoreline rates of change information has influenced coastal policy formulation and enabled development of sustainable coastal management practices worldwide. Such information can be used to improve coastal management and planning since it enables future risks to be established, revealing likely social and economic implications.

Numerous studies have reported inconsistent and varied rates of change ranging between 1.5 and 15 m/yr in Ghana's Accra shoreline, a data starved nation. This has resulted in the lack of effective and sustainable management of the coastal resources. The objective of this study was to predict future erosion rates in the Accra shoreline accounting for climate change scenarios.

Different modelling techniques were combined to estimate historic shoreline recession rates and quantify identified uncertainties. Shoreline data from Ghana of 1904, 1974, 1996 and 2002 were used to estimate the historic rate of recession in the Accra region. Linear regression statistical method was used for the long-term shoreline trend analysis. Orthogonal transects, cast automatically at 100 m intervals from the established on-shore baseline, intersected the four-shoreline positions, which was used by the system to fit the best regression line at 95% confidence interval. The results obtained, together with measured wave and tidal climate data, fed a numerical model which simulated the emergence of soft rock shore profiles over timescale of decades to centuries, to predict future positions of the Accra shoreline for the next 250 years under different scenarios of climate change.

The study results indicate that the average historic rate of erosion in the Accra region was 1.13 m/yr. The rate of change information has provided a reliable database for the Accra coastal zone management. This study, for the first time in the history of the Accra coastal zone, has statistically quantified the shoreline erosion of the Accra coast, and used the results to estimate how recession will develop in future. It has demonstrated that significant ecological, economic, social and national losses should be expected within the next Century. The research has demonstrated that shoreline rate of change analysis can be undertaken for developing countries with limited shoreline data.