

Simulation of cross shore beach change to episodic storms

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Globally, coastal communities are becoming increasingly exposed to a wide range of potential hazards including shoreline retreat and coastal resource degradation. Significant coastline retreat can occur in a short period of time due to episodic storms endangering people, property and thus defining the local susceptibility to erosion.

The problem is heightened by rapid urbanization and the human induced beach changes which affect coastal processes. The lack of proper long term prediction and planning tools as well as lack of basic disaster warning mechanisms makes the situation daunting.

This study therefore investigated the vulnerability of the coast to periodic extreme wave events using models and estimated erosion prone area widths using the American EPA guidelines. Simulation using the SBEACH model was employed for estimating coastal vulnerability to storms. Beach fill options were also tested to determine the most effective approach to reduce vulnerability of the coast. Problems related to beach profile response during storms, seasonal changes in profile shape, and the influence of water levels on profile evolution were conveniently predicted through simulation of potential storms.

The findings of this study revealed that beach fill options as a method of reducing coastal vulnerability provided only a short term protection hence revealing retreat as the best option. It was also found out that beaches with medium sized sediment were highly vulnerable to storms. Information gathered from this study is significant for developing pragmatic coastal environment policies for sustainable management of the coastal areas. It also provides a framework for developing coastal projects, identifying problems and appropriate solutions, evaluating alternative designs, and optimizing the selected design to reduce human vulnerability.

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