A GIS framework for probabilistic modelling of coastal erosion and flood risk

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In: PIANC COPEDEC VIII, 20-24 February 2012, India. (2012)

Abstract: The Coastal Zone is a complex and dynamic environment that is often highly developed with valuable property and businesses located within close proximity of the coast. Beaches can vary rapidly over time; their dynamic nature ultimately influencing the risk of coastal erosion and flooding of the Coastal Zone. Traditionally, deterministic models are used to investigate the evolution of the shoreline. Occasionally the results from one model are used as input to a complimentary model. Such approaches can be time consuming and tend to be used to explore a small number of predefined scenarios over short spatial and temporal scales. Probabilistic approaches can be employed to explore the potential outcomes that may occur due to natural variability in the climatic or stochastic forcing conditions. Such approaches allow the Coastal Zone Manager to understand the uncertainty associated with any management intervention that may be undertaken. By coupling chains of nearshore probabilistic models together it is possible to explore the potential impact of uncertainty on downstream processes. This paper presents a generic GIS based framework for integrated modelling of the coastal zone and presents a recent application of the framework to perform coupled probabilistic coastal evolution modelling.

Item Type: Conference or Workshop Item (Paper)

Subjects: Coasts > Coastal erosion and flooding
Coasts > General

ID Code: 600

Deposited On: 18 Dec 2012 12:39

Last Modified: 18 Dec 2012 12:39