Tidal wetlands as ecosystem-based adaptation to coastal flood risks

Rebecca Van Coppenolle, Christian Schwarz and Stijn Temmerman

University of Antwerp, Universiteitsplein 1 C.032, 2610 Wilrijk, Belgium
E-mail: rebecca.vancoppenolle@uantwerpen.be

Coastal hazards are realities to coastal communities around the world; coastlines and their human settlements face increasing threats due to climate change, such as increasing cyclone intensity or rising sea-level. Traditional coastlines protection structures are mainly engineering structures in need of costly maintenance and adaptations and whose ability to endure will be challenged by climate change induced events. Over the past years and in some regions, the use of preserved or restored coastal habitats, such as tidal wetlands, have been developed, often in complement to more hard engineering structures, to protect populations and economic assets from coastal hazards. This approach, defined as an Ecosystem-based management, relies on the ability of vegetation to attenuate storm surge flood levels, wind waves and shoreline erosion and to adapt by sedimentation to the sea-level rise in addition to other valuable ecosystem services.

Our study investigates a specific aspect of the Ecosystem-based management approach, namely the ability of salt marshes and mangroves to reduce storm surges, by comparing the consequences of its presence in the world's most populated deltas. We investigate these consequences using a GIS model that assesses the potential reduction in surge height due to presence or absence of coastal vegetation and that highlights areas potentially eligible for tidal wetlands restoration. The Ganges-Brahmaputra delta in India and Bangladesh is used as a case study to present initial insights on the implications of Ecosystem-based management on a large spatial scale.