

WADSnext! morphodynamic modelling tools for the sustainable management of barrier coasts

While coastal management strives for sustainable management of barrier coasts, the required knowledge basis is still incomplete. The morphodynamics of barrier coasts, and particularly the interaction among the various inlets, are not yet understood. Sustainable management is further complicated by climate change and human intervention as well as conflicting interests (economy, coastal safety, ecology).

The WADSnext!-project aims to explain the long-term morphodynamic development (over decades to centuries) of the inlets and back-barrier basins in a mesotidal barrier coast displaying its inherent dynamics and further subject to environmental and anthropogenic changes. More specifically, we investigate the influences of storm-induced breaches and the geometry/topography of the back-barrier basin. To do this systematically, we adopt a morphodynamic modelling approach, choosing appropriate levels of detail for the physical processes and geometry/topography. This results in a computationally efficient aggregate-scale model of barrier coast dynamics. Validation will be done by comparison with historical data, existing empirical relationships and other observations. The innovation of this project lies in its focus on inlet interaction, the applied modelling techniques (stochastic, aggregated-scale) and its integral, long-term approach.

Results indicate that storm-induced breaches have a larger chance at survival if the barrier coast is not yet saturated, the breach is far away from an existing inlet, and the breach has a large width. The effect of basin geometry appears to be that inlets tend to cluster near the wider part, and less in the narrow part of a basin.