

## Physical and Morphological Response to Land Reclamation Projects in a Wave-Dominated Bay

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**Abstract :** Land reclamation from the ocean has considerably increased over past decades to support worldwide rapid urban growth. Reshaping the coastline, however, inevitably affects coastal systems. One of the main challenges for coastal oceanographers is to predict the physical and morphological responses for nearshore systems to man-made changes over multiple time-scales. Fully-coupled numerical models are powerful tools for simulating the wide range of interactions between flow field and bedform morphology. Restricted and inconsistent measurements, combined with limited computational resources, typically make this exercise complex and uncertain. In the present study, we investigate the impact of proposed land reclamation within a wave-dominated bay in New Zealand. For this purpose, we first calibrated our morphological model based on the long-term evolution of the bay resulting from land reclamation carried out in the 1950s. This included the application of sedimentological spin-up and reduction techniques based on historical bathymetry datasets. The updated bathymetry, including the proposed modifications of the bay, was then used to predict the effect of the proposed land reclamation on the wave climate and morphology of the bay after one decade. We show that reshaping the bay induces a distinct symmetrical response of the shoreline which likely will modify the nearshore wave patterns and consequently recreational activities in the area.

**Keywords :** coastal waves, impact of land reclamation, long-term coastal evolution, morphodynamic modeling

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