The Effect of a Rise in Mean Sea Level on the New Plymouth Coastline: A GIS Investigation.

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Abstract

The world's sea levels are predicted, by the international scientific community, to rise anywhere between 0.18 metres to 2.2 metres by the year 2100, 87 years away. As a large portion of the population of both the World and New Zealand live by the sea, this prediction is of concern to those in its vicinity. With such a large range in the predicted sea rise level, a range of scenarios have been investigated to determine what effect the rising sea will have on the New Plymouth Coastline, its people, its properties and its places.

This study uses a GIS, in conjunction with property and census datasets, to investigate the areas of potential inundation that should be of most concern to our planners and local authorities. Using 3D models of the coastline and seabed and by projecting the predicted sea level rise onto the 3D model, an assessment of the value of property and numbers of people potentially affected was determined. Erosion / accretion are also considered in the investigation and modelled into the coastal topography of the New Plymouth coastline.

The key findings from this research are that there are areas of high value, high importance or population that are critically exposed to moderate levels of sea rise. Infrastructure such as Port Taranaki, The CBD, New Plymouth Airport and sewage systems are all greatly affected, whilst populations in Waitara and other populations close to river mouths are also at risk from a rising sea.

“Maps are like campfires – everyone gathers around them, because they allow people to understand complex issues at a glance, and find agreement about how to help the land.”

– Sonoma Ecology Centre, GIS/IS Program Web Site

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List of Abbreviations

3D	Three Dimensional
CD	Chart Datum
CTM	Coastal Terrain Model
DEM	Digital Elevation Model
DTM	Digital Terrain Model
FEMA	Federal Emergency Management Agency
GIS	Geographical Information System
HAT	Highest Astronomical Tide
IPCC	Intergovernmental Panel on Climate Change (IPCC)
LAT	Lowest Astronomical Tide
MHWN	Mean High Water Neaps
MHWS	Mean High Water Springs
MLWN	Mean Low Water Neaps
MLWS	Mean Low Water Springs
MSL	Mean Sea Level
NIWA	National Institute of Weather and Atmosphere
NPDC	New Plymouth District Council
RSL	Rising Sea Level
SAS	SAS
SWL	Still Water Level
TIN	Triangular Irregular Network
TRC	Taranaki Regional Council
LINZ	Land Information New Zealand