

RESILIENCE TO CLUSTERED DISASTER EVENTS ON THE COAST – STORM SURGE



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Coastal communities in Australia are particularly exposed to disasters resulting from the coincidence of severe wind damage, storm surge, coastal flooding and shoreline erosion during cyclones and extra-tropical storms. Because the climatic drivers of these events are stronger during or across specific years (e.g. during La Nina periods), they can repeatedly impact the coast over periods of weeks, months or up to a few years. The consequences of individual events are therefore exacerbated with little or no opportunity for recovery of natural systems or communities.

OBJECTIVE

This study will demonstrate how a methodology developed for clustered storm surge events can be applied to better inform decisions around resource investment in terms of disaster mitigation, planning and response and thereby optimise the resilience of the communities involved.



Storm surge damage from Cyclone Yasi, Tully Heads, February 2011



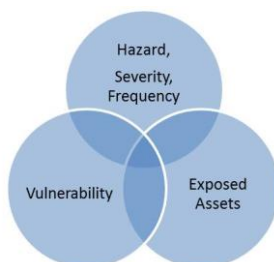
Beach erosion & storm surge washover, Tully Heads, February 2011

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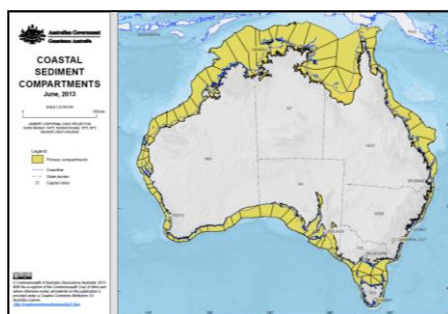
APPROACH

The project will combine two conceptual frameworks:

- the framework that quantifies risk as the product of severity and frequency of impact defined by hazard, vulnerability and exposure
- the framework of the coastal sediment compartment as the functional unit for modelling shoreline response to storm surge



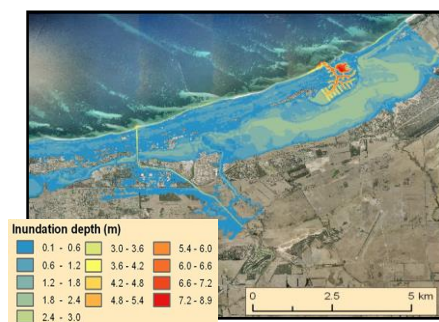
The risk framework considers the impact and likelihood of a range of potential events at a local and regional scale¹



Coastal sediment compartments span a hierarchy of spatial scales (primary & secondary) and enable nationally consistent shoreline response modelling²

METHODOLOGY

- Identify coastal landforms that are vulnerable to storm surge erosion
- Case studies at selected areas in southeast (NSW) and southern (SA) Australia
- Document geomorphic properties and shoreline history at study sites → aerial photos, beach profiles, ground penetrating radar surveys
- Model storm event clustering to define magnitude and frequency of potential erosion events
- Model storm surge inundation and shoreline response for clustered events
- Validate clustering model against field data
- Quantify impacts on coastal assets



Inundation modelling will utilise nearshore bathymetry and onshore topographic information



References

1. Middelmann, M.H. (Ed.) 2007. Natural Hazards in Australia: Identifying Risk Analysis Requirements. Geoscience Australia, Canberra.
2. Hazelwood, M. 2013. Primary and Secondary Coastal Sediment Compartment Maps. www.ga.gov.au