Key Topics:

- coincident events [2]
- flood [3]
- storm surge [4]

Resilience to clustered disaster events on the coast - storm surge [5]

The fundamental processes that cause erosion during storms are generally well understood and management strategies are available. However, the response of beaches to successive storms (storm clusters), such as those that damaged Australia's east coast in 1974, is not well understood or managed, with the response of any given beach depending on its physical characteristics. Because of this, the likely effectiveness of a given management strategy may not be clear, such as beach nourishment (a remedial process where sand is added to a beach to restore its shape). This project developed a methodology and demonstrated it through two case study sites, which had different oceanographic and geological settings. The methodology combined expertise in statistical modelling, hydrodynamics, coastal geology, hazard mapping and impact analysis. The project integrated these approaches to develop tools, information and methods that can be used by others nationally.

Project: detail Notabs

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Description

The fundamental processes that cause erosion during storms are generally well understood and management strategies are available. However, the response of beaches to successive storms (storm clusters), such as those that damaged Australia's east coast in 1974, is not well understood or managed, with the response of any given beach depending on its physical characteristics. Because of this, the likely effectiveness of a given management strategy may not be clear, such as beach nourishment (a remedial process where sand is added to a beach to restore its shape). This project developed a methodology and demonstrated it through two case study sites, which had different oceanographic and geological settings. The methodology combined expertise in statistical modelling, hydrodynamics, coastal geology, hazard mapping and impact analysis. The project, now concluded, integrated these approaches to develop tools, information and methods that can be used by others nationally.

In consultation with end-users, two case studies were selected: Old Bar on the New South Wales mid north coast (between Newcastle and Port Macquarie) and the Adelaide metropolitan beaches. These beaches were identified as key localities where erosion is an ongoing issue and where field studies and modelling would provide new insights into the problem.

Findings shows that for Old Bar, erosion and property loss are centred on a section of coast where sand cover is limited by shallow bedrock and offshore reefs. This means that the potential for natural beach recovery is hindered by a finite local sand supply, and modelling indicates that further shoreline retreat is possible. Other parts of the beach are more stable due to larger sand reserves onshore and offshore, as evidenced by sand dunes up to 200 metres wide. These findings support previous observations and are consistent with independent hydrodynamic modelling for Old Bar that shows erosion associated with a near-shore circulation cell under storm conditions.

For the Adelaide metropolitan beaches, erosion is managed effectively through an established beach-nourishment program. This project demonstrated that nourishment strategies could be fine-tuned and made more cost-effective by mapping beach thickness using ground-penetrating radar.

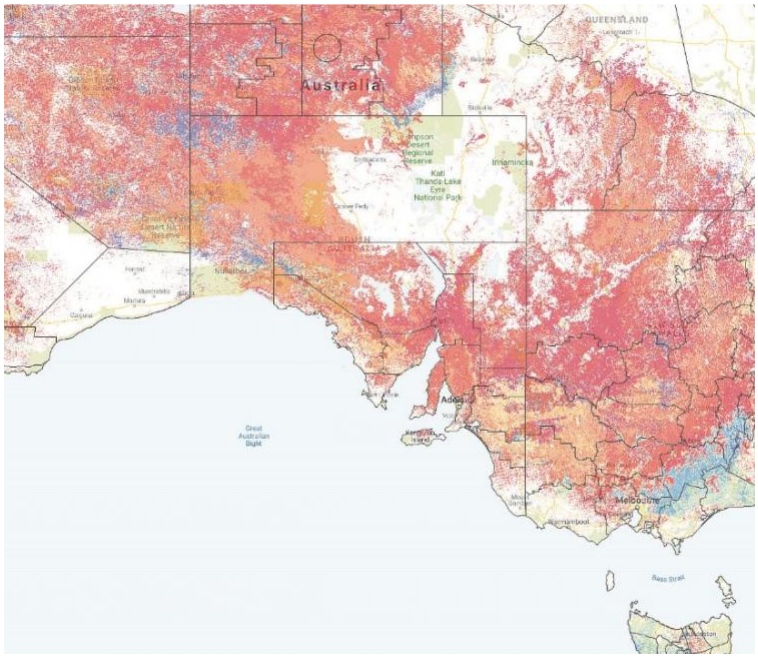
As part of the project's utilisation plan, a workshop was held with end-users in April 2017. The workshop focused on two aspects: the software that enables statistical modelling of storm events and the results from shoreline modelling at Old Bar. Feedback from end-users was centred on the value of improving on-the-ground knowledge regarding the processes driving coastal erosion at case study sites and the potential for end-users to make use of data and software modelling tools. While the modelling to date has focused on Old Bar in New South Wales, the South Australian end-users wish to compare the current beach management strategies with the modelling results and make changes if required. South Australian coastal managers are also planning similar studies for other beaches using the methodology showcased in this project. In New South Wales, the project results will be part of a broader conversation about how to manage the coastal erosion hotspot of Old Bar. For instance, the sub-surface investigations using ground penetrating radar are being used by the New South Wales Office of Environment and Heritage to re-assess hazard lines as it develops a coastal management plan for the area. For all end-users, seeing the data, methods and tools being published and made open source is a positive step towards enabling others to apply this method at other locations.

Related News

15 NOV 2018

New online – November 2018
EARTHQUAKE, MODELLING

[26]



13 SEP 2018

Preparedness measures on land and sea

COASTAL, FIRE

[27]

12 SEP 2018

Coastal erosion undercutting policy

COASTAL, RESILIENCE

[28]

24 APR 2018

Helping coastal managers plan better for future storms

COASTAL, RISK MANAGEMENT

[29]

17 NOV 2017

New online - November 2017

[30]

20 OCT 2017

Briefing to enhance policy

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[31]

16 AUG 2016

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[32]

23 MAY 2016

New online - May 2016

[33]

17 MAY 2016

Videos highlight research benefits

COASTAL, INDIGENOUS COMMUNITIES

[34]

12 NOV 2015

Coastal management update

COASTAL, STORM SURGE

[35]

17 JUN 2014

Go Einstein

COASTAL

[36]

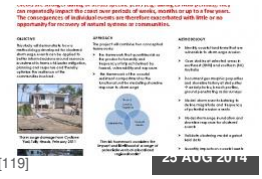
Publications

Year	Type	Citation
2018	Report	Nichol, S. [37] **Resilience to clustered disaster events at the coast: final project report** [38]. (Bushfire and Natural Hazards CRC, 2018). Google Scholar [39] BibTeX [40] EndNote XML [41]
2018	Thesis	Ramm, T. [42] **Improving adaptation planning for future sea level rise and coastal flooding** [43]. *Environmental Engineering* (2018). at <https://eprints.utas.edu.au/29624/ [44]> Google Scholar [45]
2017	Conference Paper	Rumsewicz, M. [48] **Research proceedings from the 2017 Bushfire and Natural Hazards CRC and AFAC Conference** [49]. *Bushfire and Natural Hazards CRC & AFAC annual conference 2017* (Bu
2017	Conference Paper	Gravois, U. [53] *et al.* **Improving resilience to storm surge hazards** [54]. *AFAC17* (Bushfire and Natural Hazards CRC, 2017). Google Scholar [55] BibTeX [56] EndNote XML [57]
2017	Journal Article	Davies, G. [58] *et al.* **Improved treatment of non-stationary conditions and uncertainties in probabilistic models of storm wave climate** [59]. *Coastal Engineering* **127,** 1-19 (2017). DOI [60] Goog
2017	Report	Nichol, S. [37] **Resilience to clustered disaster events at the coast - storm surge: annual report 2016-17** [64]. (Bushfire and Natural Hazards CRC, 2017). Google Scholar [65] BibTeX [66] EndNote
2016	Report	Gravois, U. [53], Callaghan, D. [68], Baldock, T. [69], Smith, K. [70] & Martin, B. [71] **Review of beach profile and shoreline models applicable to the statistical modelling of beach erosion and the**
2016	Report	Nichol, S. [37] **Resilience to clustered disaster events at the coast: storm surge: Annual project report 2015-2016** [76]. (Bushfire and Natural Hazards CRC, 2016). Google Scholar [77] BibTeX [78
2015	Presentation	Nichol, S. [37] **Resilience to clustered disaster events on the coast: Storm surge** [80]. (2015). Google Scholar [81] BibTeX [82] EndNote XML [83]
2015	Report	Nichol, S. [37] **Resilience to clustered disaster events on the coast: storm surge - Annual project report 2014-2015** [84]. (Bushfire and Natural Hazards CRC, 2015). Google Scholar [85] BibTeX [8

Presentations & Resources

DATE [88]	TITLE [89]	DOWNLOAD	KEY TOPICS
21 Mar 2014	Resilience to clustered disaster events on the coast [90]	1.67 MB	[91], [2], coincident events [2], engineering [93]
04 Dec 2014	Resilience to clustered events on the coast - storm surge [94]	2.02 MB	[95], [2], coincident events [2], storm surge [4]
06 May 2016	Coastal management - cluster overview [96]	0 bytes	[97], [92], cyclone [98], storm surge [4]
09 May 2016	Oceans on the rise [99]	180.51 KB	[100], [92], cyclone [98], storm surge [4]
24 Oct 2016	Resilience to clustered disaster events on the coast: storm surge [101]	5.7 MB	[102], [92], resilience [103], storm surge [4]
08 Jun 2017	New technologies to better manage coastal erosion [104]	681.09 KB	[105], [92], modelling [106], storm surge [4]
07 Jul 2017	Water, water everywhere: living with flood and coastal threats [107]	3.98 MB	[108], [92], severe weather [109], storm surge [4]
07 Sep 2017	Improving resilience to storm surge hazards [110]	3.41 MB	[111], [92], coincident events [2], storm surge [4]
31 Oct 2017	Dynamic coasts: improving community resilience to storms and extreme water levels along the coast [112]	4.99 MB	[113], [92], severe weather [109], vulnerability [114]
12 Sep 2018	Fire Australia Issue Three 2018 [115]	19.49 MB	[116], [92], fire [117], Northern Australia [118]

Posters



[119]

Resilience to clustered disaster events on the coast - storm surge

[119]

Coastal communities in Australia are particularly exposed to disasters resulting from the coincidence of...

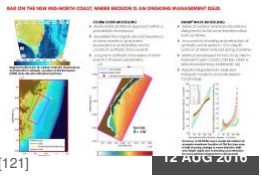
[120]

Resilience to Clustered Disaster Events on the Coast - Storm Surge

[120]

COINCIDENT EVENTS [2], FLOOD [3]

The aim of the project is to develop a new method to quantify the potential hazard associated with coincident...



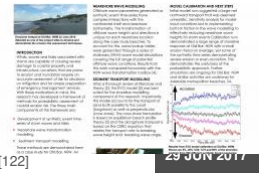
[121]

Improving resilience to storm surge hazards: assessing risk through wave simulations, shoreline modelling and field observations

[121]

COASTAL [92], STORM SURGE [4]

This project will produce probabilistic assessments of coastal erosion and inundation risks associated with...



[122]

Improving resilience to storm surge hazards: assessing risk through wave simulations, shoreline modelling and field observations

[122]

COINCIDENT EVENTS [2], FLOOD [3]

This research aims to produce probabilistic assessments of the coastal erosion and inundation risks...

Linked Projects

Developing better predictions for extreme water levels [123]

FLOOD AND COASTAL MANAGEMENT [124]

Prof Charitha Pattiaratchi
University of Western Australia [125]

[125]

Improving flood forecast skill using remote sensing data [126]

FLOOD AND COASTAL MANAGEMENT [124]

A/Prof Valentijn Pauwels
Monash University [127]

[127]

Improved predictions of severe weather to reduce community impact [128]

SEVERE AND HIGH IMPACT WEATHER [129]

Dr Jeff Kepert
Bureau of Meteorology [130]

[130]

Links

[1] https://www.bnhcrc.com.au/files/bg-img10jpg [2] https://www.bnhcrc.com.au/research/topics/coincident-events [3] https://www.bnhcrc.com.au/research/topics/flood [4] https://www.bnhcrc.com.au/research/topics/storm-surge [5] https://www.bnhcrc.com.au/research/stormsurge [6] https://www.bnhcrc.com.au/people/snichol [7] https://www.bnhcrc.com.au/organisations/ga [8] https://www.bnhcrc.com.au/people/amcpherson [9] https://www.bnhcrc.com.au/people/dcallaghan [10] https://www.bnhcrc.com.au/node/1156 [11] https://www.bnhcrc.com.au/people/dmoore [12] https://www.bnhcrc.com.au/people/gdavis [13] https://www.bnhcrc.com.au/people/jsexton [14] https://www.bnhcrc.com.au/people/tbaldock [15] https://www.bnhcrc.com.au/people/ugravois [16] https://www.bnhcrc.com.au/people/wjiang [17] https://www.bnhcrc.com.au/people/dhanslow [18] https://www.bnhcrc.com.au/organisations/oeh [19] https://www.bnhcrc.com.au/people/jguy [20] https://www.bnhcrc.com.au/organisations/dewnr [21] 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