Saving our beach recreation from climate change

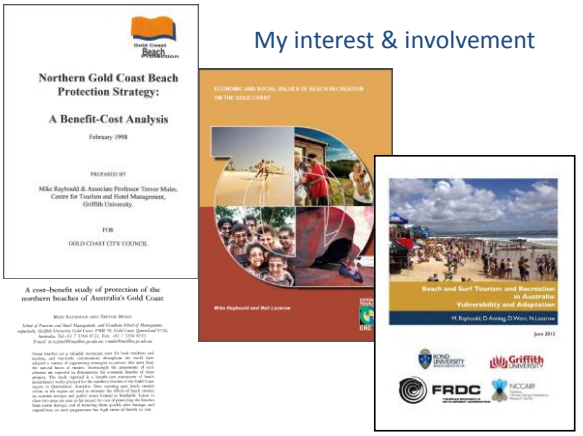
Dr Mike Raybould

Dept. of Hotel and Tourism Management
Faculty of Business
Bond University

Gold Coast 2050?

Australian Institute of Architects (2010), CGI of Gold Coast c2050

My interest & involvement

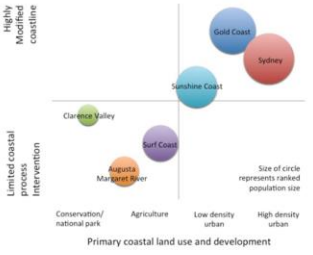


The Fisheries Research & Development Corporation (FRDC) project

Research questions:

- What recreation services are at risk?
- What is the value of those services?
- How can coastal communities adapt to a changing climate?

A case study approach



Overview

- The beach as recreation space
- How does climate change threaten beaches?
- What is at risk?
- What can we do about it?

The beach as recreation space

- About 85 % of Australian's live within 50km of the coast and 25 % within 3km (ABS, 2004).
- The coast is one of the most powerful attractions for resident migration (Sea Change Taskforce, 2006) and tourism.
- 58 % of international tourists visit the beach (BTR, 2003).
- For residents, the beach is the most frequently visited outdoor recreation space.
- The beach as part of Australian 'identity'(Ellison, 2011).

Beaches are the reason many coastal communities (as we know them) exist.

Jubilee Bridge linked Southport with Surfers Paradise, 1925

Original Surfers Paradise Hotel, 1930

Main Beach Pavilion, Southport, 1935.
Source: Bonzle's Photo History of Australia Project. Retrieved from http://www.bonzle.com

But sandy beaches around the world are under threat!

Surfers Paradise, June 2013 (GC Bulletin Photo)

Nobby Beach, June 2013 (GC Bulletin Photo)

Nobby Beach, June 2013 (GC Bulletin Photo)

We are not alone …

Miami Beach, Fl., in 1970's before and after renourishment

Beach renourishment at Waikiki

A waterfront hotel on the Texas Gulf coast

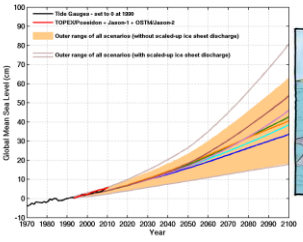
Table 1: Direct and indirect climate change impacts on beaches

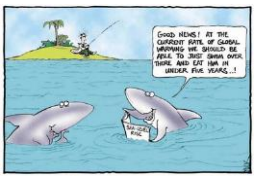
Climate change (driver)	Principal direct physical and ecosystem effects	Potential secondary and indirect impacts
Sea-level rise	Increased inundation of coastal zone	Disruption of coastal economy, tourism impacts
	Increased coastal erosion	Displacement of residents in impacted areas
	Increased risk of flooding and storm damage	Damage to coastal infrastructure
	Saline intrusion into surface and groundwater	Health impacts associated with water quality changes
Altered wave climate	Increased wave run-up	Increased erosion
	Altered erosion and accretion balance	Increased erosion
Storm frequency and intensity changes	Increased wave heights, run-up and storm surge	Increased storm damage
	Southward shift in cyclone zones	Increased storm damage and erosion
Ocean acidification	Impacts on reef-building corals	Reduced storm protection function, less resilient and functional reefs

(Source: Raybould, Anning, Fredline and Ware, In Press)

Climate change impacts on our beaches

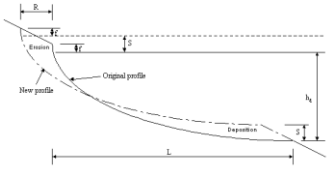
- Sea level on east coast of Australia is expected to rise between 0.5 and 0.8 m by 2100





Source: CSIRO. (2012). Sea level rise: Understanding the past – improving projections for the future. Available: http://www.cmar.csiro.au/sealevel/sl_proj_21st.html

- Relationship between sea-level rise and shoreline retreat is explained by the Bruun Rule (Bruun, 1962).



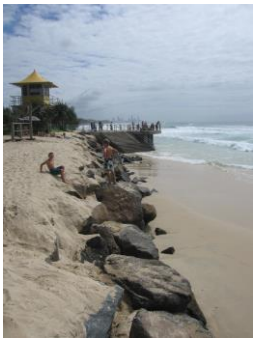
Source: CSIRO. (2012).

- R = SL/(hd+f),
  - Where S is the amount of sea level rise, L is the active length of the profile, hd is the closure depth, and f is the freeboard.
- R is typically of the order 50-100 times the magnitude of S.
- If sea-level rises 10cm shoreline will retreat 5-10m

Bruun, P. (1962). Sea-level rise as a cause of shore erosion. Proceedings of the American Society of Civil Engineers. Journal of the Waterways and Harbors Division, 88, 117–130

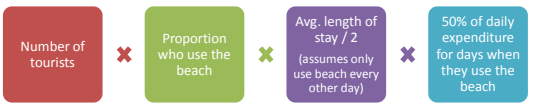
What is at risk?

- Property
- Social and cultural values
- Recreation values
- Tourism values

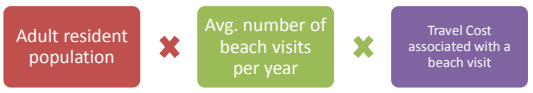


Estimating recreation values associated with the beach

Visitors:



Residents:



13

Estimating the economic value of beach recreation to tourists on the Gold Coast, 2011

Visitor type	Total beach visits	Value per adult visit [1]	Total economic value
Domestic Overnight	4,731,960	$87.00	$411,680,520
International	2,672,896	$68.00	$181,756,955
Day	1,641,000	$8.80	$14,440,800
Total	9,045,856		$607,878,275

1. Assumes 50% of daily expenditure for international and domestic overnight related to access to beach

14

Tourists and the beach

(rough estimates only)

Bega Valley Shire 2014

	Visitors	Expenditure $m	Avg nights	Spend per night $	% who use beach [1]	Total Beach Visits
Domestic	435,000	253	4.3	127	43	402,158
International	22,000	8	4.6	75	79	39,974
Day visitors	364,000	31		86	30	109,200
Total	**821,000**	**292**				**551,332**

Source: Destination NSW, Bega Valley Shire Profile

Notes:

[1] International and Day visitor values from Clarence Valley study

Caution should be exercised in use of these estimates. They are based on benefit transfer approaches from research conducted in other regions and not on primary data collected in the Bega Shire.

15

Tourism values and the beach

(rough estimates only)

Bega Valley Shire 2014

	Beach Visits	Value per adult visit $ [1]	Total Economic Value $
Domestic	402,158	64	25,537,001
International	39,974	38	1,499,025
Day visitors	109,200	43	4,695,600
Total	**551,332**		**31,731,626**

[1] Value per visit estimated as half of daily expenditure in the region only for the days when the beach is used

Caution should be exercised in use of these estimates. They are based on benefit transfer approaches from research conducted in other regions and not on primary data collected in the Bega Shire.

16

Resident's beach recreation values

(rough estimates only)

Bega Valley Shire Profile

Census		Beach visits per year [1]	Total beach visits	Value per visit $ [1]	Annual value $
Resident Pop	35,000				
Adult (15+) Pop	30,500	80	2,440,000	6.1	14,884,000

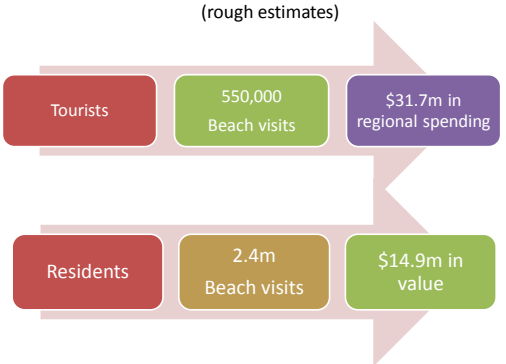
[1] Data from Clarence Valley study

Caution should be exercised in use of these estimates. They are based on benefit transfer approaches from research conducted in other regions and not on primary data collected in the Bega Shire.

17

Summary: Bega Valley Shire 2104

(rough estimates)



18

Reality Check

- **Tourism:** $31.7m associated with beaches is approx. 12% of total $270m visitor expenditure in Bega Valley Shire (Destination NSW 2014) .
- **Residents:** $14.9m = approx. $490 per adult per year

What proportion of this is 'at risk'?

- An eroded beach still has value.
- Recreation value loss is not linear
- Is there a 'tipping point' when the beach is no longer an attractive recreation site?

Adaptation strategies for minimising tourism and leisure impacts of climate change on coastal communities

1. Increase the resilience of existing beaches
2. Increase recreation space in the surf and on the back beach
3. Increase accessibility of substitute beaches
4. Increase supply of alternative (non-beach) recreation sites
5. Communication strategies to counter negative media and give accurate information on beach conditions and alternatives

Raybould, M., Anning, D., Ware, D. & Lazarow, N. (2013). *Beach and surf tourism and recreation in Australia: Vulnerability and adaptation*. FRDC Research Report # 2010/536. ISBN: 978-0-646-90467-2

22

Strategy 1: Increase the resilience of existing beaches

Actions / Examples	Key benefits
• Beach nourishment and shaping • Off-shore reefs and controls	• Maximises usable beach space • Improves access for people and equipment • Minimises beach losses during storm events.

Miami Beach, Florida

23

Strategy 1: Increase the resilience of existing beaches

Actions / Examples	Key benefits
• Beach nourishment and shaping • Off-shore reefs and controls	• Maximises usable beach space • Improves access for people and equipment • Minimises beach losses during storm events.

Before and after beach nourishment between Alexandra Headland and Maroochydore, Qld, 2013. ($1m Project)

Source: http://www.couriermail.com.au/news/queensland/sunshine-coast-beach-between-alexandra-headland-and-maroochydore-restored-in-1m-project/story-fnihsrf2-1226727196796

24

Strategy 2: Increase recreation space in the surf and on the back beach

Actions / Examples	Key benefits
• Construction of offshore reefs • Park development behind the beach.	• Increases supply of surf breaks - reduces congestion • Provides recreation space close to the beach.

Artificial surf reef at Narrowneck, Gold Coast, constructed in 1999 from huge geotextile bags.

- Primary objective was as sand control point – successful
- Secondary objective was recreation – mixed results?

25

Strategy 2: Increase recreation space in the surf and on the back beach

Actions / Examples	Key benefits
• Construction of offshore reefs • Park development behind the beach.	• Increases supply of surf breaks - reduces congestion • Provides recreation space close to the beach.

$20m ongoing project to enhance recreation space along 500 m of beach at Broadbeach

Strategy 3: Increase the accessibility of substitute beaches

Actions / Examples	Key benefits
• **Provide ramps, stairs, more parking to remote beaches**	• More choice for beach users • Reduces congestion on heavily used beaches - increases recreation values of those sites

$300K project to provide disabled access to Lakes Beach by Wyong Council.

Strategy 4: Increase supply of alternative (non-beach) recreation sites

Actions / Examples	Key benefits
• **Provide facilities and promote alternative water / open-space recreation environments, e.g. lakes, rivers, dams, etc.**	• Provides alternative recreation sites with similar characteristics • Opportunity to select locations which are climate-resilient • Reduces congestion on eroded urban beaches

Broadwater Parklands, Southport.
$60 m project to redevelop 3km of the waterfront

Strategy 5: Communication strategies to counter negative media and give accurate information on beach conditions and alternatives

Actions / Examples	Key benefits
• Communication plans to provide accurate information about beach conditions and expected repair rates after erosion events • Tourism communication strategies to counter negative media coverage of erosion	• Minimise losses in tourism visitation caused by negative media coverage

The Latest Canada Ski & Snow Conditions

Check out the current snow reports for Canada ski resorts, updated daily with new snow, base depth, number of lifts open, skiable acres and weather conditions. For the best Canada skiing, click through to each ski area's full set of webcams before heading to the mountains. Click the weather icon for your ski resort of choice to see a powder forecast, or visit each mountain's "Full Report" for more skiing and snowboarding details, including the official ski and snow report. To have a look at the ski area overview, click the resort name of interest. Canada snow reports are sourced directly from the ski resorts.

Resort Name	Status	New Snow	Base Depth	Lifts Open	Runs	Weather	Cams
			Lower/Upper	Open/Total	Open/Total		
Massif du Sud Quebec, CAN Last Updated: 2/ 1		24 HR: 0" 72 HR: 9"	135" - 140" Full Report	2/2	30/30		
Tremblant Quebec, CAN Last Updated: 2/ 1		24 HR: 1" 72 HR: 8"	71" - 71" Full Report	14/14	96/96		
Big White British Columbia, CAN Last Updated: 2/ 1		24 HR: 1" 72 HR: 1"	42" - 67" Full Report	14/16	117/118		

Big questions

- Will coastal communities plan ahead - or be reactive?
- Should we be investing early to prevent losses later?
- How should we fund coastal development projects?

What will Gold Coast beaches look like in 2100?

Not like that

Australian Institute of Architects (2010), CGI of Gold Coast c2050

And hopefully not like that

And hopefully not like this ….

Congestion on a Korean beach

Maybe more like this ….

Elwood Foreshore, Victoria – design by Aspect Studios

Source: http://www.landezine.com/index.php/2011/04/elwood-foreshore-by-aspect-studios/

Mission Rock Seawall , San Francisco, California.

Source: http://www.hargreaves.com/projects/Waterfronts/MissionSeaWall/

33

Saving our beach recreation from climate change

Dr Mike Raybould

Dept. of Hotel and Tourism Management
Faculty of Business
Bond University

Gold Coast 2050?

Australian Institute of Architects (2010), CGI of Gold Coast c2050

34