Beach and Surf Tourism and Recreation in Australia: Vulnerability and Adaptation

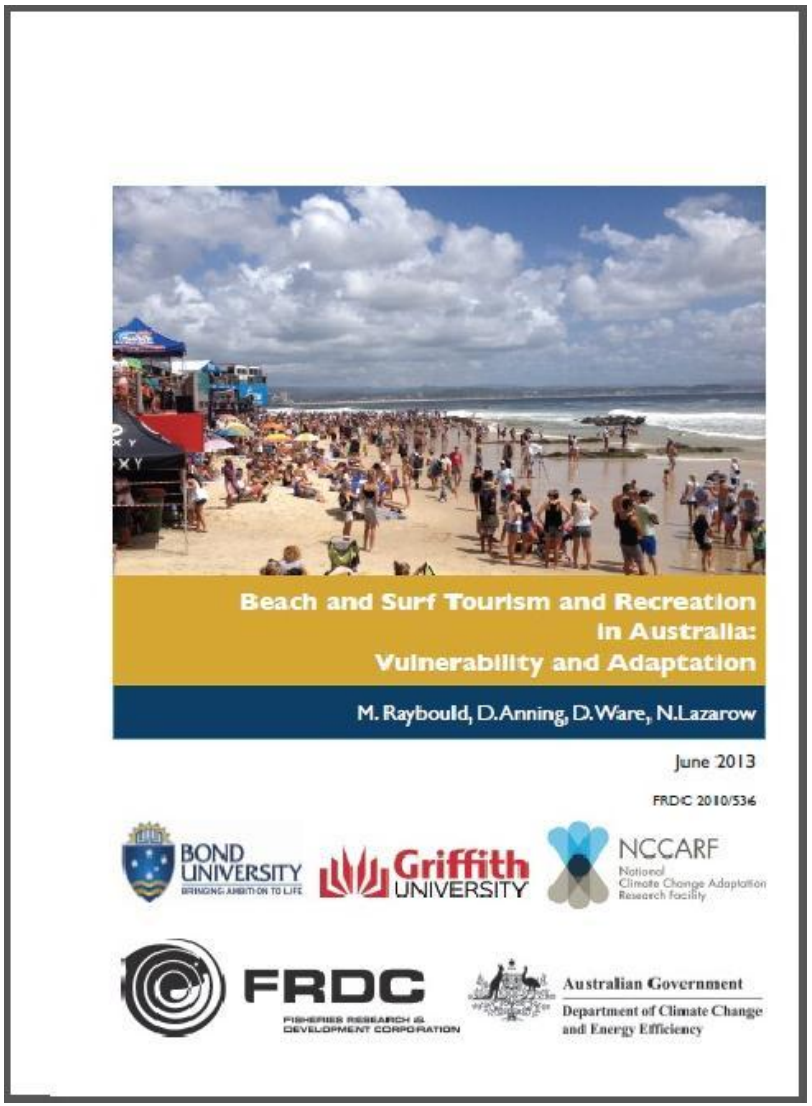
Mike Raybould

NCCARF
National Climate Change Adaptation Research Facility
BOND UNIVERSITY
BRINGING AMBITION TO LIFE
Griffith UNIVERSITY
Australian Government
Fisheries Research and Development Corporation

Presentation outline

- Some background and rationale for the project
- Case study selection
- Research approach
- Beach visitation and importance
- The recreation valuation approach
- Beach recreation values: Residents & Tourists
- What is ‘at risk’ during an erosion event?
- Management strategies

Beach and Surf Tourism and Recreation in Australia: Vulnerability and Adaptation (BASTRA)



- Project funded by the National Climate Change Adaptation Facility (NCCARF) on behalf of the DCCEE
- Part of the Marine Biodiversity and Resources NARP
- Administered by Fisheries Research Development Corporation (FRDC)
- $430,00 (cash) plus $2m+ ‘in-kind’ contributions
- 2 year project finishing April 2013
- Partners: Sydney Coastal Councils Group (SCCG), Sea Change Task Force, Surf lifesaving Australia, Surfing Australia

Key Project Team Members

Steering Committee:

Professor Rodger Tomlinson (GCCM)

Phil Watson (OEH, NSW)

Colin Creighton (FRDC)

Research Team:

Dr Mike Raybould (Bond)

Dr David Anning (Bond)

Daniel Ware (Griffith)

Dr Neil Lazarow (Griffith / CSIRO)

Dr Boyd Blackwell (UNE)

Professor Jack Carlsen (Curtin)

Project objectives:

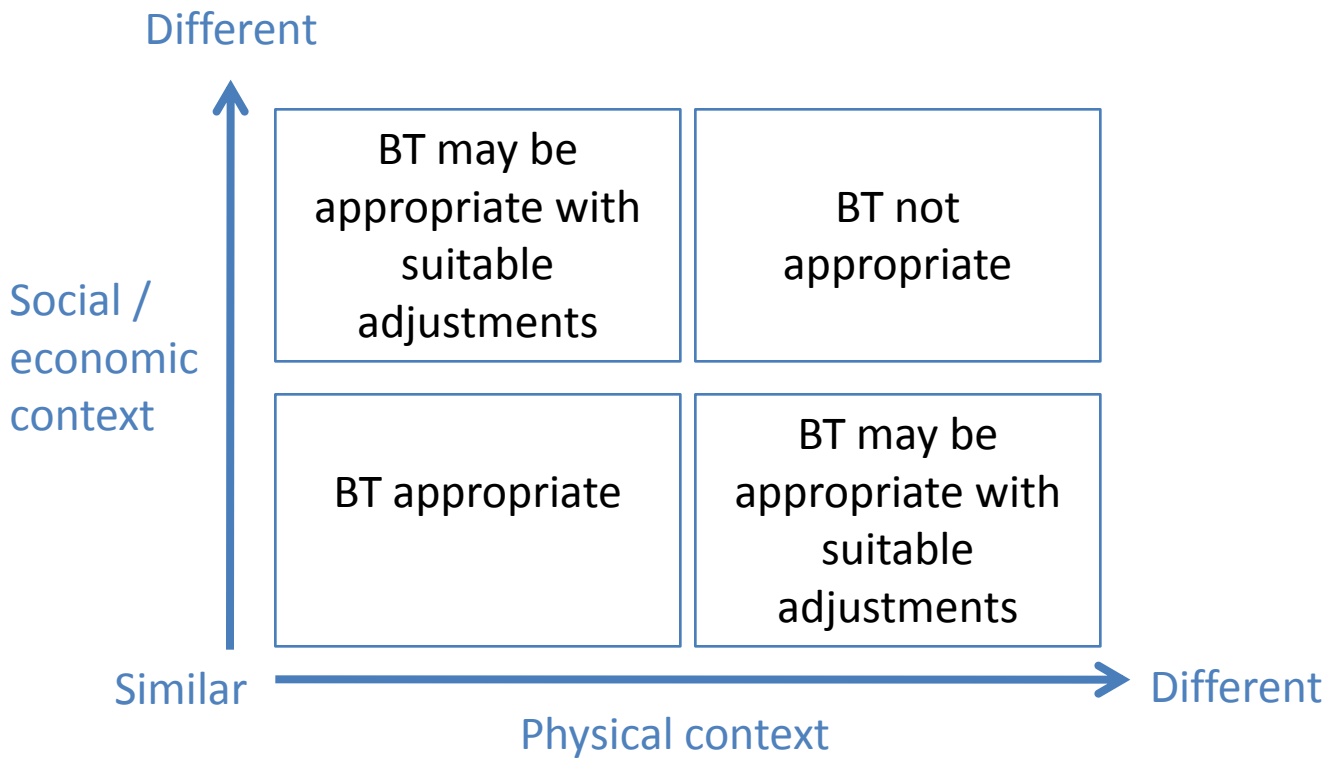
1. Estimate the economic values of beach related recreation and tourism in coastal locations.
2. Identify the extent to which these values are threatened by climate change.
3. Identify the key features of beaches that drive their recreation and tourism value.
4. Explore the social and behavioural responses to changes in beach availability or quality

Why so few valuation studies?

- Time and resources
- Lack of visitation and beach use data
- Theoretical challenges:
  - estimating non-use values
  - defining the baseline/status quo
  - defining the future scenarios

So, how are values estimated?

- Benefit transfer (BT) is typically used
- This method has some severe limitations



Gold Coast Beach Protection

Northern Gold Coast Beach Protection Strategy:

A Benefit-Cost Analysis

February 1998

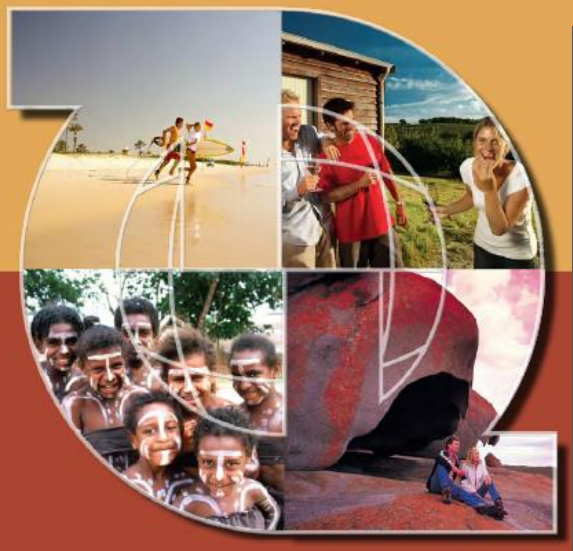
PREPARED BY

Mike Raybould & Associate Professor Trevor Mules.
Centre for Tourism and Hotel Management,
Griffith University.

FOR

GOLD COAST CITY COUNCIL

ECONOMIC AND SOCIAL VALUES OF BEACH RECREATION ON THE GOLD COAST



Mike Raybould and Neil Lazarow

SUSTAINABLE TOURISM CRC

Beach and Surf Tourism and Recreation in Australia: Vulnerability and Adaptation

M. Raybould, D.Anning, D.Ware, N.Lazarow

June 2013

FRDC 2010/536

BOND UNIVERSITY BRINGING AMBITION TO LIFE

Griffith UNIVERSITY

NCCARF National Climate Change Adaptation Research Facility

FRDC FISHERIES RESEARCH & DEVELOPMENT CORPORATION

Australian Government
Department of Climate Change and Energy Efficiency

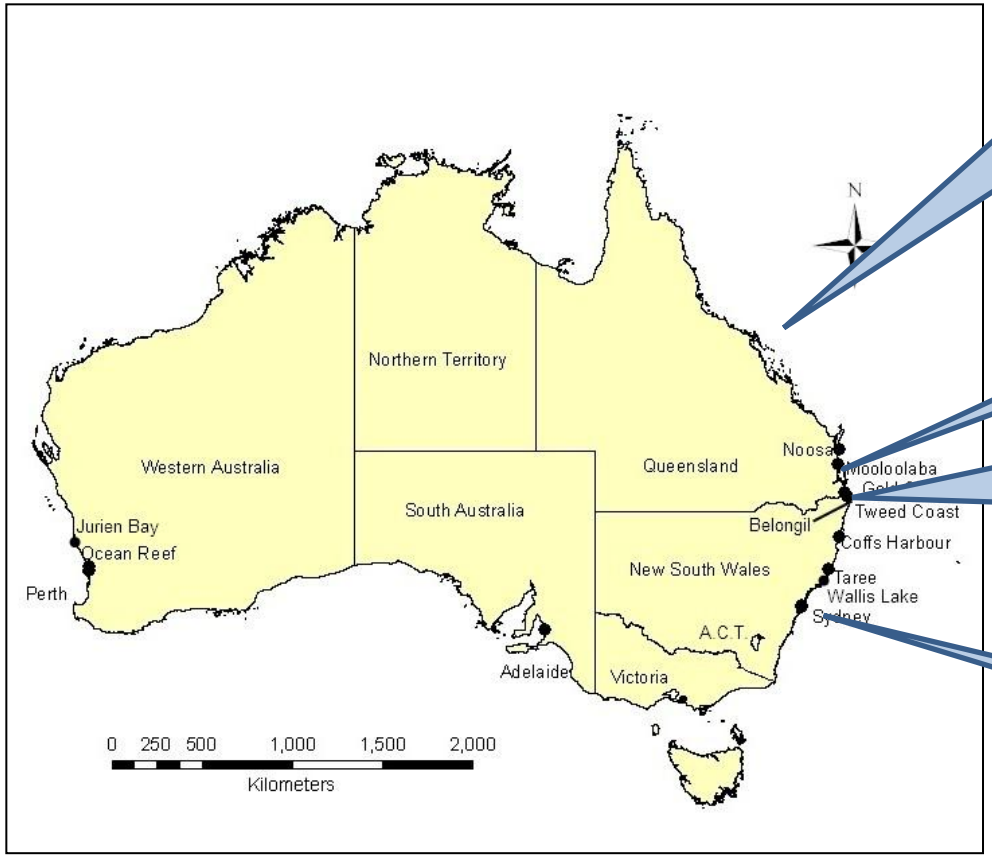
A cost–benefit study of protection of the northern beaches of Australia's Gold Coast

MIKE RAYBOULD AND TREVOR MULES

School of Tourism and Hotel Management, and Graduate School of Management, respectively, Griffith University Gold Coast, PMB 50, Gold Coast, Queensland 9726, Australia. Tel:+61 7 5594 8721. Fax: +61 7 5594 8553. E-mail: m.raybould@mailbox.gu.edu.au; t.mules@mailbox.gu.edu.au

Ocean beaches are a valuable recreation asset for local residents and tourists, and beachside communities throughout the world have adopted a variety of engineering strategies to protect this asset from the natural forces of erosion. Increasingly the proponents of such schemes are expected to demonstrate the economic benefits of these projects. The study reported is a benefit–cost assessment of beach nourishment works planned for the northern beaches of the Gold Coast region in Queensland, Australia. Data covering past beach erosion events in the region are used to estimate the effects of beach erosion on tourism receipts and public assets located at beachside. Losses in these two areas are seen to far exceed the cost of protecting the beaches from storm damage, and of restoring them quickly after damage, and expenditure on such programmes has high ratios of benefit to cost.

Beach recreation valuation research in Australia



Rolfe & Gregg (2012)

Blackwell (2007)

Raybould & Mules (1999)
Raybould (2006)
Raybould & Lazarow (2009)
Blackwell, Raybould & Lazarow (2013)

Anning et al. (2009)
Anning (2012)

Source: Anning, 2012.

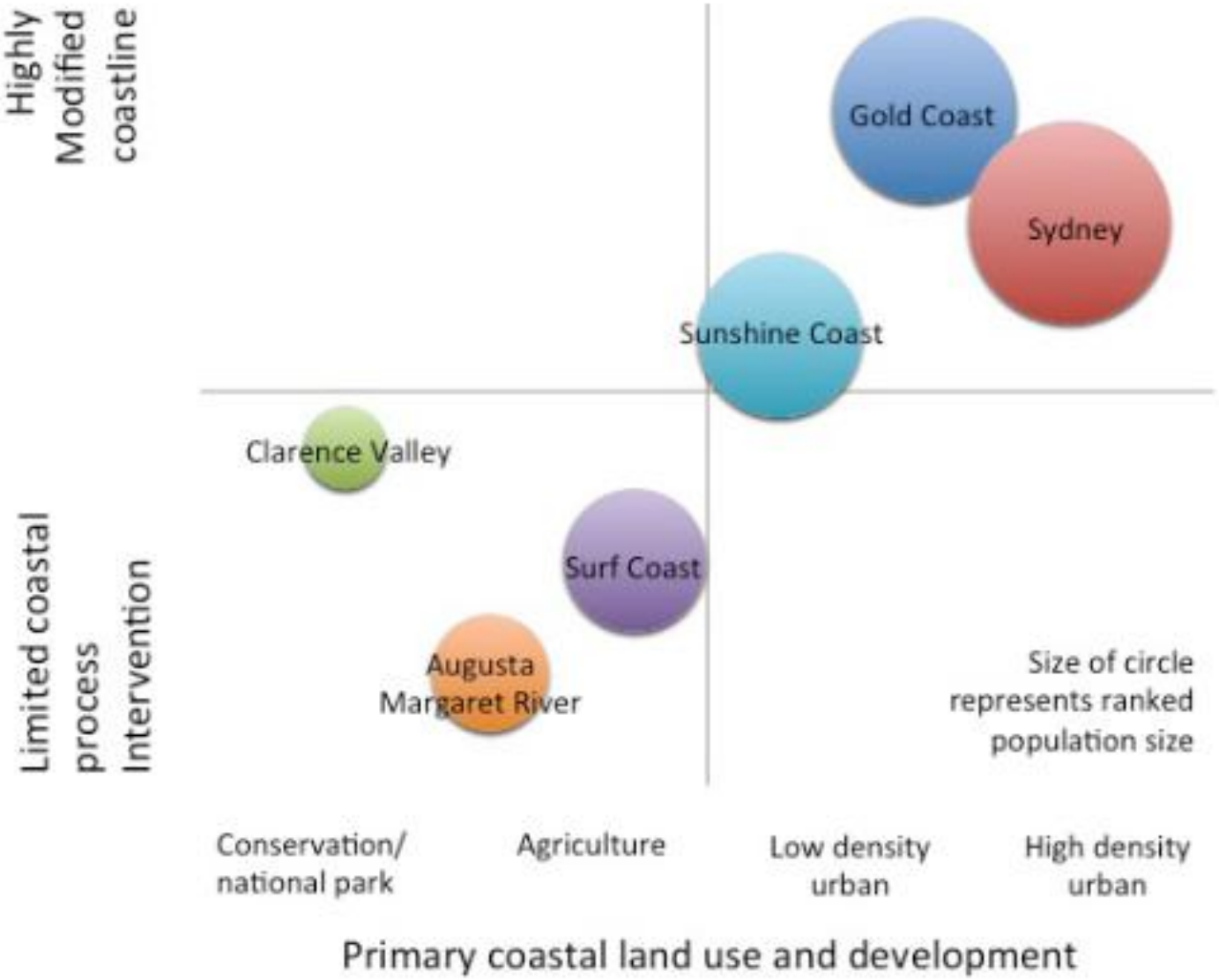
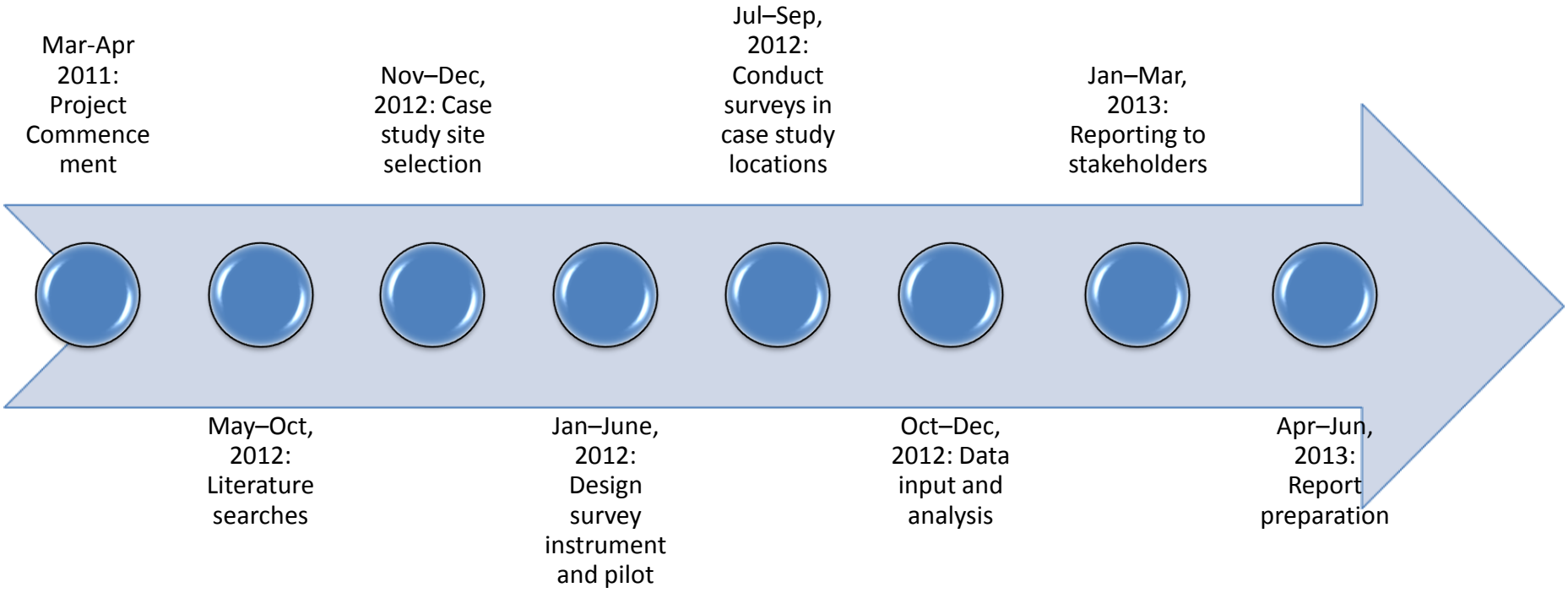


Figure 1 BASTRA Partner Portfolio

Project Timeline

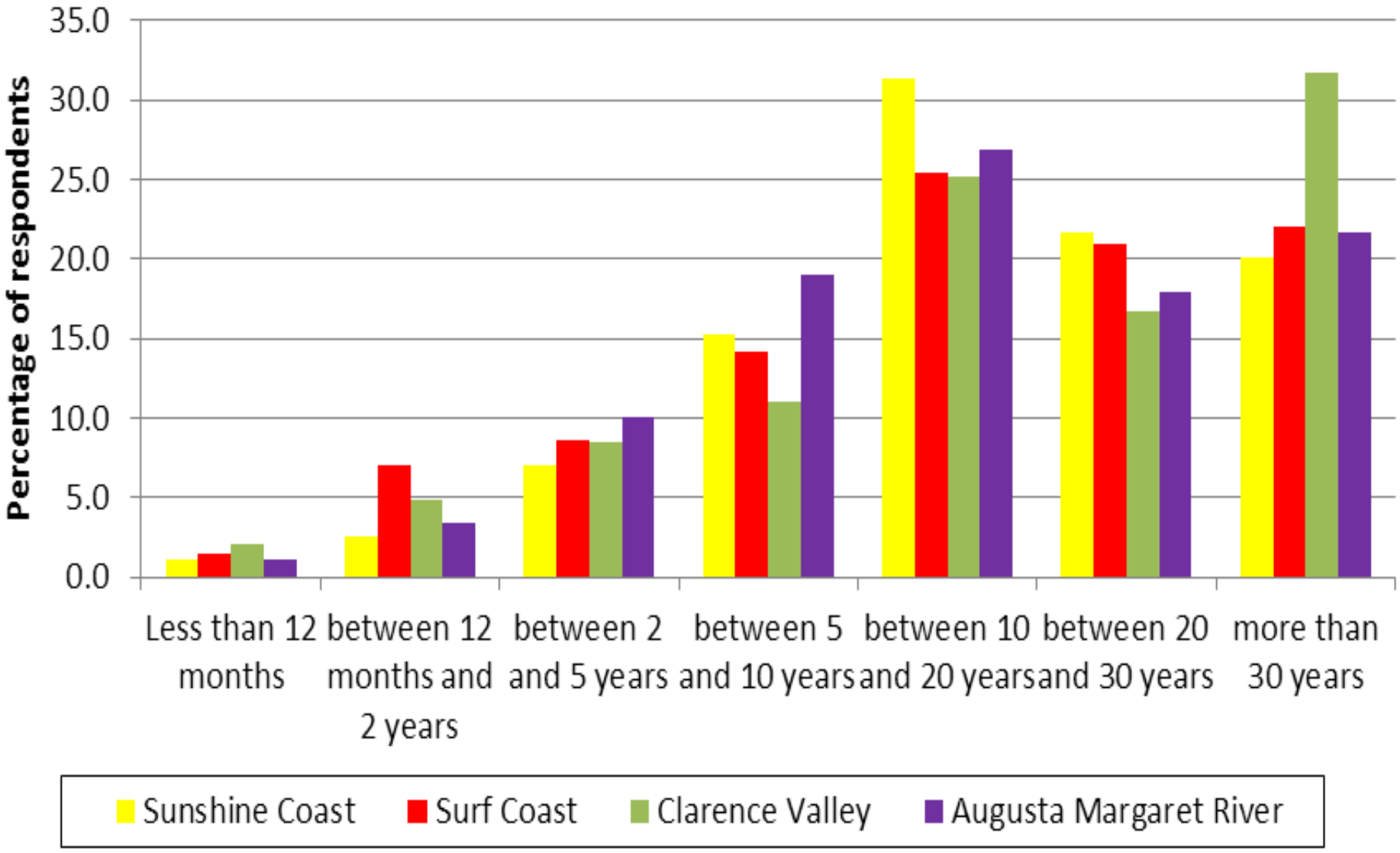


Data collection stats

Responses to resident survey and beach intercept survey

Case-study location	Resident Survey	Beach Users
Sunshine Coast	325	235
Clarence Valley	267	150
Margaret River	300	129
Surf Coast	318	248

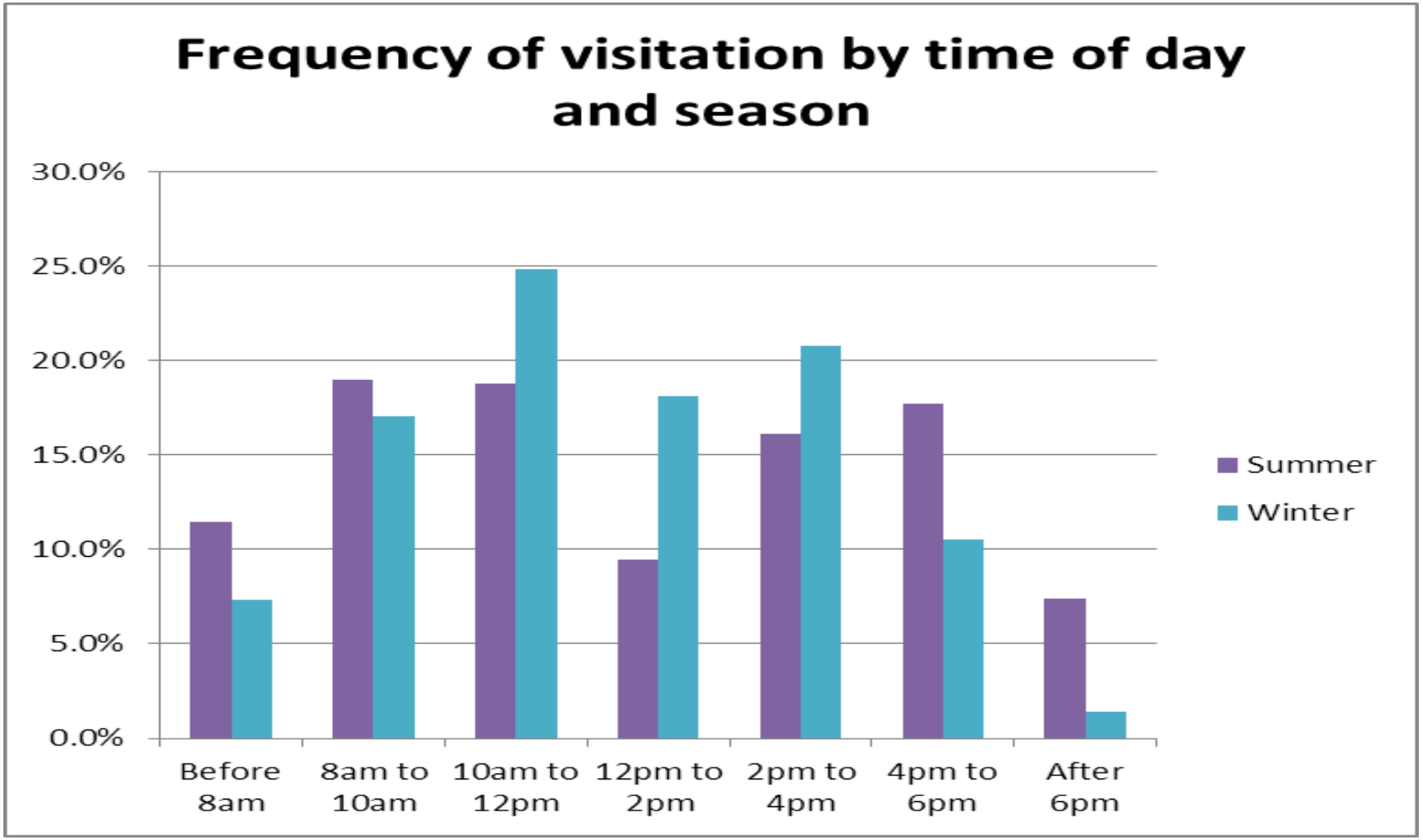
Number of years residence in LGA



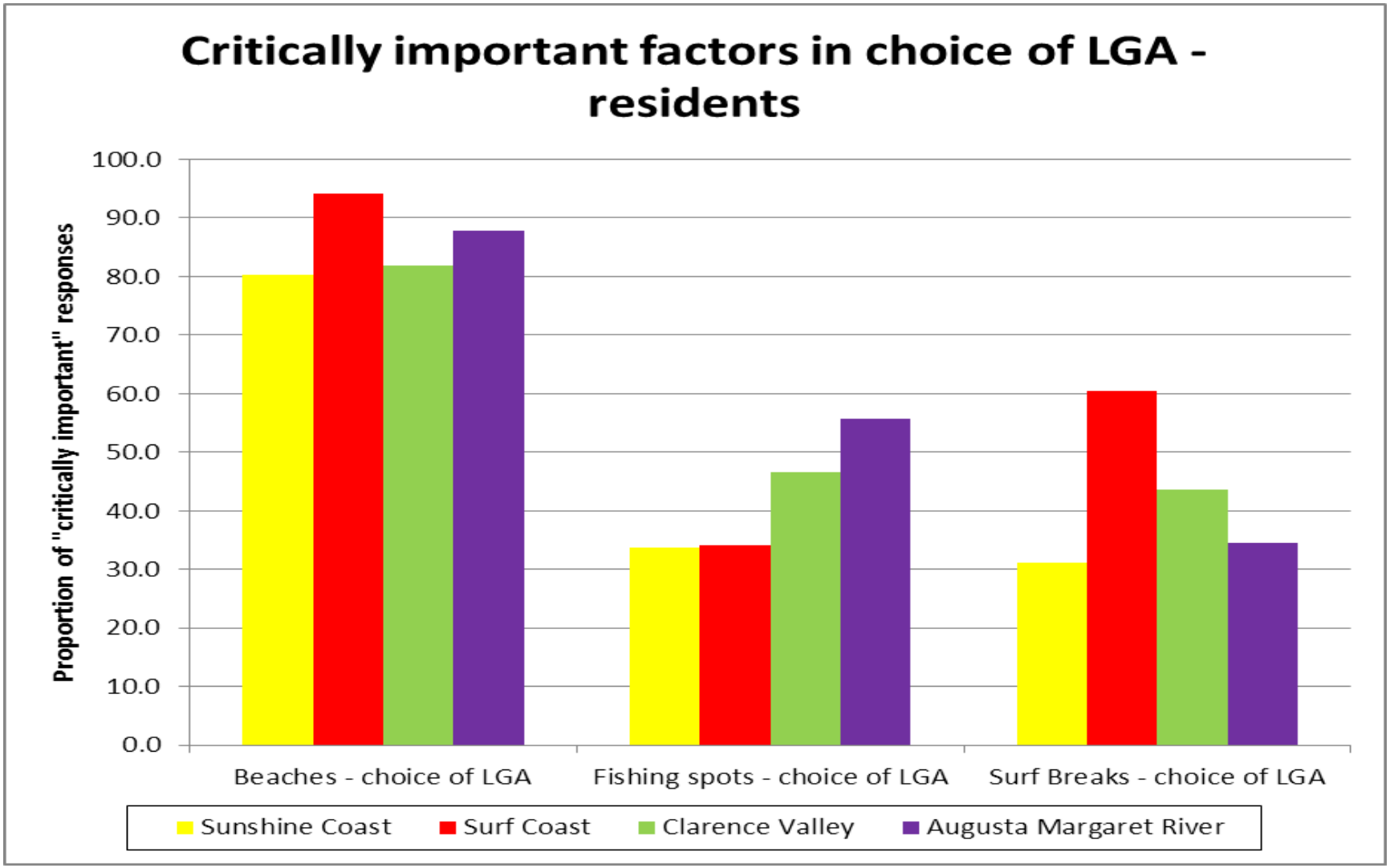
Beach visitation patterns – residents

Case-study location	Visited a beach in previous 12 months (% of respondents)	Mean annual beach visits	Mean time spent on beach (minutes)
Sunshine Coast	93	84	98
Clarence Valley	94	102	115
Margaret River	98	138	98
Surf Coast	99	123	84

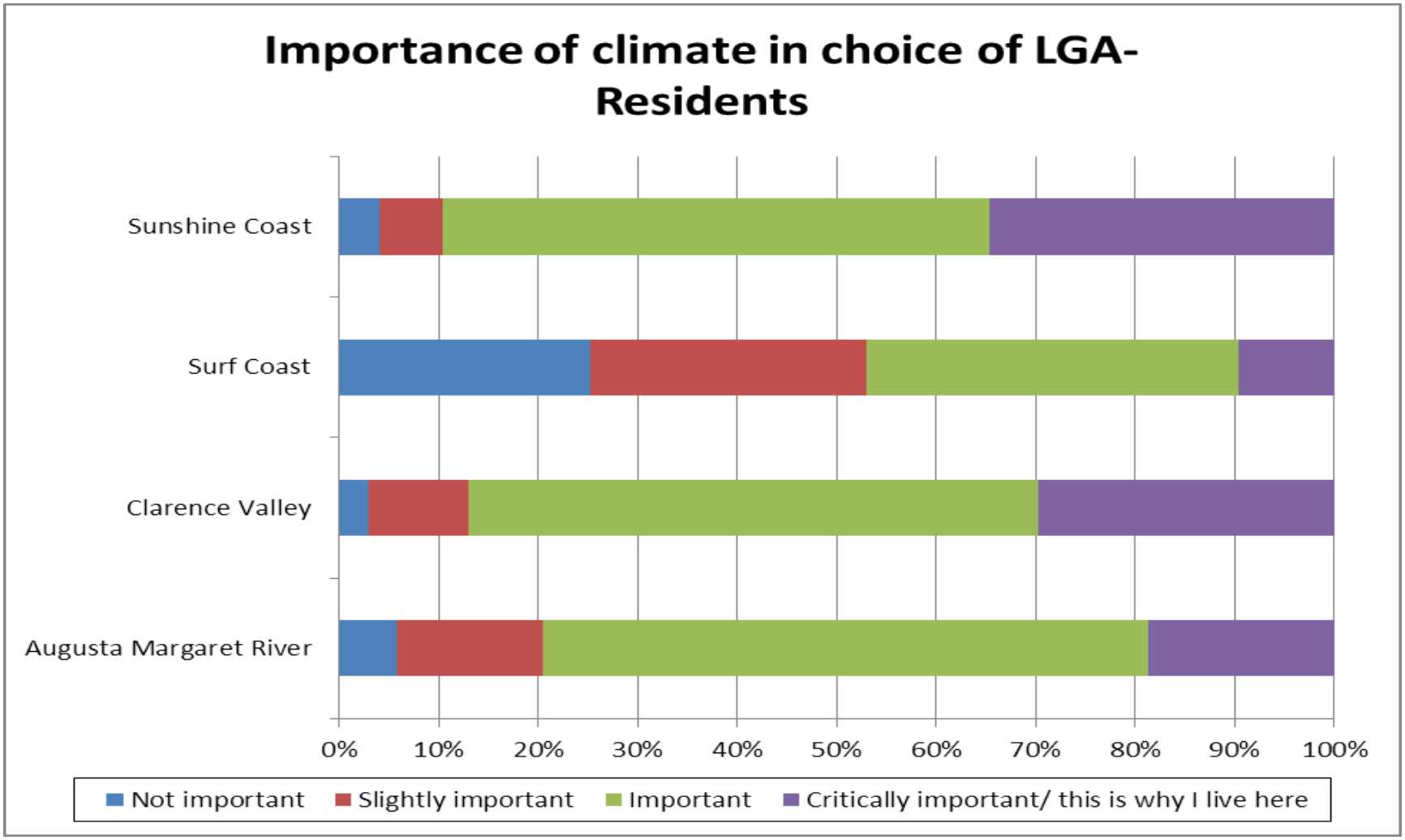
Visitation by time of day and season – residents (all samples)



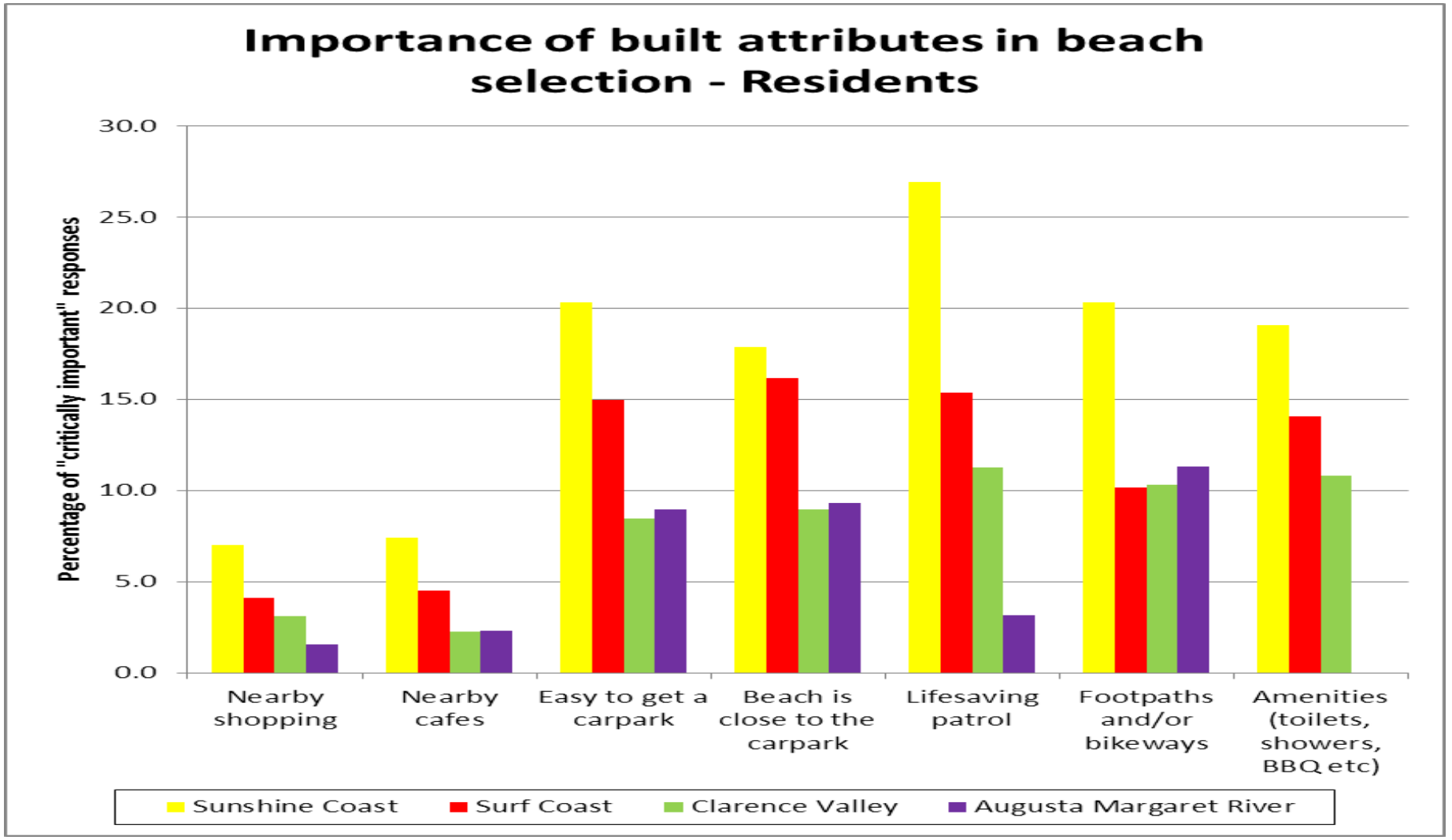
Regional-level drivers of residential location choice – residents



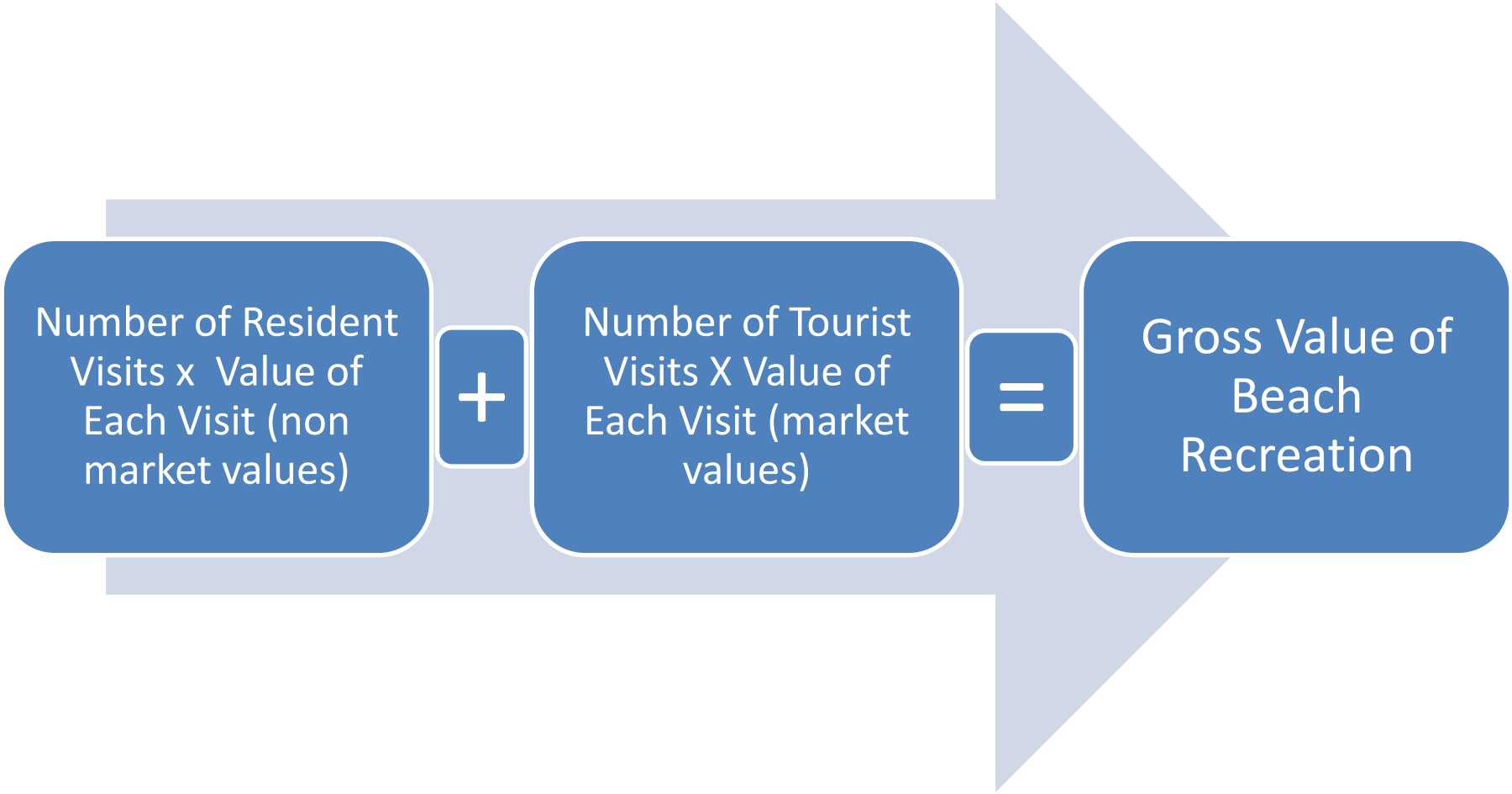
Importance of climate in choice of LGA – residents



Importance of built features in beach choice – residents

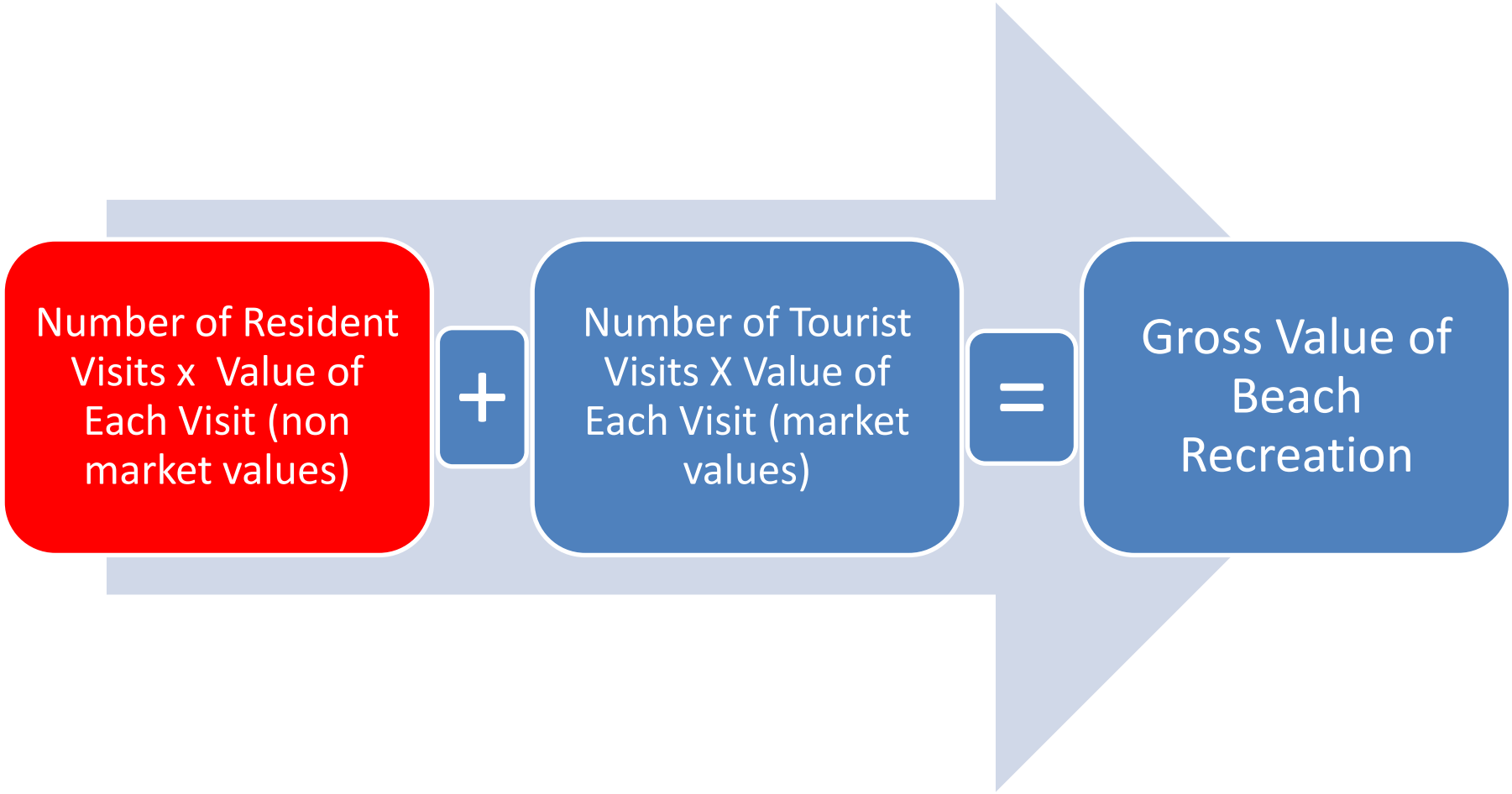


Estimating gross value of beach recreation



Basic principle: most conservative estimates throughout

Estimating gross value of beach recreation



Beach Use Estimates: Residents

Table 15 Resident beach visitation estimates

	Gross annual beach estimate – visits p.a. across LGA			
Case-study location	**Regional population (2006 Census estimate, persons over 15)**	**Mean number of visits p.a. from BASTRA resident survey**	**Using visitation estimate from BASTRA resident survey**	**Using Gold Coast estimates from Raybould 2006** (48 visits p.a.)
Sunshine Coast	254 112	84	21 345 408	12 197 376
Surf Coast	18 245	102	1 860 990	875 760
Clarence Valley	37 536	138	5 179 968	1 801 728
Augusta-Margaret River	9 288	123	1 135 044	442 944

Regression variables used in models

Variable name	*Description*	*Measurement for subsequent component*
Dependent		
VISITSPY	Respondent's annual quantity of day visits to the site	Whole, positive number
Explanatory		
TCost1	Fuel cost only of return trip to site	$, AUD per person per trip
TCost3	Fuel cost only plus opportunity cost of time of return trip to site (travel time x 0.4 of individual's hourly wage rate)	$, AUD per person per trip
DEPCHILD	Whether there are dependent children in the HH	0 = none, 1= 1 or more
GENDER	Whether respondent was female or not	0 = Female, 1 = Male
AGE	Age of respondent	Whole, positive number
INC	Household Income (not available GC)	$, AUD
LOCALRES	How long the respondent has been a resident in the region	Whole, positive number
OWNER	Whether respondent owns their home or not	0 = no,1 = yes
WORKFORCE	Respondent is in workforce or not	0 = no, 1=yes

TNB regression models

	TCost1			***TCost3***		
Variable	***Gold Coast***	***Sunshine Coast***	***Clarence Valley***	***Gold Coast***	***Sunshine Coast***	***Clarence Valley***
Constant	5.62**	5.52**	5.24**	5.65**	5.55**	5.32**
	(39.13)	(11.44)	(46.28)	(39.43)	(11.32)	(45.85)
TCost1 or TCost3	-.243**	-.297**	-.164**	-.099**	-.117**	-.107**
	(-16.38)	(-5.59)	(-7.01)	(-16.16)	(-4.78)	(-7.395)
DEPCHILD	-.044	.069	-.015	-.056	.024	-.009
	(-.791)	(.382)	(-.093)	(-1.02)	(.130)	(-.061)
GENDER	.165**	-.019	-.000	.186**	-.013	.000
	(3.72)	(-.156)	(-.010)	(4.20)	(-.102)	(.082)
AGE	-.005**	(-.006)	-.000	-.003	-.005	-.000
	(-2.06)	(-.986)	(-.614)	(-1.32)	(-.795)	(-.523)
HHINC		-.000	.000*		-.000	.000*
		(-.361)	(1.80)		(-.456)	(1.839)
LOCALRES	.001	-.014	.000	.001	-.015	.000
	(.744)	(-.418)	(.996)	(.813)	(-.466)	(1.01)
OWNER	-.051	.176	-.000	-.066	.103	-.000
	(.734)	(1.273)	(-.424)	(-.966)	(.745)	(-.436)
WORKFORCE	.057	.006	.000	.036	.010	.000
	(1.07)	(.040)	(.061)	(.709)	(.064)	(.196)
α	0.7381**	0.6525**	0.5374**	0.7360**	0.6645**	0.5239**
	(25.38)	(9.57)	(8.76)	(25.35)	(9.61)	(8.88)
Chi squared	177216.0**	18968.2**	15469.5**	175050.8**	19325.8**	14994.2**
Log Likelihood	-9272.4	-1364.6	-1383.5	-9184.2	-1366.9	-1380.2
Pseudo R^2	0.9053	0.8742	0.8483	0.9050	0.8760	0.8445
N	1511	233	253	1497	233	253

Notes: t-value or equivalent in brackets. Significance level: **= 5%; * = 10

Resident beach recreation consumer surplus estimates

	Consumer surplus per adult per visit ($/person/day)	
Case-study location	Fuel only model	Fuel only plus time @40% of hourly rate
Sunshine Coast	3.36	8.50
Surf Coast	3.27	5.15
Clarence Valley	6.10	9.30
Augusta-Margaret River	3.28	12.21
Gold Coast	4.19	10.06

Resident consumer surplus values

	Gold Coast	Clarence Valley	Sunshine Coast
TC1: Fuel only model	$4.19	$6.10	$3.36
TC2:Total running costs model	$27.70	$36.21	$22.77
TC3: Fuel only plus time @ 40% of hourly rate	$10.06	$9.30	$8.50
TC4: Total running costs plus time @ 40% of hourly rate	$32.99	$41.91	$26.46

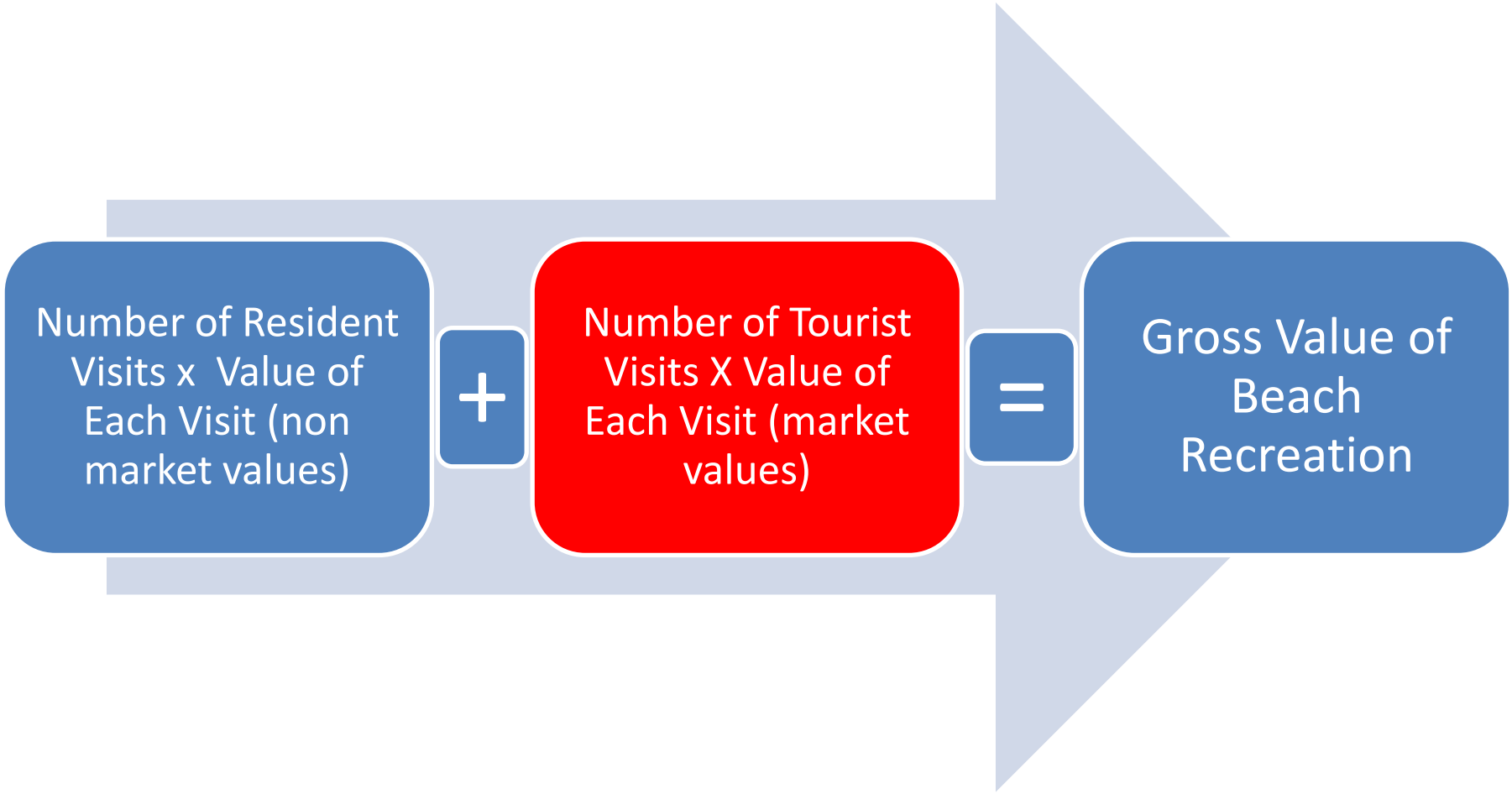
Comparisons:

- Rolfe & Gregg (2012) used <u>total</u> running costs but no time and found $35.09 per person
- Blackwell (2007): Fuel only model = $2.39; Total running cost plus time = $17.41

Aggregate value of resident beach recreation in the case study locations

Case-study location	Annual value (million $A) of resident recreation	
	Fuel only model	Fuel only plus time @ 40% of wage rate
Sunshine Coast	$69.59 m	$197.23 m
Surf Coast	$6.09 m	$9.58 m
Clarence Valley	$31.60 m	$48.17 m
Augusta-Margaret River	$3.72 m	$13.86 m

Estimating gross value of beach recreation



Estimating tourist beach visits: Augusta-Margaret River (example)

Visitor type	Number of visitors p.a.*	Proportion using beach *	Estimated number of beach visits during trip	Total annual beach visits
Domestic overnight (average stay = 4 nights)	350, 000	0.4	2	280, 000
International (average stay = 6 nights)	61, 432	0.87	3	160, 338
Day-Trippers	234, 000	0.25	1	58, 500
Total	645, 432			498, 838

* Visitor data from TRA (Average 2009, 2010, 2011)

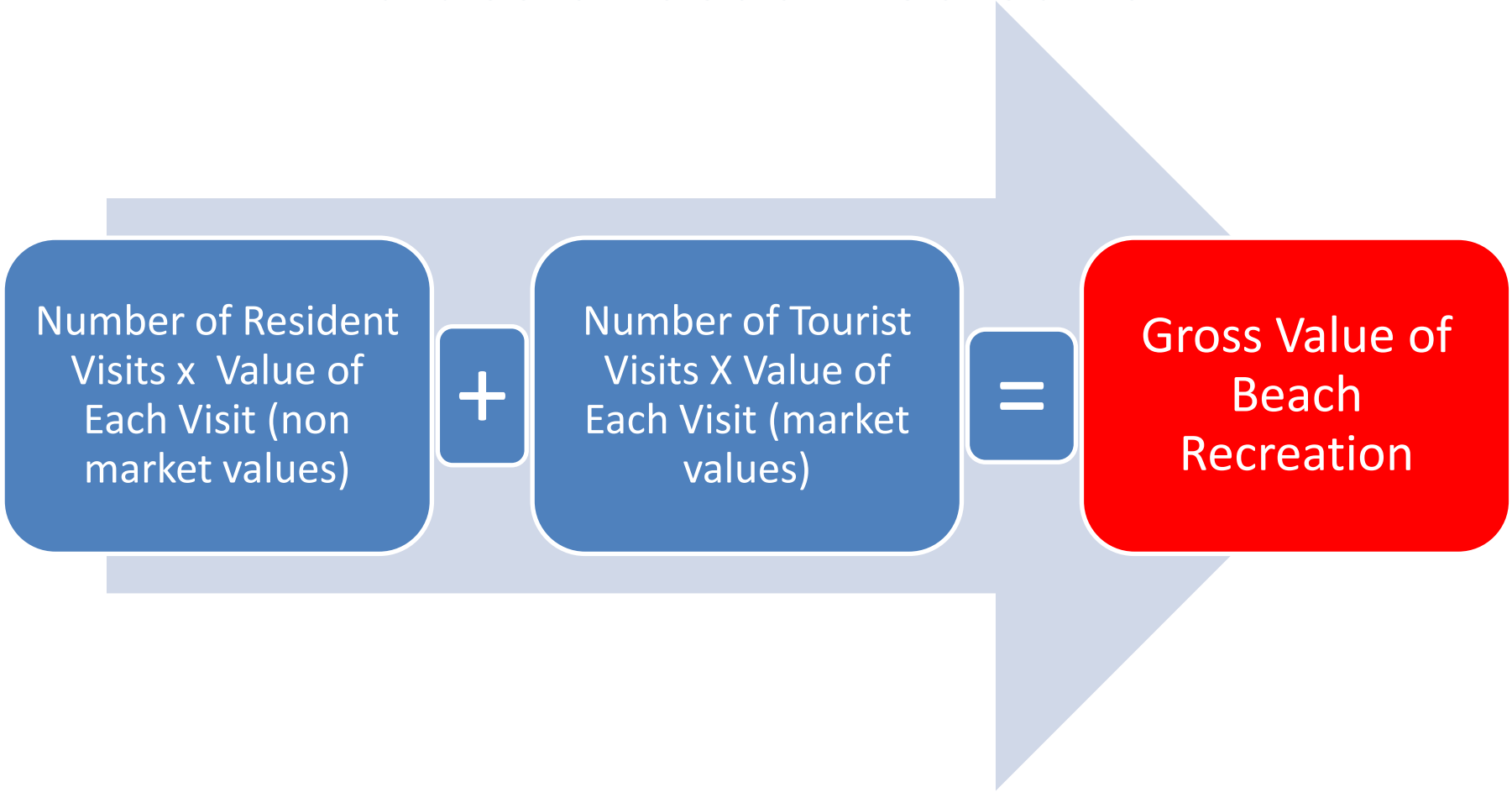
Tourist beach visitation estimates (annual)

Case-study location	Total visits to LGA p.a.	Estimated beach visits p.a.
Sunshine Coast	7,588,200	4,677,956
Surf Coast	3,041,096	2,127,872
Clarence Valley	922,000	643,260
Augusta-Margaret River	645,432	498,838

Summary of gross tourism expenditures associated with beach use

Case-study location	Annual value (million A$) of tourist value			Total
	Day-trippers	Domestic overnight	International	
Sunshine Coast	13.85	227.45	28.87	270.17
Surf Coast	8.22	93.45	4.95	106.63
Clarence Valley	1.67	29.33	1.13	32.13
Augusta-Margaret River	1.29	19.04	4.25	24.58

Putting it all together - estimating gross values of beach recreation



Summary of BASTRA value estimates for recreation and tourism

Case-study location	Annual value (million $A) of resident recreation	Annual value (million $A) of tourist expenditure related to beaches
Sunshine Coast	$69.59 m	$270.17 m
Surf Coast	$6.09 m	$106.63 m
Clarence Valley	$31.60 m	$32.13 m
Augusta-Margaret River	$3.72 m	$24.58 m

Putting estimated tourist values into perspective

Location	Annual value of tourist expenditure related to beaches (million A$)	Gross regional product (million A$)	BASTRA value as % of GRP
Sunshine Coast	270.17	10,000	2.7%
Surf Coast	106.63	823	13.0%
Clarence Valley	32.13	1,600	2.0%
Margaret River	24.58	1,220	2.0%

But ….what value is at risk during erosion events?

- Avoided losses from investment in projects
- How do people respond to beach damage?
- An eroded beach still has recreation value

The contingent behaviour questions:

13. Please think about what you would do if you went to your favourite beach in the future and there was no usable beach because of erosion damage.

If there was an alternative beach in the region that offered everything you wanted how far would you be willing to travel and how much would you be willing to spend in travel costs to get to it?

☐ I would **not** be willing to spend any time or money getting to an alternative beach, because:

a. I don't care about the sand / the sand is not important to me
b. I can't afford it / I don't want to spend the extra money
c. I don't have time / don't want to spend the extra time
d. Some other reason _____

Go to Q15

☐ I would be willing to spend some additional time and money to get to an alternative beach

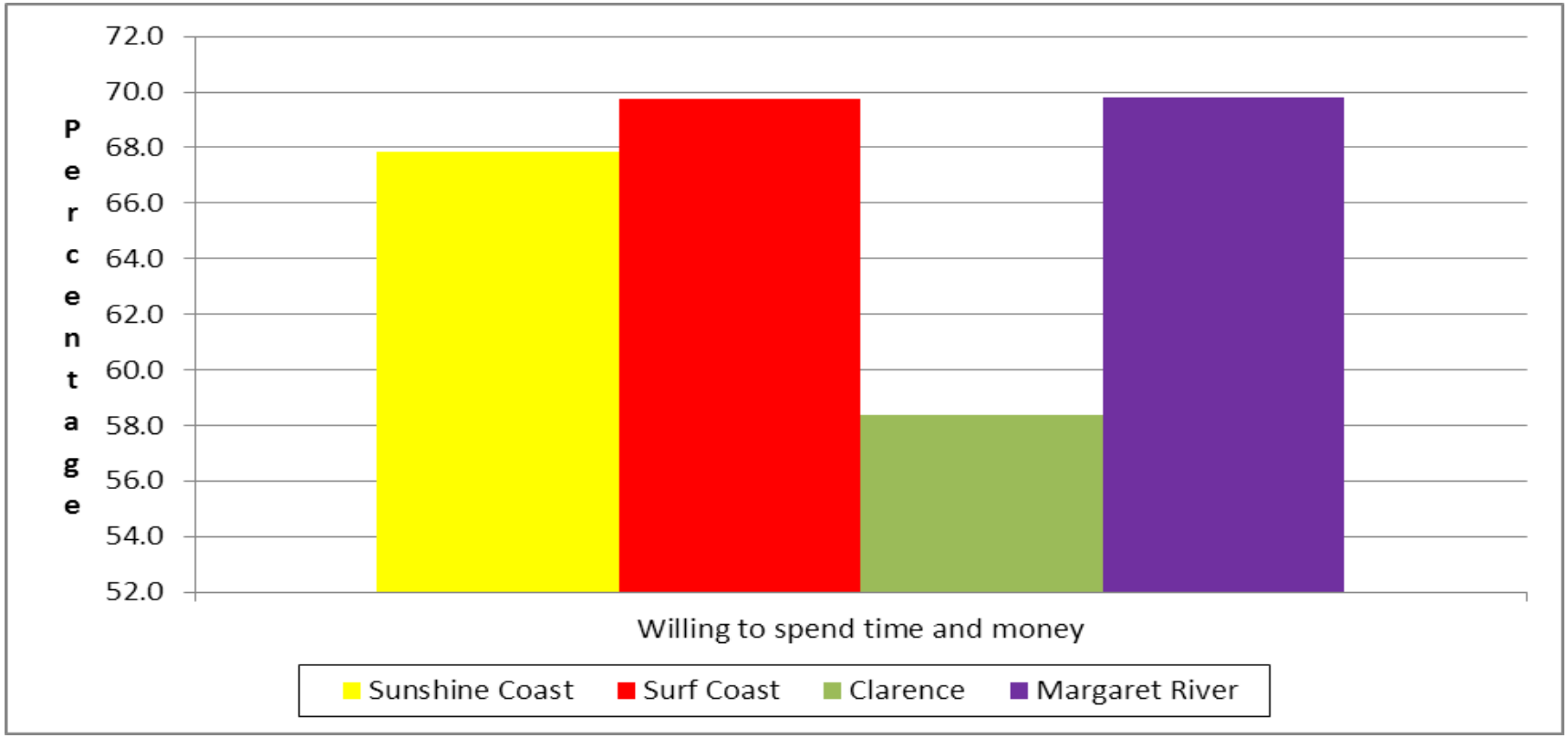
13a. What is the **maximum** amount of additional time you would be willing to spend getting to the alternative beach and back to your home?

5 minutes each way (10 minute round trip)	10 minutes each way (20 minute round trip)	15 minutes each way (30 minute round trip)	20 minutes each way (40 minute round trip)	30 minutes each way (60 minute round trip)	More than 30 min each way
☐$_1$	☐$_2$	☐$_3$	☐$_4$	☐$_5$	☐$_6$

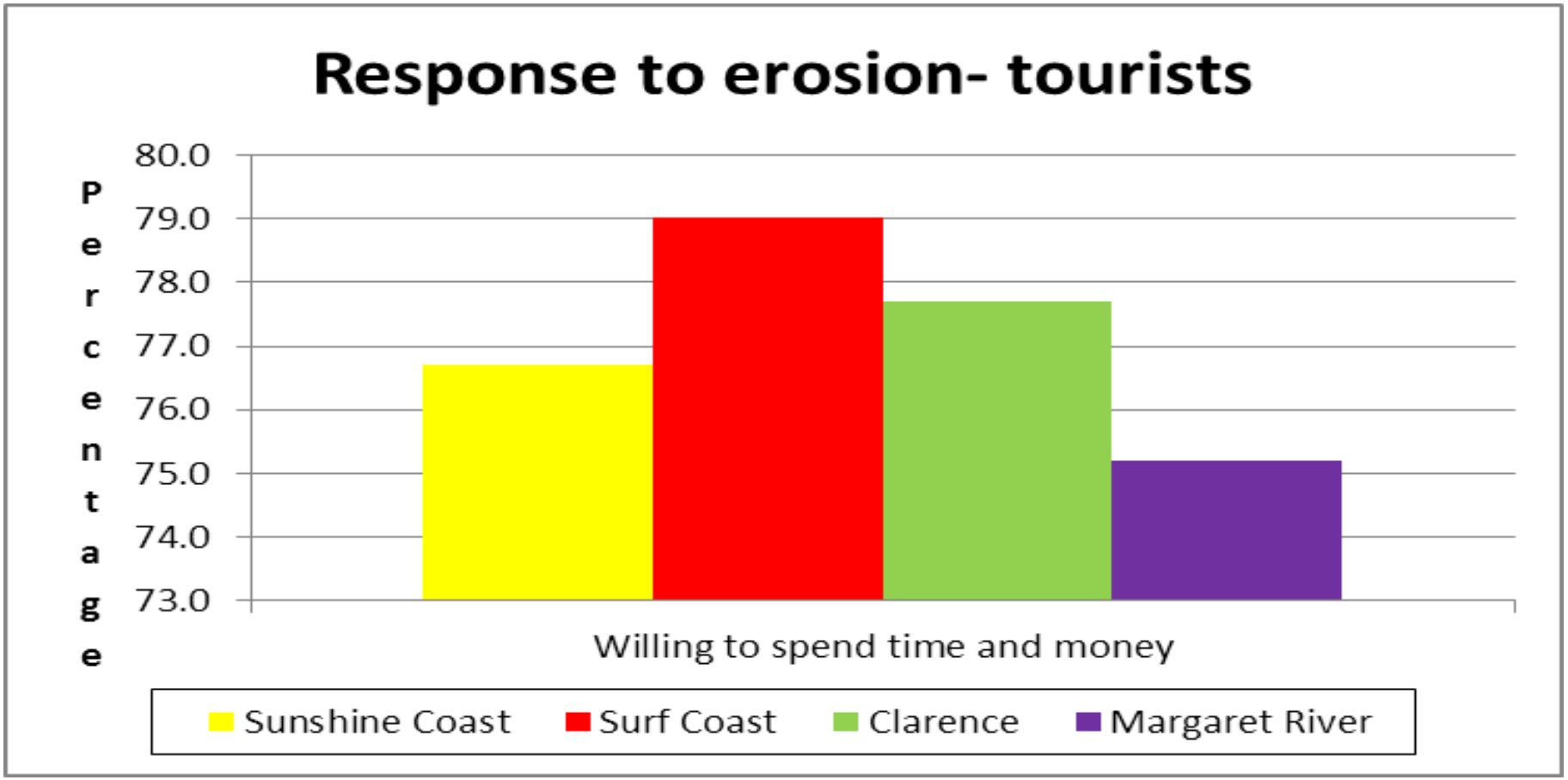
13b. What is the maximum amount of additional money you would be willing to spend in travel costs to get to an alternative beach and back to your home?

$2 (round trip)	$5 (round trip)	$10 (round trip)	$15 (round trip)	$20 (round trip)	More than $20
☐$_1$	☐$_2$	☐$_3$	☐$_4$	☐$_5$	☐$_6$

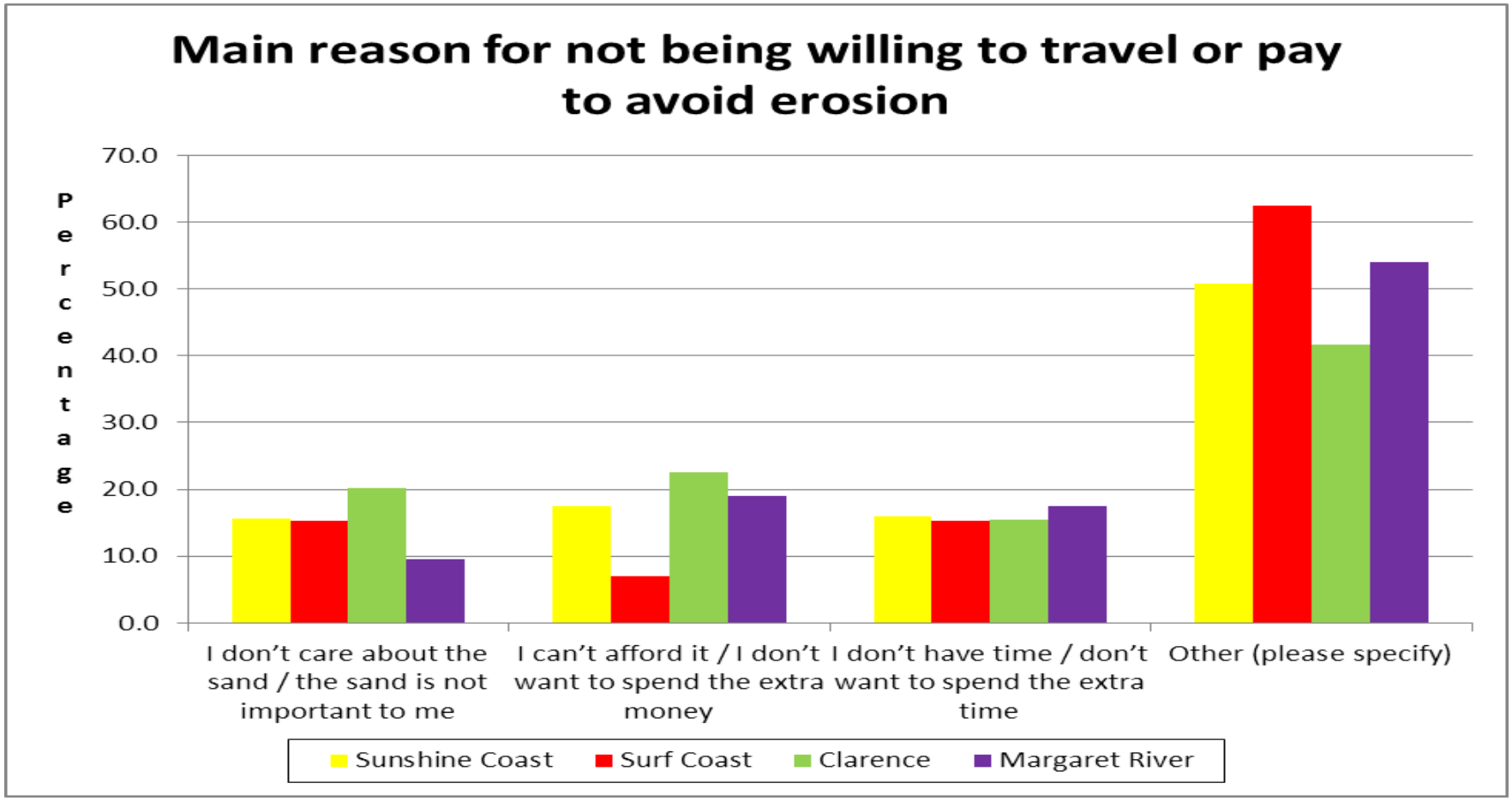
Residents willingness to travel or pay to avoid erosion impacts



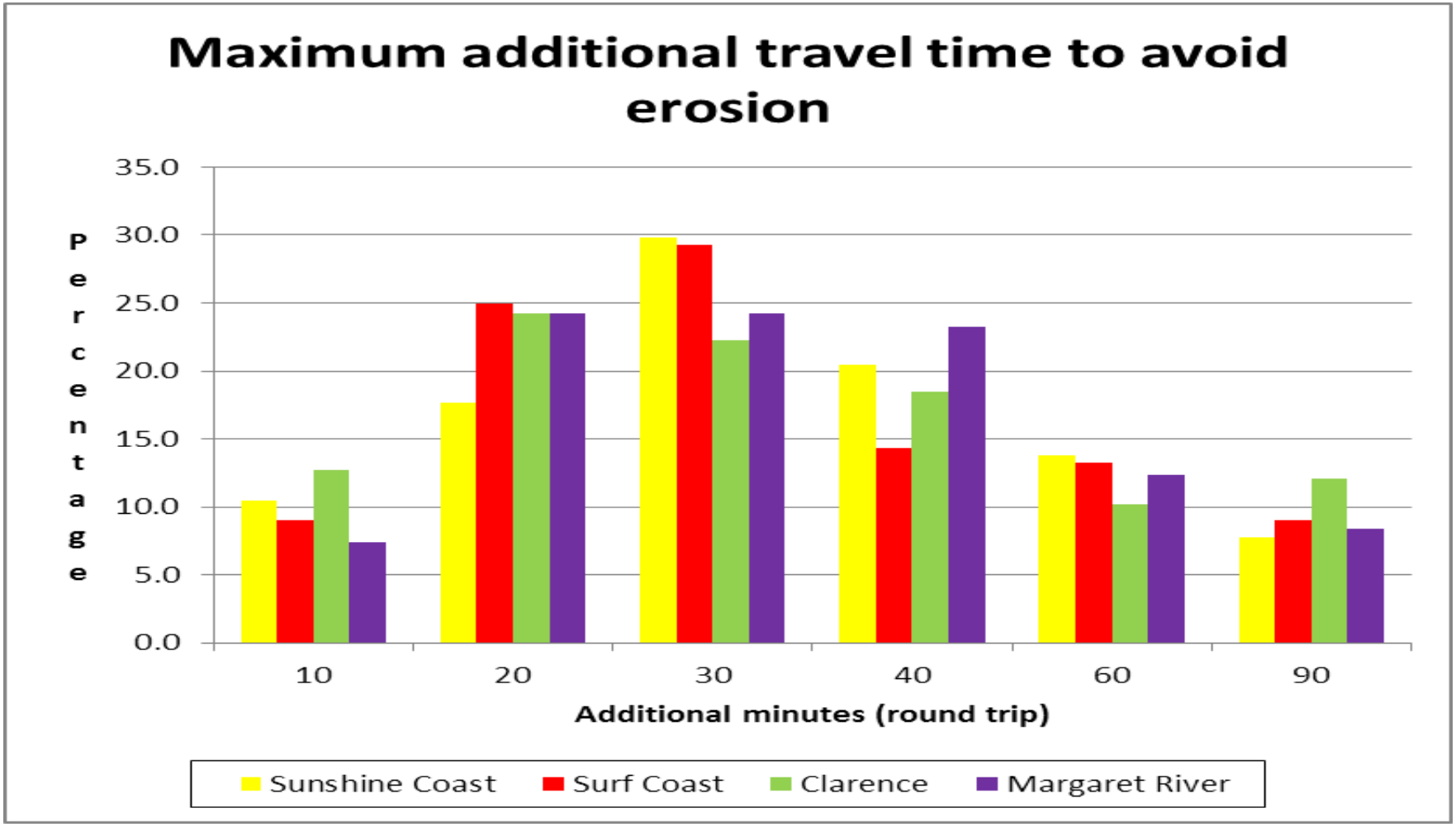
Tourist's willingness to travel or pay to avoid erosion impacts



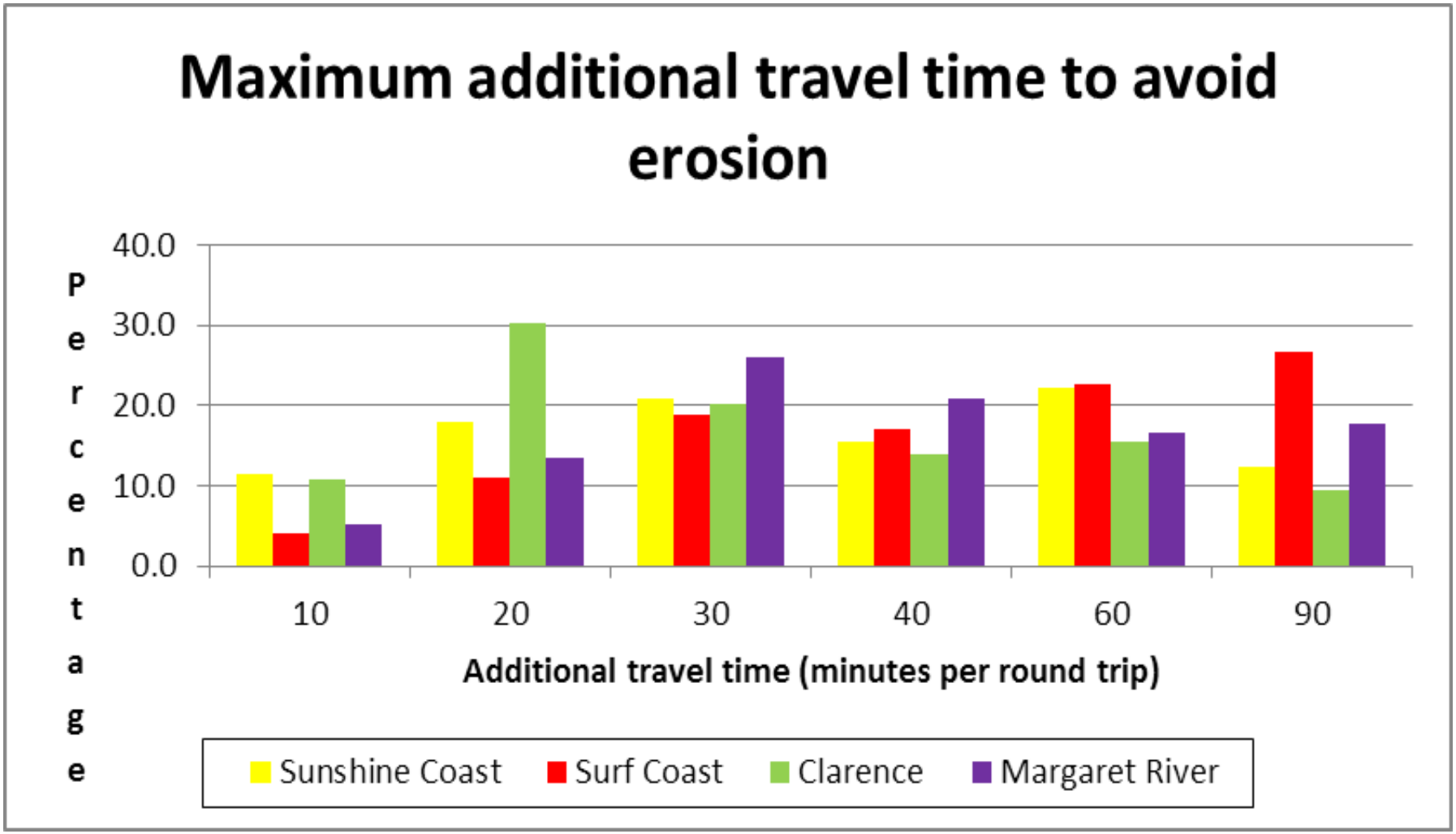
Reason for unwillingness to pay – residents



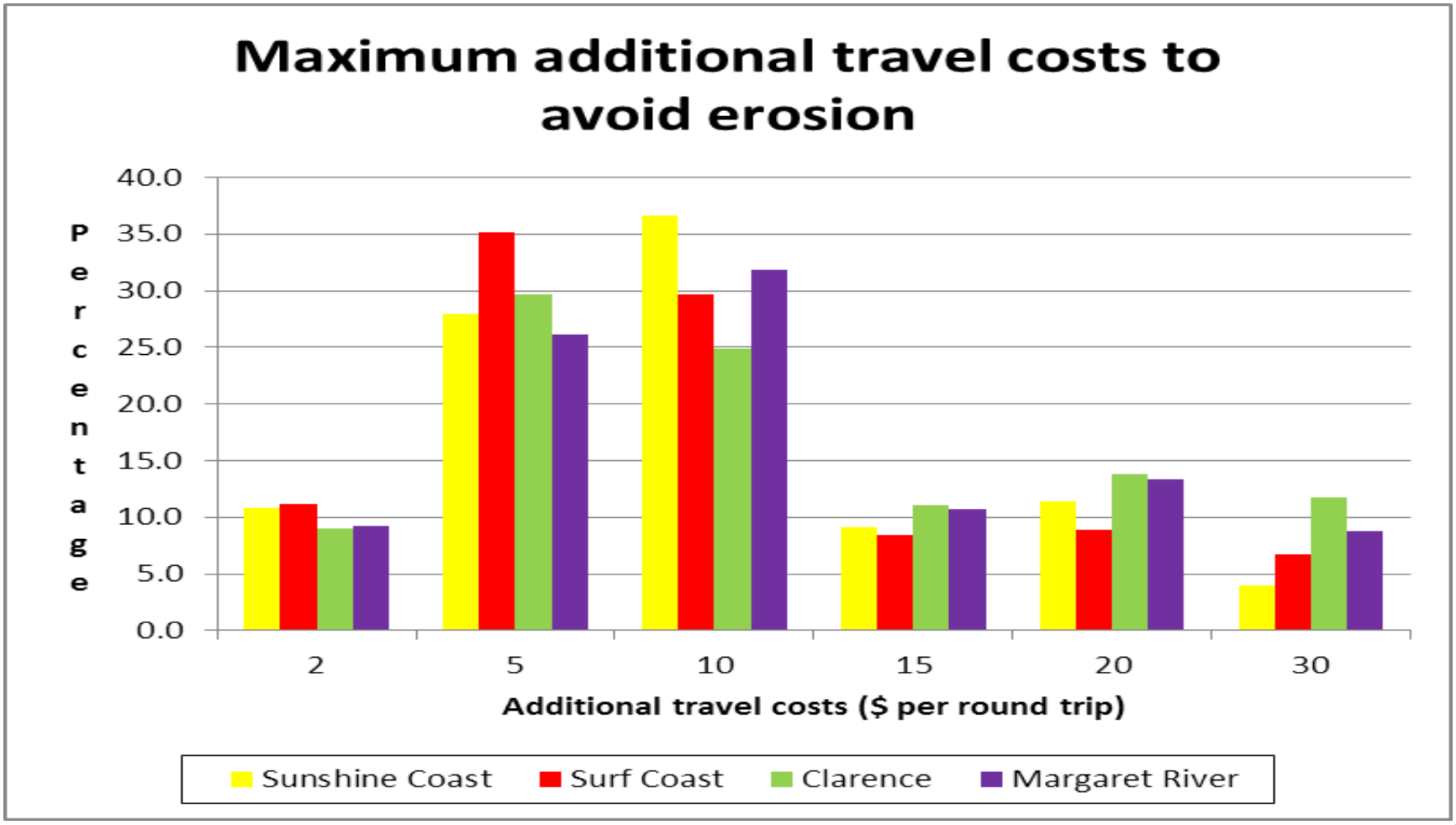
Resident's willingness to travel to avoid erosion



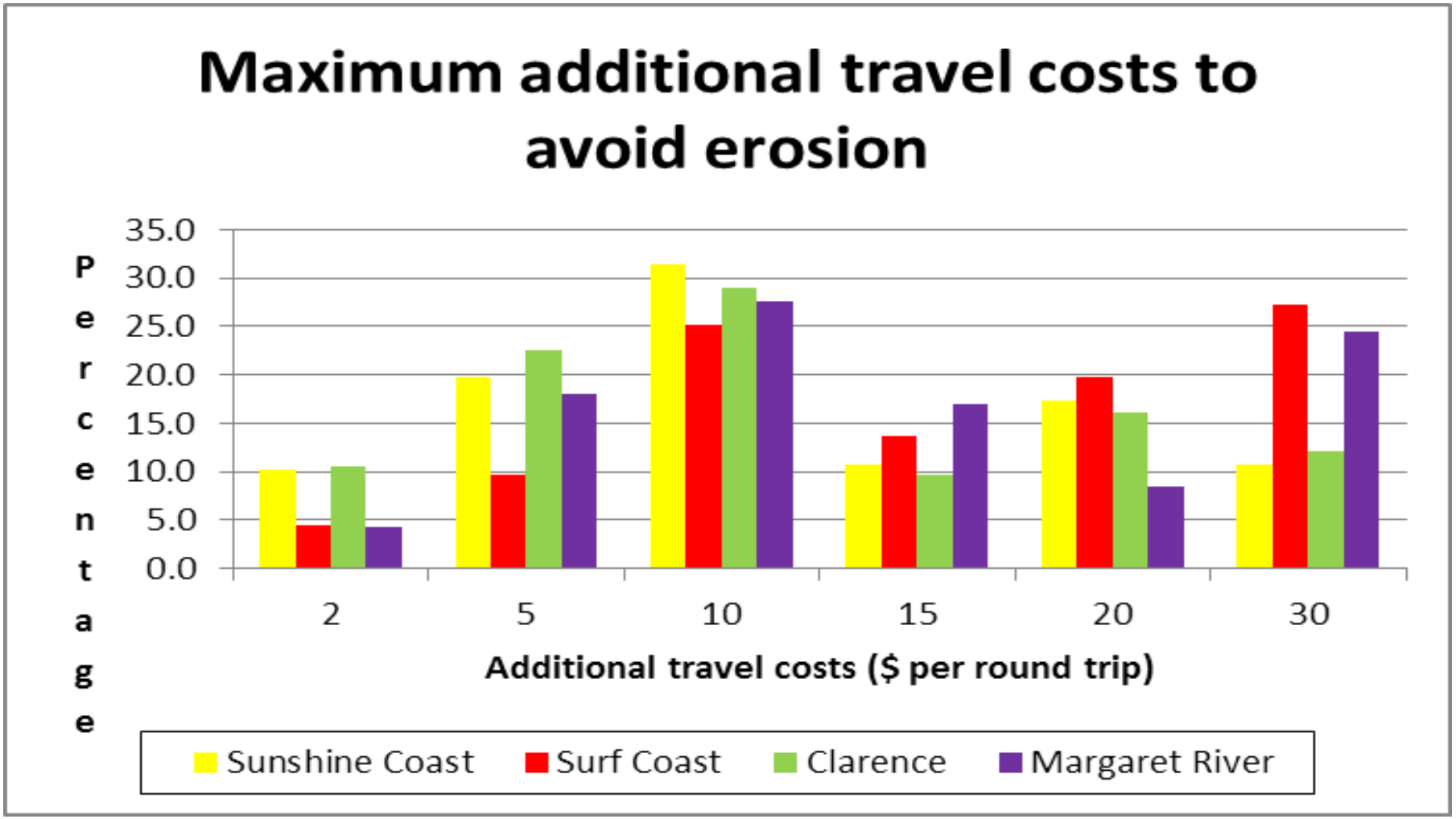
Tourist's willingness to travel to avoid erosion



Resident's willingness to pay to avoid erosion



Tourist's willingness to pay to avoid erosion



Potential economic loss due to resident response to beach erosion *

Case study	Annual value (million $A) of resident recreation		Proportion of total respondents affected by loss of sand AND unwilling to incur additional costs to visit alternative location	Potential economic loss (million $A) of resident recreation	
	Fuel only model	Fuel only plus time @ 40% of wage rate		Fuel only model	Fuel only plus time @ 40% of wage rate
Sunshine Coast	69.59	197.23	0.27	18.71	53.02
Surf Coast	6.09	9.58	0.26	1.55	2.44
Clarence Valley	31.60	48.17	0.34	10.62	16.19
Augusta-Margaret River	3.72	13.86	0.27	1.00	3.74

*** Assumes erosion is not repaired**

Potential economic loss due to tourist response to beach erosion *

Case study	Annual value (million $A) of tourist value	Proportion of respondents not willing to substitute their location	Proportion of those not WTP that are not influenced by sand	Potential economic loss (million $A) of tourist value
Sunshine Coast	270.17	0.23	0.10	56.62
Surf Coast	106.63	0.21	0.10	20.19
Clarence Valley	32.13	0.22	0.25	5.30
Augusta-Margaret River	24.58	0.25	0.06	5.70

* Assumes erosion is not repaired

Management strategies for minimising beach recreation value losses related to climate change

Basic Strategy	Actions/Examples	Key benefits
Increase beach related recreation space	• Beach nourishment, offshore reefs (for surfers). • Park development – green areas behind the beach (for families). • Walking and bike tracks (for exercisers).	Provides buffer to erosion, reduces congestion, greater recreation opportunity.
Increase alternative recreation sites	• Provide facilities and promote alternative water / open-space recreation environments, e.g. lakes, rivers, dams etc.	Reduces congestion. Can select locations which are 'climate-resilient'.
Increase beach access	• Improve access to remote beaches or beaches with difficult access. Provide ramps, stairs, parking - manage environmental impacts.	Reduces congestion. Opens up wider range of beach experiences
Increase resilience of beaches	• Beach nourishment and/or grooming. • Off-shore controls to reduce erosion.	Maintain use values of existing sites
Behaviour management / Communications	• Educate users – manage expectations! • Communication plans to provide information about beach conditions and expected repair rates after erosion events. • Tourism communication strategies to counter negative media – which beaches are actually affected and how badly?	Enables users to adapt to the conditions. Minimise tourism losses caused by negative media coverage.

Mike Raybould: mraybould@bond.edu.au

Project info and survey:

www.mybeachmysay.com

NCCARF
National
Climate Change Adaptatic
Research Facility

BOND
UNIVERSITY
BRINGING AMBITION TO LIFE

Griffith
UNIVERSITY

Australian Government
Fisheries Research and
Development Corporation