Valuing beach and surf tourism and recreation in Australian sea change communities

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Introduction

Many of Australia's iconic sandy beaches are already under pressure due to coastal development and the impacts of severe storm or flood events. These impacts are likely to be exacerbated by projected climate changes such as elevated water levels and potentially increased storm intensity. Beaches provide important recreation services for both residents and tourists but few studies in Australia have attempted to place economic values on this service. Thus, coastal authorities that are forced to make investment decisions relating to beach protection and restoration have insufficient data to conduct cost-benefit evaluations of projects where recreation values are significant.

This paper reports on a series of beach recreation surveys that were conducted as part of the national Beach and Surf Tourism and Recreation in Australia: Vulnerability and Adaptation project. Residents and tourists were surveyed in four case study locations, Sunshine Coast (Qld), Clarence Valley (NSW), Augusta-Margaret River (WA) and Surf Coast (Vic) chosen to represent different levels of development, geomorphology and vulnerability. The data was analysed using both the travel cost method and expenditure analysis to estimate recreation and tourism values respectively.

Methods

This section briefly describes the methods employed in estimating economic values of resident beach recreation, and the amount of tourism expenditure related to visiting the beach. It also details a contingent behaviour exercise, where people were asked how they would respond to erosion of the beach. The responses to this question provide some measure of the sensitivity of these economic values to resource conditions.

Estimating the value of resident beach recreation

Beach recreation values for residents were estimated using non-market valuation techniques, specifically the travel cost method (TCM). The TCM approach uses visitation behaviour of users of a resource of interest (in this case the beaches in the respective regions) as the basis for estimating the value of the use of the resource. By estimating the relationship between travel costs incurred to get to a site and the frequency of visitation, it is possible to estimate how users would respond to a change in access costs (analogous with an increased entry fee for a site), and hence their maximum WTP for the trip undertaken. This provides an estimate of the shape of the demand curve for recreation, which is not otherwise possible due to the absence of market price signals (see Figure 1).The application of the TCM provides estimates of a per person consumer surplus (CS) — a measure of the difference between actual expenses incurred in a beach visit and maximum WTP per person for a beach visit. For further information on the estimation process, please refer to http://www.ecosystemvaluation.org/travel_costs.htm

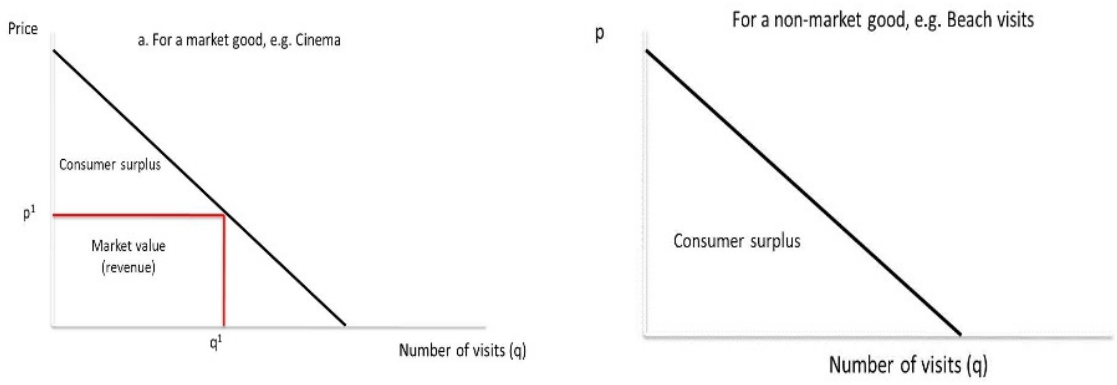

Figure 1 Consumer surplus of beach visits.

Estimating the tourism expenditure associated with beach visits

Expenditure analysis of beach recreation related to tourism was undertaken in response to requests from council officers in partner councils for details of direct expenditure associated with beach recreation to augment the resident consumer surplus estimates.

The expenditure analyses used data from the Tourism Research Australia (TRA) domestic and international visitor surveys, which include estimates of tourist visitation, per night expenditure and percentage of tourists that visit the beach. The beach-user survey data collected as part of the current project and the length of stay data from the TRA data were used to estimate beach visitation per night for visitors to each region.

Contingent behaviour

Previous TCM studies have suggested that changes in visitation frequency in response to erosion events or beach nourishment projects are more economically significant than any changes in consumer surplus (Whitehead 2005; Whitehead, Dumas et al. 2008). This project therefore asked respondents about how they would respond to erosion damage at their chosen coastal location. Respondents were asked to consider a hypothetical situation in which they visited a location and found that there was ‘no usable beach due to erosion damage’. They were asked about their willingness to travel to an alternative location.

It should be explicitly noted that this was framed as a single beach closure and one where suitable substitutes were readily available, whereas climate change impacts have the potential to result in permanent closure of some beach locations or coastal areas. The duration of closure is a key factor which is often neglected in stated preference surveys that ask about WTP to avoid beach closures, despite recognition in the travel cost literature of the importance of temporal substitution (Smith and Palmquist 1994).

Results

This section presents both the non-market estimates of the economic value of resident beach recreation in the case study areas, and the estimate of market expenditure associated with tourist visitation and use of the region that is related to the beach. It also presents the results of the CB behavioural surveys, which indicate that people would be negatively impacted by the loss of sand at their desired locations.

Resident beach recreation values

Table 1 shows the range of estimates for consumer surplus for resident recreation values based on the inclusion or exclusion of the cost of travel time in the TCM analysis.

Table 1 Resident beach recreation consumer surplus estimates

Case-study location	Consumer surplus per adult per visit ($/person/day)	
	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

Most management actions are concerned with the gross value of all beach recreation at a location or within a region, rather than the individual per person value. To estimate the gross value of beach recreation at a given location it is necessary to aggregate this individual value by the total number of beach recreation trips by all beach users. Data availability for total beach visitation for most beach locations in Australia is currently very limited, so this study asked residents to estimate their visitation in the previous month, in order to reduce recall bias. Visitation estimates ranged from 84 visits p.a. for the Sunshine Coast to 138 p.a. for Clarence Valley residents.

Using the BASTRA estimate of visits per year, we estimate the total value of beach recreation to residents of case-study locations. This estimate is shown in Table 2.

Table 2 Aggregate value of resident beach recreation value to case study locations

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

Tourist expenditure analysis

Expenditure analysis of tourist beach recreation was undertaken in response to requests from council officers from all LGAs for details of direct expenditure associated with beach recreation to augment the consumer surplus estimates.

The expenditure analysis used data from the TRA domestic and international visitor surveys, which includes estimates of tourist visitation, per night expenditure and percentage of

tourists that visit the beach. The beach-user survey data and the length of stay data from the TRA data was used to estimate beach visitation per night for visitors to the region.

Table 3 shows total annual estimates of beach visitation volumes in the Augusta-Margaret River region by each of the three categories of tourists recognised by the TRA data.

Table 3 Tourist beach visitation estimates – process

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	**234 000**	**0.25**	**1**	**58 500**
Total	**645 432**			**498 838**

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

The same process is undertaken for each of the case-study locations. Total beach visitation estimates are shown in Table 4 below. Data is again sourced from TRA estimates.

Table 4 Tourist beach visitation estimates (annual)

Case-study location	Total visits to LGA per annum	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**

Table 5 shows the gross travel costs of daytrip tourists to the case-study region who went to the beach. This is calculated by multiplying the travel cost per adult for daytrip tourists to the regions by the number of beach visits by day visitors from the previous step. The per adult beach visit expenditure for daytrip tourists is calculated using the mean travel distance, group size and vehicle type from the BASTRA beach-user survey.

Table 5 Tourist day-tripper beach recreation expenditure estimates

Case-study location	Average driving distance for return trip (km)	Number of adults per vehicle	Expenditure per adult beach visit (A$)	Annual gross expenditure – daytrippers (A$)
Sunshine Coast	220	2	12.10	13 849 176
Surf Coast	200	2	11.00	8 224 920
Clarence Valley	200	2	11.00	1 669 800
Augusta-Margaret River	400	2	22.00	1 287 000

Table 6 shows the gross beach visit related expenditure for the case-study regions for each of the TRA tourist categories. For Domestic overnight and International Tourists expenditure per visit is based on 50% of average daily expenditure for each day of the trip that they visit the beach. This assumed expenditure value is only included on the days on which they are estimated to have visited the beach and hence is likely a conservative measure.

Table 6 Tourist gross beach visitation expenditure

Case-study location	Annual value (million A$) of tourist value			Total
	Daytrippers	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

The estimates for the value to tourists represent actual expenditure, rather than CS. The figures were derived by combining trip characteristics from the BASTRA surveys with expenditure measures sourced from TRA. It therefore represents the 'realised' economic importance of beach-related recreation in each location. Consumer surplus estimates would be in addition to these figures. To place these figures in some sort of regional context, Table 7 provides a comparison of beach-related tourism expenditure and Gross Regional Product (GRP).

Table 7 Site-specific beach recreation values compared with GRP

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	1600	2.0%
Margaret River`	24.58	1220	2.0%

These figures indicate that the presence of attractive coastal assets is a key factor in the continued economic prosperity of the case-study locations, and is of critical importance for the Surf Coast. This has substantial implications for strategic planning, operational expenditure and sustainable tourism planning, as the loss of this income would have severe implications for the LGAs. Understanding the way in which people respond to changes in the state of these resources is therefore critical in selection of management and adaptation options.

Behavioural response to beach erosion

Around two-thirds of resident respondents in all case studies indicated that they would be willing to incur additional monetary or travel time costs to visit an alternative location. It is assumed that this substitution would not take them outside their 'home' LGA, and hence there is no net loss to the region.

In general, tourists were more likely to be WTP to avoid erosion impacts than the residents. This perhaps reflects that tourists have more substantial sunk costs and are therefore chasing their losses, or that they tended to be more wealthy than the residents sampled at the same location. Notably, visitors to Clarence Valley beaches are much more likely to be willing to incur time or monetary costs to maintain their beach experience than residents of the same location.

Take home messages

The economic value of beach and surf tourism and recreation varies significantly across the four case study locations, but are nonetheless substantial when compared to figures such as GRP of the region. Understanding the behavioural response to changes in the quality and accessibility of coastal regions is critical to informing coastal adaptation options, as the various behavioural responses dictate the economic impacts for the different classes of people affected by the decision. For example, if the beach user does not consider the sand to be important in their decision to visit a coastal location, then they are unlikely to change their trip, and hence there is no net economic impact due to erosion. If, however, they indicate that they would travel to an alternative destination (i.e. interstate travellers from Melbourne may choose to travel to Noosa rather than to Margaret River), then there are potentially large losses to the original beach location and the regional economy. These potential losses should be incorporated into planning and management decisions.

References

Smith, V. K. and R. B. Palmquist (1994). "Temporal Substitution and the Recreational Value of Coastal Amenities." The Review of Economics and Statistics **76**(1): 119-126.

Whitehead, J. C. (2005). "Environmental Risk and Averting Behavior: Predictive Validity of Jointly Estimated Revealed and Stated Behavior Data." Environmental & Resource Economics **32**(3): 301-316.

Whitehead, J. C., C. F. Dumas, et al. (2008). "Valuing Beach Access and Width with Revealed and Stated Preference Data." Marine Resource Economics **23**(2): 119-135.