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Estimating the value of beach recreation for locals in the Great Barrier Reef Marine Park, Australia

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ABSTRACT

Although more that 86% of Australia's population live less than 100kms from the coast and spend or invest a lot of money to gain access to the beaches, little is known about the intensity of their use and the economic value of beach recreation. Very few studies estimate recreational use value of beaches particularly for those living close (less than 10 km) to the beach (locals). They typically have dissimilar visit patterns and low or zero travel costs because of their proximity to the recreation site. This study uses the latent class framework to extend the standard count data models to estimates the economic value of beaches for locals in the Capricorn Coast region of the Great Barrier Reef in Queensland. Results indicate that values for beach use among the locals differ depending on their visit patterns. This information is essential when evaluating policy options associated with beach protection and management.

1. Introduction

Coastal zones, which include beaches and open waters, are increasingly seen as important resources that generate significant use and non-use values. However there are increasing concerns about protecting and sustainably managing these coastal resources due to increasing degradation and overuse (Kline and Swallow, 1998). Beach management policies are required to protect and preserve beaches from erosion and overuse. To assist in making policy decisions about whether and how much to invest in protecting beaches, it is necessary to understand the characteristics of beach users and their recreational use values.

Use values are benefits that accrue from using the resources either directly or indirectly. Direct use values of coastal resources particularly beaches include recreation, tourism, research and education, with recreation and tourism yielding the greatest direct benefits. Some of the other benefits or indirect use values attributed to beaches are protection from storm surges, providing a habitat for many animal and plant species, enhancing property values, increasing employment opportunities etc. (Hamilton and Cocks, 1996; GBRMPA, 2006). Beaches often provide free and easy access to a wide range of outdoor recreational activities like swimming, boating, surfing, fishing and walking for a range of user types and are one of the most popular forms of outdoor recreation (Bell and Leeworthy, 1990). In 1999, Australians took approximately 171 million day trips for recreation (Retschlag, 2001) with a quarter of these to the beach equating to an average of 2.26 day trips per person to the beach annually.[1] The 2004 National Visitor Survey reported that Australians took about 17.6 million overnight trips to the beach and spent approximately $13.1 billion during their beach trips (Beeton et al., 2006).

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[1] The total population of Australia in 1999 was 18,925,855 (ABS, 2008) and the number of day trips to the beach (42.75 million) gives an average visit rate of 2.26.

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Despite the wide range of benefits provided by the beaches there is limited literature on the value of beaches (Freeman III 1995; Blackwell, 2007a). Studies on beaches in Australia have focused predominantly on coastal engineering and geology, with a few studies that estimate the recreational use value of beaches in Australia (Kinhill Stearns et al., 1983; Pitt, 1992a,b; Blackwell, 2007b) and in the Great Barrier Reef (GBR) (Rolfe and Gregg, 2012).

Kinhill Stearns et al. (1983) estimated total annual value of beach recreation in Adelaide using the zonal travel cost method (ZTCM) to be between $17,101 and $52,633 for 100 m of beach. The study used a small data set with four zones which might have resulted in loss of information. Pitt (1992a,b) used both the travel cost and contingent valuation methods to estimate willingness to pay (WTP) for beach recreation and dune maintenance respectively. Both these studies estimated WTP only for tourists with local residents not included in the sample. The WTP by visitors for beach recreation was estimated to be $192 per visitor which was high and may have been overestimated because the study included fixed and capital costs such as costs of equipment used at the site. WTP for beach and dune maintenance was estimated to be 44 cents per visitor per day which was lower than expected. This low value could be attributed to a high proportion (22%) of zero responses and with a majority of the respondents of the opinion that taxes collected from locals should cover such expenditure.

Blackwell (2007b) estimated the economic value of a recreational visit to surf beaches along the Sunshine Coast in southeast Queensland and Western Australia using individual travel cost models (ITCM). Average travel costs were $14 per person per visit and the mean annual visit rate to beaches was 48 visits. Consumer surplus for beach trips was estimated to be between $0.50 and $250 per person per visit depending on the specification of the travel cost variable and the estimation methods used. The study sample included a mixture of both local residents and tourists with locals constituting about a third of the sample. The diverse nature of the sample could have contributed to low travel costs and the subsequently low estimates of value. Rolfe and Gregg (2012) estimated the value of beach recreation at six locations along Queensland's Coast using the travel cost models. They estimated that there were 16.7 million beach visits annually to these beaches and the willingness to pay for a beach visit ranged from about $23.79 per person in Cairns to $56.98 per person in Rockhampton. The study had a combined sample of local residents and tourists. Travel distances to the beaches for local residents varied from about 9.7 to 31 km.

A review of these studies shows that their samples contained a mixture of local residents who lived close to beaches and those that travelled to visit the beaches. None of the studies distinguished between locals (those who live within a 10 km radius of the beaches) and those that travelled more than 10 km to the site. These two visitor groups are distinct and have different characteristics. For instance, the locals are different to the other groups that visit the beach for two reasons (i) high visit rates and low travel costs and (ii) heterogeneity in visit rates i.e. some visit more often than others. The studies in literature so far have not distinguished between or accounted for the heterogeneity of locals living close to recreation sites such as beaches. This paper addressed this research gap in estimating recreational beach use for those living close to the beaches taking into account the heterogeneous nature of visit rates by extending the standard count data models through latent class framework which assumes that the observations are drawn from a finite number of groups which have different covariate and slope coefficients.

The paper is organised as follows, Section 2 presents the methodological approach while Section 3 describes the study area and data. Section 4 reports the results of the main models and benefit estimates and Section 5 discuss the results and concludes.

2. The travel cost model and welfare estimation

The travel cost method has frequently been used to value outdoor recreational activities (Shrestha et al., 2002; Loomis, 2003; Martínez-Espiñeira et al., 2006; Bowker et al., 2007; Fleming and Cook, 2008; Donovan and Champ, 2009). The individual maximises utility based on the number of trips to the site (*Trips*), the quality of the site (q) and the vector of the individual's socioeconomic and demographic variables likely to influence trips to the recreation site (z) such as age, recreational activities available at the current site, proximity to substitute sites and costs of travel to substitute sites (Freeman III 2003). The individual maximises utility as follows

$$\begin{aligned} &\text{maximise} : u(Trips, q, z) \\ &\text{subject to} : M + p_w * t^* = tc * Trips \end{aligned} \tag{1}$$

where M is income, p_w is wage rate, t^* is total discretionary time which includes travel time and time spent on-site, tc is travel costs of a visit. The solution to this problem yields individual demand for visits to the recreation site

$$Trips = r(tc, M, q, z). \tag{2}$$

The relationship between travel costs and the number of trips to the site is expected to be negative. Consumer surplus is the area under the demand curve between the individual's current price and their choke price (the price at which trips fall to zero). This can be mathematically represented as in Eq. (3) and applies to any functional form (Parsons, 2003).

$$CS = \int_{tc_0}^{tc_{choke}} f(tc, M, q, z)dtc. \tag{3}$$