Recreation value of a new long-distance walking track

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A large recreation value may be expected for a long-distance walking track which allows for hiking and camping in a tropical rainforest environment. When such a resource is new, sufficient data are not available for a primary study. A practical way to obtain a value estimate is by employing benefit transfer procedures. Using a travel cost analysis for the Thorsborne Trail as the transfer source, a consumer surplus estimate for the new Cannabullen Track was estimated at about Aus$300 per person per year. This value may contribute to management decisions about further development of facilities along the track and about user fees.

Keywords: benefit transfer; environmental value transfer; consumer surplus; zonal travel cost; Queensland

In north Queensland, which has a strong reliance on the tourism dollar, there is a demand for genuine experiences in natural surroundings away from the typical tourist sites and a growing interest in opportunities for walking in more remote areas through the rainforest (WTMA, 2002). Until recently, there were few long-distance hiking opportunities (requiring at least one overnight stop) in the wet tropics rainforests. Seed funding for the construction of a network of walking tracks was obtained from the government as part of the Centenary Year of Federation in 2001. This track network, called the Misty Mountains Trails, consists of medium- and long-distance walking tracks through high quality tropical rainforest. In addition to providing a long-term recreation asset, it was considered that the development of a linked network of tracks would stimulate tourism and promote economic growth for the nearby small towns of Ravenshoe, Millaa Millaa, Mena Creek and Tully (WTMA, 2001). Unfortunately, after only one season of being open, these trails were in the direct path of Cyclone Larry in 2006 and suffered much damage.

To assist with management decisions about the provision of facilities, as well as about the extraordinary expenditure as a result of the cyclone damage and for policies of user pays, it is useful to have an estimate of the value people might place on such tracks. In this paper, recreation use values are estimated and it is recognized that these are only part of the total economic value of a walking track.

Special techniques are required to determine the recreation value of a newly created, and now not fully usable, recreation asset because insufficient visitation information is available. Useful benefit and cost estimates can be obtained using *transfer* techniques. A study of a similar resource is required to be the source study for transfer. In this paper, the source is a travel cost (TC) study of the Thorsborne Trail.

The transfer process is reviewed briefly in the following section and the criteria required for successful transfer are presented. Then, the source track and the target track are compared with respect to these criteria. In the next section, the TC methodology is explained and applied to estimate demand and a recreation value for the source track, the Thorsborne Trail. The transfer procedure is then applied to obtain an estimate of recreation value in the form of consumer surplus for one of the new long-distance walking tracks in the Misty Mountains Trails network (namely, the Cannabullen Track). Discussion and concluding comments complete the paper.

Environmental value transfer

In the demand analysis literature, much has been written about *benefit transfer*. In 1992, the *Water Resources Research* journal devoted a special issue to studies in benefit transfer. These papers summarized the research to date, pointed out conceptual problems and the need for guidelines for deciding when the application of benefit transfer was applicable. An alternative terminology, *environmental value transfer*, is sometimes preferred (Brouwer, 2000) because economic valuation techniques can also measure benefits foregone, the values of which are described more appropriately as costs rather than benefits. Benefit transfer, or value transfer, refers to the use of existing information from a source site in a different context for which little data exist. For a new recreation resource, a value estimate may therefore be obtained by transfer.

There are various forms of transfer, such as transfer of a mean or median value, or else an entire demand function may be transferred to the target site. The latter is expected to produce better results (Loomis, 1992). The demand equation may be obtained from a single non-market estimation for a similar site, or may be obtained from several studies or sites (called a pooled model) (Pearce *et al*, 1994), or it may come from a meta-analysis where past research results are synthesized and summarized in a multivariate model (Smith, 1992; Parsons and Kealy, 1994; Rosenberger and Loomis, 2000b; Piper and Martin, 2001). The advantages of using benefit transfer are the time and money savings on a primary study, and value estimates may be obtained for a site where a primary study is not possible.

The degree of accuracy required of benefit transfer depends in part on how the results will be used. All models have errors. What is at issue is how important these errors are to the intended use. The minimum degree of accuracy necessary is related to the cost of making a wrong decision based on the results of the transfer. Brookshire and Neill (1992) and Desvousges *et al* (1992) discussed a continuum of accuracy for benefit transfer based on the intended use. If the outcome is simply a gain in knowledge where inaccuracies involve small cost to society, a low level of accuracy is acceptable. If the environmental

policy decision maker uses the benefit transfer approach to set broad priorities for action, this may require a middle level of accuracy. When the transfer is used to determine a just compensation in the context of natural resource damage litigation, a high level of accuracy is required since the costs to society of a wrong decision may be large.[1] In this study of walking tracks, a middle or low level of accuracy may be all that is required. As noted by Rosenberger and Loomis (2000a), recreation decisions can be improved by the inclusion of estimates of non-market recreation values, even if these values are only approximate. Some estimate is better than none.

As with other economic measurement techniques, value estimates generated by benefit transfer are subject to error. Measurement errors are inherent in original source site values or arise within the methodologies employed. When the benefits obtained are transferred, such errors or biases will be compounded (Bergstrom and de Civita, 1999). The total error associated with the recreation value after transfer is a combination of random error, measurement error involved in the initial estimation at the source site and error or bias resulting from the transfer process. Random error is unavoidable and measurement error is already present in the source study. Therefore, it is necessary to concentrate on minimizing the transfer error.

The error arising from the transfer process can be minimized under certain conditions. Effective and efficient benefit transfers may arise when (a) there are strong similarities between the populations for each site; (b) there are strong similarities between the characteristics of the two sites; and (c) the time elapsed between the original study and the transfer is relatively short (Boyle and Bergstrom, 1992; Desvousges *et al*, 1992; Smith, 1992; Brouwer and Spaninks, 1999; Rosenberger and Loomis, 2000a; Piper and Martin, 2001). The greater the similarity between the populations and the characteristics of the two walking tracks, and the shorter the time difference, the more accurate the transferred estimates will be. In addition, the quality of the transfer will depend on the quality of the study used as the source for the transfer. Some studies concerning the error involved in a transfer have tested for validity using primary data at more than one site. In such cases, the transfer estimates may be compared with the values obtained from primary data (Loomis *et al*, 1995; Kirchhoff *et al*, 1997; Morrison *et al*, 1998). Frequently, large errors have been found. In the present case, this would not necessarily constitute a problem because it is expected the estimates will be used as a general guide for trail managers.

The central walking track in the Misty Mountains Trails network, called the Cannabullen Track, has been selected as the target track for transfer. It is considered that the source Thorsborne Trail and the Cannabullen Track have many close similarities and therefore a transfer of values from one to the other may be made readily. The resemblances in the features are presented in the next section.

Comparison of the two walking tracks

Both walking tracks are located in World Heritage Areas in north Queensland, Australia. The 38 km-long Cannabullen Track is in the Wet Tropics World
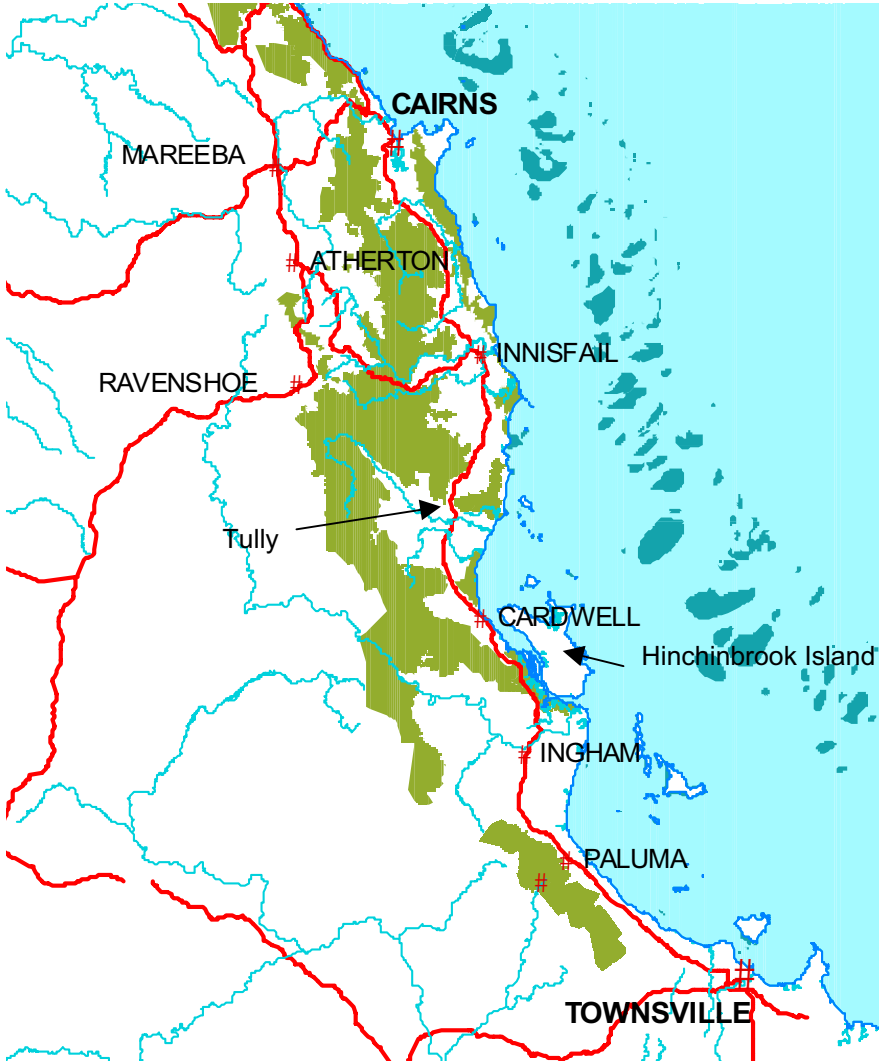
Figure 1. North Queensland and part of the Wet Tropics World Heritage Area.
Source: McDonald and Lane (2000).

Heritage Area (WTWHA) and starts 50 km west of Tully, ascending the ranges
to finish near Ravenshoe on the Atherton Tablelands. These towns are shown
in Figure 1, where the shaded area indicates part of the WTWHA. The 32 km
Thorsborne Trail traverses the east coast of Hinchinbrook Island, which is in
the Great Barrier Reef World Heritage Area. This island is located near the
town of Cardwell, shown in Figure 1.

The Thorsborne Trail and the Cannabullen Track are located in the wet
tropics[2] region of Queensland and so experience a hot and humid climate and
heavy seasonal rain during the summer. Three overnight stops are recommended
for each track and only minimal facilities (camping sites and composting toilets)

are provided. The hiker on each trail will suffer the same annoyances, such as mosquitoes, march flies and leeches. Rainforest, creeks and waterfalls are features of both trails, but the Thorsborne Trail has more variety of scenery (including beaches, grassland and eucalypt forests). Visitation to both trails is limited over the summer months by the high temperatures and rainfall. It is noted that Tully is one of the wettest towns in Australia, with an exceptionally high rainfall averaging over 4,000 mm (160 inches) of rain per year. On parts of both trails, hikers may encounter day-trippers. Day-trippers to the Cannabullen Falls use part of the Cannabullen Track. On the Thorsborne Trail, sea kayakers use one of the campsites and a nearby swimming hole, and day-trippers visit some of the bays and beaches by boat.

Both tracks are in remote areas and so the hiker should be able to expect and enjoy a wilderness experience with isolation and solitude. Along both tracks, hikers have views of waterfalls and the creek water is unpolluted and drinkable. Other similarities are associated with the anticipation of seeing different or rare animals. On the Thorsborne Trail, hikers cross a swamp and some rivers where the signs warn that 'Crocodiles inhabit this area'. It is known that cassowaries and tree kangaroos inhabit the mountain areas, so hikers on the Cannabullen Track may hope to experience a sighting of these rare animals. Similarly, both trails are in regions where there are feral pigs and native white-tailed rats. A close encounter with a crocodile, feral pig or a cassowary can be dangerous (and hence exciting for some), whereas the native rats can become a nuisance at the camping areas.

Both trails are managed by Queensland Parks and Wildlife Service (QPWS) and so have the same rules and regulations. Registration, bookings and camping permits are required and the same camping fees per night apply. Hikers and campers are required to be totally self-reliant and self-sufficient and to follow the *minimum impact* rules. No garbage bins are provided and campers and hikers must carry out all their own rubbish.

Since the trails are in remote areas, access to the trailheads is not particularly easy and the costs of access and pickup at either end of the Thorsborne Trail and the Cannabullen Track are high. The former includes the ferry cost to and from the island and possibly bus return to Cardwell. Access costs to the Cannabullen Track may be high, particularly at the lowland end of the track, which is about 50 km from the nearest town, Tully. The characteristics of both tracks that are closely similar are summarized in Table 1 according to their physical and aesthetic features and management regimes.

The main difference in management regimes for the trails is that visitation to the Thorsborne Trail, which is booked to capacity in the cooler months of the year, is strictly controlled and limited to a maximum of 40 persons per day on the trail. Also, group size is limited to a maximum of six and permits are not issued for longer than seven days. The reasons for these limits are both environmental (to limit damage) and social (to provide a wilderness experience). The need for such limits does not exist so far on the Cannabullen Track.

Comparison of populations and time

One feature of long-distance walking tracks that would be expected to contribute to a more accurate transfer is usage by a wide range of people.

Table 1. List of closely similar features of the two tracks.

Physical features	Aesthetic features	Management
Linear walking tracks	Remote region	Managed by QPWS
Length (32 and 38 km)	Wilderness experience	Permits and camping
Three nights camping	Isolation	fees required
Rough track classification	Anticipation of rare animal view	Self-reliant campers
Tropical climate	No mountain bikes or horse riding	Minimum impact rules
Heavy summer rainfall	Limited facilities	Both in WHAs
Creeks and waterfalls	Clean creek water	High access cost
Access difficulties		

Hiking and camping are not pastimes that require the participant to have a high income or special skills. The level of difficulty along a formed track does not require the hiker to have specialized knowledge, equipment or expertise. So, hikers of either of the long-distance walking tracks would be expected to be of all ages and have a wide range of backgrounds and expectations. They could be described as heterogeneous and would constitute a broad spectrum of the population. The diversity may be expected to facilitate any value transfer, especially when the track at the source site and the proposed track offer similar challenges, experiences and level of difficulty, as in this case.

Initially, before the Cannabullen Track develops a good reputation, it is expected that many of the hikers will be drawn from the local regions. They could use a long weekend to hike the trail and their trip would have the sole intent of experiencing the Cannabullen Track. If a transfer were made from the Thorsborne Trail where only such single-site visitors were included in the analysis, it would be expected that the populations from which the hikers of the two trails were drawn would be closely similar.

The time difference between the original Thorsborne Trail survey and the transfer is about six years. During this time, the infrastructure and people's preferences would not have changed, so the quality of the transfer should not be affected adversely. For benefit transfer, the criteria of similarities between site and population characteristics have been satisfied to a high degree between the Thorsborne Trail and the Cannabullen Track.

Controversial issues associated with the travel cost method

TC methodology was applied to data from hikers of the Thorsborne Trail (surveyed over twelve months from September 1999). Since most hikers (83%) were hiking the trail for the first time, the zonal rather than the individual travel cost methodology was appropriate.

Identification of zones

In Australian TC studies, it is convenient to identify zones based on statistical divisions[3] within each state of Australia, population data of which are readily available from the Australian Bureau of Statistics (ABS, 2001). Using the

statistical divisions as zones has the advantages that population data are readily available and the boundaries are set by the ABS and therefore are not researcher-assigned, with possible bias. Sample members were found to originate from all states of Australia, but not all statistical divisions. It would be expected that those hiking the Thorsborne Trail as the sole purpose of their trip would be more likely to come from the closer local regions. This was found to be the case, with 71% of single-site visitors coming from the statistical divisions that included Townsville and Cairns. There were no single-site Thorsborne Trail visitors from Western Australia, South Australia or rural areas of Victoria and Tasmania. Remote rural zones with zero visitations were not included, resulting in 14 zones being used in the analysis.

Substitute sites

It is important to take into account the presence of alternative long-distance walking tracks for either the source or target track since the price of substitute sites will have an impact on the estimation of recreational demand (Bateman, 1993). No alternative long-distance hiking opportunity existed in north Queensland at the time of the Thorsborne Trail survey. A high proportion of the respondents were regular hikers, which suggested low substitutability between long-distance walking and other recreation activities (Cook and Harrison, 2002). If people plan a long-distance hike, they do not consider a day at the beach (for example) to be a substitute activity. Thus, no substitutes were included for the Thorsborne Trail and it was not relevant to include individual characteristics of the trail in the analysis since no choices were available.

The Cannabullen Track, on the other hand, is one of three long-distance walking tracks in the Misty Mountains Trails network and so there are two other long-distance trails of similar length and difficulty in close proximity. These must be taken into account in the transfer process, otherwise the source site values will be overestimates for the Cannabullen Track. The three long-distance trails in the Misty Mountains network have the same remote access and associated difficulties, the same length and pass through similar tropical rainforest environments. They are under the same management regime, camping rules and camping costs and so the values for the three long-distance trails can be considered equivalent.

The fact that visitation to the Thorsborne Trail is strictly controlled and capped at 40 people per day indicates that visitation to the Cannabullen Track is not likely to displace visitation to the Thorsborne Trail, but rather will absorb the excess demand. The total demand for three- to four-day hiking in north Queensland will be shared between the three Misty Mountains Trails and the Thorsborne Trail.[4] The absorption of excess demand indicates that part (or all) of the benefit estimates for the new trail are additional or new benefits. Additional utility may arise from new users or greater utility experienced by locals who have hiked the Thorsborne Trail multiple times and are looking for a new long-distance hiking facility.

Multiple destination visitors

One of the major assumptions of the TC methodology is that only one site is visited per trip. In other words, all the travel costs are incurred exclusively to

obtain access to the particular recreation site being valued (Haspel and Johnson, 1982). When the site is remote but unique, some visitors travel from far distances and so the hike for them is one of a group of activities and other destinations. If all visitors are included in the analysis and the total TCs for visiting multiple sites are adjusted, with only part thereof being applied to a single site, the basis of the TC procedure is undermined (Beal, 1995). TC methodology (TCM) relies on the tenet that demand falls to low levels when prices rise to high levels. If the total costs for multiple destination visitors are used for the one site, then TCM overestimates the benefits attributable to that site (Loomis and Walsh, 1997). On the other hand, the problems associated with cost allocation for multiple sites are avoided or eliminated when only single-site visitors are analysed. It is desirable in this case to consider only single-site visitors so that the transfer source and target sites have similar populations. Using only single-site visitors, though, may result in an underestimation of consumer surplus.

The treatment of overseas visitors can vary. One option is to take their costs of travel from their temporary residence. Prayaga *et al* (2006) did this, treating all overseas visitors (to the Gemfest event in central Queensland) as coming from the local region. On the other hand, Carr and Mendelsohn (2003) treated the home country of international visitors (to the Great Barrier Reef) as a zone in their TC analysis. They determined the benefit (ostensibly consumer surplus) for each zone and the total was expressed as the value of the recreational benefits of the Great Barrier Reef.[5] In the Thorsborne Trail study, about 30% of all respondents were from overseas. It was considered, from an Australian perspective, that their expenditure while in Australia might be considered more appropriately as contributing to producer surplus and not to consumer surplus (which is measured by the TC procedure). Therefore, in this paper, overseas visitors and Australians for whom the Thorsborne Trail was one of multiple sites visited were not included in the analysis.

Inclusion of time

In TC models, it is hypothesized that the rate of visitation is dependent on TC and some other variables. The inclusion of travel time and on-site time, as well as the value of time, have been discussed by many authors (Bockstael *et al*, 1987; McKean *et al*, 1995; Loomis and Walsh, 1997; Berman and Kim, 1999). In the Thorsborne Trail study, *on-site time* was not included since there was little variation in the time spent on the track (limited to between four and seven days), the long-distance nature of the trail was the reason for the trip and the experiences over those few days provided utility (enjoyment and satisfaction). Thus, on-site time may be considered more of a benefit than a cost. The marginal utility of on-site time is at least equivalent to that which may be obtained from alternative activities (Whitten and Bennett, 2002). Beal (1995) also concluded that if there was a net benefit from the visit, then the cost of on-site time might be omitted from the estimation of travel cost.

Most TC studies in the literature are for day trips to rivers, lakes or mountains, involving hours of on-site time rather than days. An exception is the Fix and Loomis (1997) study of mountain biking in Moab, Utah (USA), where the average length of stay is around four days. Time (especially leisure

time) is a scarce resource for many people and travel time may be traded off against money by choosing a more expensive, but quicker, form of travel (for example, air travel rather than motoring). This is especially relevant for Australian visitors to north Queensland, which is remote from Australia's main population centres. For example, the nearest capital city to Cairns is Brisbane, which is either two hours of flying time or two days of driving away. The various modes of transport employed by respondents have been taken into account when determining the TC variable. This has been calculated as the sum of the cost of boat transfer to the island, camping fees, car, bus, rail or air travel expenses and accommodation costs for the night before starting the walk (when applicable).

Travel cost analysis for the Thorsborne Trail

For the Thorsborne Trail during the 12-month survey period, 485 question-naires were returned, representing 1,101 people, 784 of whom were Australian. Of the Australian hikers, responses representing 440 people (56%) indicated that the hike was the sole purpose for the trip. During the survey period, 1,199 Thorsborne Trail camping permits were issued by the QPWS for 2,987 people (Hunter, 2002). Assuming the same proportion as in the sample, 2,127 of these were Australians. The sample fraction for single-site visitors therefore is 440/2,127, or 0.2069. This was used to calculate the visitation rate (VR) variable, which represented the number of visitors per year per 10,000 population for each zone, expressed as:

$$VR_i = \frac{V_i}{N_i \times 0.2069} , \tag{1}$$

where V_i = number of visitors from zone i and N_i = population of zone i over 14 years of age (in 10,000).

There is no theoretical reason for choosing one functional form over another at this stage of the TC model. Various forms were estimated, including travel cost and socio-economic variables of age, education and income as explanatory variables. As in many zonal TC studies, the socio-economic variables were not significant, even at the 10% level. This is not surprising since people of any age group can hike and such activity does not require expensive equipment or specialized knowledge. The amount of discretionary income is an important determinant for recreation activities that have high equipment costs, such as boating and skiing, but not for activities such as hiking or local fishing (Mercer, 1977). In agreement with other recreational studies (for example, Knapman and Stoeckl, 1995; Stoeckl, 1995), it was found that the respondents were highly educated, with nearly 70% holding a tertiary degree.

There are two approaches that may be taken when estimating a zonal TC model. One approach is the two-stage methodology described by Clawson and Knetsch (1966) and the other is a gravity model approach often used in geography and transport studies to model commuting decisions (Garrod and Willis, 1999; Haab and McConnell, 2002). Models from the two approaches have many similarities. They both obtain the visitation rate to a particular

destination as a function of the cost of travel and other variables, such as measures of site quality and socio-economic characteristics. This is called the trip-generating function and is what Clawson and Knetsch define as their first-stage relationship. Both models present analysts with problems of deciding what to include in the cost component (for example, travel cost, time cost, on-site costs) and how to deal with substitute sites and multiple destinations. Both models separate the origins into zones for which population information is available. Ewing (1980) presents an excellent summary of the various types of gravity model which may be used. Both models increment the TC variable in each zone until visitation drops to zero. The increment is a proxy for an entry fee and, since it is added to the TC variable ($TC + \Delta c$), the same coefficient applies to both. The TC methodology, therefore, relies on the assumption that people respond to an entry fee in the same way that they respond to an increase in travel costs.

Essentially, the two-stage method determines aggregate visitation from each zone for a set of hypothetical entrance fees and then determines the consumer surplus (CS) from the resultant price–quantity demand function. The gravity model determines the CS for each zone and then aggregates them to obtain the total CS. For ease of future transfer, the gravity model method is used here.

For each zone, the TC variable was incremented until visitation dropped to zero. The increments began with zero (at the current travel cost) and the final increment obtained the zonal choke price for which visitation became zero. The CS for each zone was calculated and then all were summed to obtain the total CS value for the Thorsborne Trail.

The TC trip-generating function for single-site visitors was found to be:

$$\ln VR = 2.554 - 0.00358\,TC \quad \text{(adjusted } R^2 = 0.412), \quad\quad (2)$$
$$\quad\quad (0.005) \quad\quad (0.0079)$$

where VR = visitation rate per 10,000 population, TC = travel cost (Aus$) and the p-values for the coefficients are given in parentheses.

Other functional forms were estimated but were not selected because they had less explanatory power or no price increment could be determined, which drove visitation levels to zero.

The sum of all the zonal integrations gave a CS estimate for the Thorsborne Trail of Aus$396,660 for the 12 months of the survey,[6] which converted to Aus$197 per trip, or Aus$49 per person per night, since the average number of nights spent on the track was 3.8. In order to compare this value with other studies, it may be useful to express the benefit in 'per day' terms. If people camp for three nights, then they are spending four days on the trail. Using 4.8 as the average number of days hiking, the CS becomes Aus$38.85 per person per day.

Transfer to the Cannabullen Track

In order to transfer the demand estimates to the Cannabullen Track, a level of expected visitation is needed which takes into account the presence of substitute long-distance tracks. It is noted that the composition of visitation may change

over the years. In the short to medium term (the first few seasons after opening), as a result of the widespread promotional programme conducted and the local interest generated by the development, it would be reasonable to assume that visitation from the local regions to the Misty Mountains Trails would be high. This may decline in total later on. Visitation from interstate (and overseas) may be slow in the early years and will increase as the area and the walking tracks become better known.

Estimates of visitor numbers have been obtained from an early feasibility study for a new long-distance walking track in the wet tropics (Vollbon and Davern, 1994) and from the marketing manager for the Misty Mountains Trails network (Sorensen, 2003). The latter estimates have been based on studies, such as Bentrupperbäumer and Reser (2002), that have surveyed visitors at popular tourist rainforest destinations where short walks are available. There is a shortage of studies such as the Thorsborne Trail survey, which target people who actually have demonstrated their interest in long-distance walking by completing at least one long-distance, three-night hike. Anecdotal evidence indicates that locals who have walked the Thorsborne Trail many times are eager to try out a new long-distance walk in the region.

Taking into account the existence of three long-distance walking tracks in the Misty Mountains Trails, the mountain location of the trails that prolong the hiking season in comparison to coastal hiking and also the absorption of the excess demand for the Thorsborne Trail, a level of visitation of about 1,800 per year is expected for the Cannabullen Track. This is slightly more than half the current Thorsborne visitation level. It is noted that this level of visitation is much below the approximate 6,000 independent walkers per year on the Milford Track in New Zealand.

The demand equation that was used to derive the CS for the single-site Thorsborne visitors was Equation (2) above. Using half the Thorsborne visitation levels in each zone, the equation becomes:

$$\ln VR = 1.861 - 0.00358 TC,$$

which can be rearranged to obtain a relationship between the level of visitation and the travel cost:

$$V = N \times 0.2069 \times \exp(1.861 - 0.00358 TC).$$

For each zone, the visitation level was estimated using TC plus increments representing changes in entry fee. The increment that drove visitation to zero in each zone was noted and then the CS for each zone was estimated by integration from zero (since the entry fee at present is zero) to the maximum increment. The summation of the separate zonal CS values produced a total CS estimate for the Cannabullen Track of Aus\$325,140 per year, or Aus\$305 per person. To judge the sensitivity of this estimate, visitation levels of one-third and two-thirds of the Thorsborne zonal visitation levels were also used. The estimated equations and the corresponding CS estimates are presented in Table 2. Although the annual CS values have a wide range, per person values are all close to Aus\$300. These values, therefore, are not sensitive to changes in level of visitation.

Table 2. Consumer surplus estimates from different visitation levels.

Visitation level	Estimated equation	Consumer surplus per annum (Aus$)	Consumer surplus per person (Aus$)
709	$\ln VR = 1.86 - 0.00358 TC$	205,900	290
1,064	$\ln VR = 1.46 - 0.00358 TC$	325,140	305
1,418	$\ln VR = 2.15 - 0.00358 TC$	444,940	314

Discussion

In Queensland, there is a general policy of no charges for entry into National Parks, although there are exceptions for unique sites. The application of the principle of *user pays* is capable of generating funds for resource management. For example, visitors to the Great Barrier Reef pay a fee (currently Aus$4 per visit), which is collected by the tour-boat operators. Also, visitors to Fraser Island have paid vehicle access fees (currently Aus$32.60 per month or part thereof) and camping permit fees since 1986. If visitors are willing to pay more money for their experience (thus generating consumer surplus), then opportunity exists to charge more in order to produce extra funds for management. Long-distance walking tracks in the wet tropics rainforests are inimitable and the estimated CS value for such is large, so user fees could be considered.

The new Misty Mountains Trails initially have been opened with minimal facilities, which contribute to the close similarity with the minimal management 'wilderness' experience along the Thorsborne Trail. In the future, if accommodation huts or lodges were built, complementing other well-known tracks such as the Overland Track in Tasmania and the Milford Track in New Zealand (both of which have a summer hiking season), the recreation value would be expected to increase. The provision of more facilities would make the hiking trails more appealing to a wider population, which could include the 'older' age group. The number of post-World War II 'baby boomers' nearing retirement in many countries is growing. They are considered to have high disposable income and to be fit and healthy and able to participate in a long-distance hike, but may prefer to spend larger amounts of money in order to avoid 'roughing it'. The provision of huts along the new track would cater more for this segment of the tourist population and would contribute to the new track possibly developing into an icon recreation asset attracting foreign and domestic tourists. Currently, advertising efforts are concentrated on attracting and catering for younger backpacker tourists. With an expansion of interest to a wider population, the CS estimate obtained in this paper might be considered to be on the low side.

In this paper, the recreation value of the Thorsborne Trail (in terms of consumer surplus) was determined using zonal TC methodology and was estimated to be Aus$396,660 for the 12 months of the survey, which converted to Aus$196 per person per trip. The Thorsborne Trail was used as the source site for benefit transfer to the new Cannabullen Track. For benefit transfer, the

criteria of close similarities between site characteristics and populations at the source and target sites were found to have been satisfied. The time between the original study and the transfer is short enough not to affect the quality of the transfer adversely. The adjusted Thorsborne Trail demand curve was transferred to become the demand curve for the Cannabullen Track, which provided a CS estimate. Three visitation levels were used and the recreation use benefits accruing to hikers were found to be Aus$300 per person per annum (in 2002 dollars). Since the majority of hikers on the Thorsborne trail are not repeat visitors, it is likely that the same situation will hold on the Cannabullen Track. Therefore, the Aus$300 per person per annum may also be the per trip value, which compares closely to the value obtained for the mountain biking trail of approximately US$200 per trip in 1997 (Fix and Loomis, 1997).

The Aus$300 per person per trip estimate is higher than that obtained for the Thorsborne Trail. The two value estimates indicate that hikers place a high value on the experiences gained from a long-distance walking track and thus indicate a strong demand for such recreation services. Such estimates have policy implications for government investment in long-distance walking track infrastructure and maintenance. These results may influence management decisions relating to the future expansion of facilities or a policy change to allow for some user-pays fees.

Endnotes

1. In the cases of decisions that would lead to potentially irreversible losses of scarce environmental attributes, the cost of making a wrong decision may be so high as to justify expenditure on a primary study instead of performing a benefit transfer.
2. All of North Australia is in the tropics, but only north-east Queensland has the high rainfall which allows classification as wet tropics. The vast majority of Australia north of the Tropic of Capricorn is classified as wet–dry tropics, characterized by two broad seasons – a cool to warm dry season and a hot, humid wet season. Australia's wet–dry tropics extend across the north of the continent and south-east along part of the Great Dividing Range (DEH, 2005).
3. Statistical divisions are large, general-purpose regional spatial units which cover, in aggregate, the whole of Australia without gaps or overlaps and do not cross State or Territory boundaries. They are delimited in all States on the basis of socio-economic criteria. The boundaries are only changed at infrequent intervals, such as 20 years (ABS, 1989).
4. This is true until more new trails (for example, Great Walks of Queensland) are completed.
5. Carr and Mendelsohn (2003) do not explain where their survey took place. Since the Great Barrier Reef is 2,000 km in length, it is arguable that it cannot be termed a 'site' in the TC analysis sense. Value estimates would be dubious if the survey was conducted at one or two points only, regardless of whether or not international visitors were included.
6. When the two-stage Clawson and Knetsch TC method was applied, a CS estimate of Aus$418,280 per year, or Aus$51.75 per person per night (Aus$41 per person per day), was obtained, which is the same order of magnitude.

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