

Valuing the Benefits of Public Goods to Meet the Requirements of the Local Government Act in New Zealand¹

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Introduction

The Local Government Amendment Act (No 3) requires Local Authorities to consider the distribution benefits from publicly provided services in relation to their expenditure and financing. This is feasible in the case of private goods where beneficiaries can be easily identified but is much more problematic with public goods where beneficiaries cannot easily be identified.

The Local Government Act states that where expenditure is independent of the number of beneficiaries, generates benefits that do not accrue to identifiable persons or groups and generates benefits to the community generally, then:-

‘the costs of the expenditure should be allocated in a manner consistent with economic efficiency and appropriate to the manner and appropriate to the nature and distribution of the benefits generated...’
Local Government Amendment Act (No3) 1996 Part V11A.

This paper reviews the economic methodologies available to evaluate benefits provided by public services. The paper uses Unit Day Values (UDV) to estimate the total benefit of Auckland Regional Parks.

Auckland Regional Parks

There are 17 Regional Parks, administered by the Auckland Regional Council (ARC) which offer a variety of services and attract nearly 8 million visits per year. The parks vary in their proximity to urban centres, and in the source of their visitors, with the majority from the Auckland region. The challenge is to assess the overall benefits provided by the parks and compare that to their overall costs.

In the 1995/6 financial year the ARC spent \$14.9 million dollars on its Regional Parks Network. The ARC received \$4.6 million in income from these parks, most of which came from Mt Smart, a stadium generating revenue from sporting and other events, (ARC 1996). The Parks predominantly provide recreational services but they also provide conservation, education and cultural heritage services.

Estimating the Benefits from Parks

Economists argue the benefit of an activity is indicated by the utility it provides. This can be measured by individuals' Willingness to Pay (WTP)³, or consumer surplus, (that is the net benefit or value obtained) for a good or service. These benefits can be both use and non-use. Use benefits are those that consumers receive from direct use of a good or service; in this case visits to Regional Parks. Non-use benefits are those benefits consumers obtain from a good or service

although they do not use it directly. There are three types of non-use benefits; option value, that is benefits of those who are willing to pay for a good or service as they wish to retain the option of benefiting from it in the future; bequest value, that is those who are willing to pay for a good or service

now to allow possibility of future generations using the good directly; and finally existence value, those who value a good or service just because it's there although they are highly unlikely ever to directly use it.

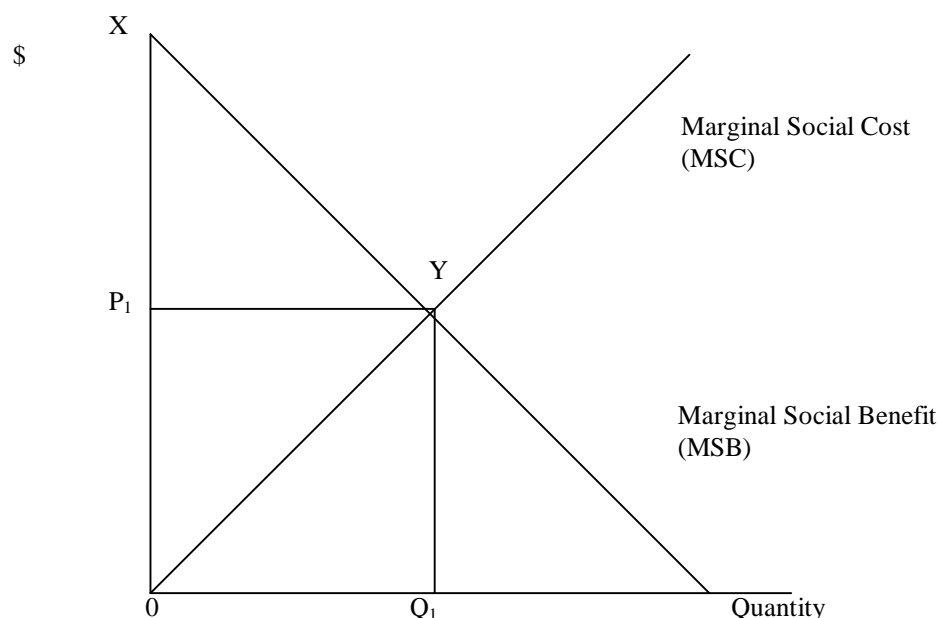


Figure 1
Total Economic Benefits of a Good or Service

The total economic value or benefit of good or service is illustrated in figure 1 which shows the marginal social cost and benefit curves for a good or service⁴. The total economic value is the area under the Marginal Social Benefit curve at the equilibrium quantity of OQ_1 , (that is $OXYQ_1$). If the consumer actually pays for the good at the equilibrium price of OP_1 then the total economic value is made up of what they actually pay (P_1YQ_1) plus what they would have been willing to pay, that is the consumer surplus, P_1XY .

Most of the regional park services in the parks are not sold in a market framework,

thus to obtain an estimate of their benefits some form of non-market valuation technique has to be used. Economic research has developed various techniques such as Contingent Valuation, Travel Cost Method and Hedonic Pricing to estimate non-market values. Contingent valuation estimates are derived by directly questioning a sample of the population about their WTP for a good or service. The sample's WTP is then scaled up to reflect that of the total population, allowing for differences in income, age, and other relevant criteria. Contingent valuation has the major advantage in being the only technique which can be used to

estimate non-use values. It does however require careful survey design, implementation and analysis, to avoid bias in the results.

The Travel Cost method derives a value for non-market goods from the costs incurred by users to access that good or service. Travel costs are largely a function of distance but also reflect the means of transport, the cost of time, entrance fees and other related expenses. The Travel Cost method is based on the observation that as travel costs to a park increase the rate of use declines. In essence, the travel costs are a proxy for price and the relationship between travel costs and the number of visits to the park is used to estimate a demand curve for the good.

The Travel Cost methodology has the attraction of being based upon revealed or actual behaviour rather than a hypothetical situation. However it is more limited than Contingent Valuation in that it can not measure non-use values. Furthermore in measuring use values Travel Cost could overestimate benefits, for example, where the benefit of visits to other sites on the same trip are not fully accounted for; no account is taken of the benefit of the travel itself. Moreover the travel costs method assumes the greater the number visiting a site the greater the benefit - this may not be the case due to congestion. Travel cost may, on the other hand, underestimate the benefit of a site, where sites are close to the source of visitors.

Hedonic pricing values goods by establishing a relationship between a non-market good and a marketed good. This method has been used to value urban parks. The differential in house prices with respect to proximity to parks is used to calculate the value of a park to residents. This technique only estimates user benefits and requires considerable data on house prices and their determinants. It also

assumes that the salient attributes (such as proximity to parks) are fully capitalised in the price of the marketed good.

Unit Day Values (UDV's)

All of the above methods require considerable skill and effort to conduct and are often regarded as prohibitively expensive. An alternative method is Unit Day Values (UDV's) a technique reviewed in Willis and Garrod (1995) and Pearce and Moran (1994). UDVs estimate the value of goods or services based upon experts' assessment of their worth. These assessments are derived from existing results from Travel Cost or Contingent Valuation studies. UDV's have been used extensively in the US, especially at sites which are considered too small for the application of the other valuation techniques outlined above. The estimates of Unit Day Values are regarded as equivalent to consumer surplus, and can be adjusted to reflect differences in activities, location, quality of facilities, the availability of substitutes, accessibility and congestion.

The benefits obtained from the Auckland Regional Parks were estimated using the Unit Day Value Technique. This required some basic data on park use, the source of visitors, activities undertaken, as well as visitors' satisfaction with their visit. These data were available from a survey conducted by the Auckland Regional Parks Service during 1995/6 (NRB1996 a, b). They were then used to calculate Unit Day Values for each of the activities within the parks.

As the benefit a user obtains from a park is expected to vary according to the activity undertaken, visits were classed according to type. The 1995/6 survey listed 45 separate activities that visitors undertook in Regional Parks, many of them on the same visit (NRB 1996b). Taking account of this the visits were reclassified into

5 broad categories: general recreation, specialised recreation, camping, education and special events. Each of these categories were then assigned UDV's.

The Unit Day estimates are based on results from previous Contingent Valuation and Travel Cost studies. In the absence of suitable New Zealand unit day estimates, overseas studies were reviewed. Three relatively comprehensive sources of these values were considered, Bergstrom and Cordell (1991), Walsh et al. (1992) and United States Forest Service (in Walsh, 1986); all three are US studies.

The estimates by Bergstrom & Cordell were chosen because they were derived primarily for the purpose of providing recreation managers with "off-the-shelf" estimates of recreation benefits, were the most comprehensive in terms of the range of activities, and were the most consistent in terms of collection method and relative magnitude. A feature of the estimates was that they were collected using the travel cost method and consequently give use values only. However, given that data was available only on regional park visitors, not the general population, only use values could be estimated.

Prior to applying Bergstrom and Cordell's US estimates to Auckland's Regional Parks, adjustments were made for exchange rates and relative income levels. The net effect of these two adjustment was negligible: the US dollar estimates were scaled up by 1.54 to account for the US:NZ exchange rate⁵ but this was effectively cancelled out by a 0.64 adjustment to account for New Zealand incomes being lower than those in United States⁶.

The UDV's were \$11.00 for general recreation and education; \$26.00 for specialised recreation; \$9.00 for camping; and \$30.00 for special events. The

estimate for general recreation corresponds closely with the results of a more recent Contingent Valuation survey of visitors to Wellington Regional Parks which estimated the value at \$10.50 per visit (Kerr 1996).

Adjustments for perceived park quality were also made to the UDV based on the survey results. Survey respondent's were asked to provide an overall assessment of parks and facilities on a 1 to 5 scale. This was used to linearly scale down the UDV estimates: if the respondents rated the facilities as excellent (a rating of 1) they were unchanged; the UDV's were multiplied by 0.8 for a rating of 2; by 0.6 for a rating of three, and so on. A rating of 5 (not at all good) meant that the benefit estimate was only 20 percent of the full UDV.

Results

The total annual use benefits for the Auckland Regional Parks was estimated at \$91m per year, as shown in Table 1. (page 39)

As shown in Table 1 the user benefits of parks were greatest at Muriwai and Karekare, which together account for 29 percent of the estimated total benefit. These are followed by Long Bay with 12 percent. Tawharanui, Tapapakanga, Karekare, Muriwai and Mahurangi have high benefits relative to visitor numbers, due to the higher percentage undertaking specialist recreational activities. This illustrates the importance of accounting for the type of activity when assessing the benefits of parks, rather than relying solely on total visitor numbers.

Table 1
User Benefits by Park

Park	Visits per Annum	Estimated User Benefit	Percentage of the total value of the parks
		(\$)	
Ambury*	401,000	7,166,000	7.82
Arataki	736,000	7,452,000	8.18
Awhiti	104,000	1,306,000	1.43
Botanic Gardens	706,000	7,776,000	8.53
Cascades	315,000	3,261,000	3.58
Cornwallis	604,000	5,988,000	6.57
Hunua	597,000	5,255,000	5.77
Karekare	975,000	13,042,000	14.31
Long Bay	1,071,000	11,027,000	12.10
Mahurangi	152,000	2,115,000	2.32
Muriwai	1,030,000	13,417,000	14.72
Omana	200,000	2,135,000	2.34
Shakespear	407,000	4,164,000	4.57
Tapapakanga	62,000	827,000	0.91
Tawharanui	164,000	2,419,000	2.65
Whakanewa*	10,000	113,000	0.12
Wenderholm	353,000	3,723,000	4.08
Total**	7,887,000	\$91,000,000	100

* Sample sizes severely limit the reliability of these estimates.

** Totals do not include all parks in the ARPS network (as discussed).

Using the five activity categories in this report, 80 percent of the benefits of visits are for general recreation, 12 percent for specialised recreation, 4 percent for camping and 2 percent each for education and special events.

This total annual use benefit from the parks is much greater than the \$14.9 million ARC expenditure on parks in 1995/6. Moreover this total benefit figure is expected to be an underestimate as it excludes non-use values. Without conducting a Contingent Valuation study the magnitude of the non-use benefits is difficult to estimate. Overseas researchers have come up with a variety of results, reflecting the unique characteristics of each resource. For example, a recreation study conducted in Colorado found that

non-use benefits exceeded recreational use benefits by a factor of 2 (Walsh, p542, 1986); if this were applicable to Auckland the non-use benefits would be \$180m. Another study (Willis, Garrod and Saunders, 1993) found the non use benefits associated with a recreation area in Southern England were 0.65 of the use values.

Where there are significant conservation values the non-use benefits are high relative to use benefits but the total WTP are generally lower. For example, a British study estimated the non-use benefits associated with three Sites of Special Scientific Interest (SSSI) to average over nine times the use values (Willis, 1990). Willis, Garrod & Saunders (1993) found that non-use values of an area with both

recreational and conservation values, exceeded use values by a factor of 4. Based on these estimates it seems reasonable to expect the non-use benefits of the Auckland Regional Parks network to at least equal the use benefits.

Two steps were undertaken to assess the validity of the benefit estimates. First, the UDV's were compared to benefit estimates from other New Zealand studies, such as those outlined in Kerr (1995; 1999). They were found to be generally consistent with these estimates.

Second, an estimate of actual travel costs to the Regional Parks by visitors was completed. While the data and travel distances were insufficient for a reliable Travel Cost assessment of benefits, a crude estimate of the actual travel costs was derived based on the travel distances from the centroids of each local authority area to each park. Using this method the total travel costs were estimated as \$70m, demonstrating that consumers spend significant amounts to enjoy the benefits of the regional parks. This figure provides support for the UDV benefit estimates above.

Conclusions

The Local Government Amendment Act requires Local Authorities to consider economic efficiency in allocating services which generate benefits to the community in general. Estimates of the costs and benefits associated with a service are necessary to determine if efficiency is achieved. Economics has several techniques to estimate non-market benefits, such as Travel Cost, Contingent Valuation and Hedonic Pricing, and these have been extensively used around the world to evaluate publicly provided services. However, these techniques are expensive to administer and can be

infeasible for some services and thus an alternative method of estimation is required. An attractive alternative is Unit Day Values, which value public services based upon the results of more comprehensive studies elsewhere.

The research presented in this paper has demonstrated how Unit Day Values may be applied to estimate the use benefits provided by regional parks. These provide managers and decision makers with estimates of the value of parks based on data that is in many cases already available. In doing so they can effectively combine information on visitor numbers, activities undertaken and perceived quality of the resources. When the total use benefits provided by parks are compared with their annual costs, the economic efficiency of their provision can be assessed.

The results of this study illustrate that the use benefits of the Auckland Regional Parks are substantial. The annual user benefits of Auckland Regional Parks are estimated to be six times greater than annual expenditure on the parks.

VEC

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ENDNOTE

- ¹ This paper is based on a study for the Auckland Regional Council reported in Ball et al (1997).
- ² Caroline Saunders and Ross Cullen are Associate Professors in the Commerce Division, PO Box 84, Lincoln University, Canterbury and Richard Ball is a Planner at Canterbury Regional Council, Christchurch.
- ³ Alternatively, we may estimate Willingness to Accept compensation (WTA).
- ⁴ It is worth noting that given perfect markets Marginal Social Benefit equates the demand curve and Marginal Social Cost the supply curve.
- ⁵ An exchange rate of NZ\$1:US\$0.65 was used based upon the purchasing power parity estimates of the OECD (1996).
- ⁶ Based on 1995 GDP per capita of \$US16,795 and \$US26,413 for New Zealand and the United States respectively (OECD, 1996).