An Estimation of the Total Benefit Value of the British Countryside for Recreational Activities

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ABSTRACT

This paper aims to estimate the total benefit value of the British countryside for recreational use. For this purpose its focus is on the main countryside habitat types used for informal rural recreation. After an introduction to the concept of total economic value and its relation to valuation methods for environmental goods, it is sought to estimate the total benefit value of the British countryside. These estimates are based on a review of previous valuation studies and on current figures for designated preservation areas and recreational activities in the countryside. The monetary values from previous studies on the basis of current area and use figures are extrapolated to obtain a first estimate of the total economic value. This estimate then is discussed and adjusted for method-bound limitations, especially possible over-estimates from revealed preference methods. Finally some policy-relevant conclusions are drawn.

1 INTRODUCTION

According to Allanson and Whitby (1996) the primary value of ecological systems (i.e. the total economic value of the framework of environmental systems) can be approximated by the sum of the use and non-use values of an environmental good for an activity which yields the total economic value (TEV) of that good. Following Hodge (1995), the use values can be classified in the direct use values (e.g. fisheries, tourism or recreation) and the indirect use values (i.e. ecological function values that can be neglected in a first approximation for the estimation of recreational benefits). The non-use values can be subdivided in option values (i.e. future direct and indirect use values) and other quasi-option values (Jepma and Munashinge, 1998). The most important of the latter ones are existence values (i.e. values from the knowledge of continued existence arising from bequest and stewardship motives, altruism and Q-altruism). Whereas a private good has only use values, public goods often have significant non-use values (Foster et al., 1997). Although there is considerable difficulty to aggregate the various studies that have attempted a valuation of the countryside for recreational activities as these have used rather different methods (ranging from contingent valuation (CV, see Carson et al., 2001) and travel costs (TC) to hedonic (HP) pricing approaches) it is sought to estimate the total economic value of Britain's rural areas for recreation from these figures. The theoretical basis common to all approaches is that ordinal individual preferences (although utility is an unobservable index of preferences) are represented by a utility function (Hanley et al., 1997). Changes in utility are then captured by consumer surplus measures. Consumer surplus is the money metric of the unobservable utility function and can be either a willingness to pay (WTP) or a willingness to accept (WTA) compensation measures (Isik, 2004; Kuriyama and Takeuchi, 2001). However, neither hypothetical nor real payments necessary correspond to the true welfare measure (e.g. the

Hicksian compensating or equivalent) but the underlying values are bounded from below by real payments and from above by hypothetical payments (Foster et al., 1997; List and Gallet, 2001).

The conceptual framework underlying the calculation of national benefits from informal recreation that makes use of the countryside is the notion that a number of distinct recreational activities takes place in several (mutually exclusive) habitats of the countryside as set out in Table 1. A complex structure of designations (e.g. ESA, SSSI and National Parks) has been set up to protect the landscape resources of the countryside (Midmore et al., 1995) and the non-existence of admission prices makes it difficult to measure benefits from rural recreation and imposes a need for indirect methods.

Table 1: Recreational activities and countryside habitat types

Recreational activities	Countryside habitat types
Sport-fishing, sub-aqua diving, canal boat travelling, beach recreation, other water-sports	Canals, rivers, reservoirs, wetlands, coastal areas, sea, other marine reserves (e.g. estuaries)
Hill-walking, countryside photography, vehicle tours, hunting, countryside watching, living in the countryside	Woodlands (esp. Ancient Woodlands), Heathlands (esp. Lowland Heaths), Moorlands
Climbing, other mountain sports	Mountain areas
Caving	Caves

The approach used here to estimate the national benefit aggregate is to interpolate the values from different valuation studies either on a population / visitor or on an area basis for the four areas of the countryside that are most important for recreation: woodlands, heathlands, agricultural lands and coastal zones and other marine and aquatic resources. However, it needs to be acknowledged, that there are some limitations to this approach. For example the use and non-use values can be very different for visitors and residents of an area. Generally non-use values are also problematic to estimate, e.g. regarding option demand. As well different individuals visit different subsets of available sites what makes it is difficult to specify each recreationalist's choice set. Finally double-counting has to be avoided.

2 WOODLANDS

Adger and Whitby (1991) estimated a total landscape benefit of agriculture and forestry of £906m (in 1988 values). This was based on contingent valuation and travel cost studies by Willis (1982), Mansfield (1971) and Willis et al. (1988). The UK Woodland cover amounts to 10 per cent of the total land area (Forestry Commission, 1998). Agriculture and forestry

together account for 87 per cent of the UK surface area (Adger and Whitby, 1991). Assuming that the landscape benefit is evenly distributed across agricultural land and woodland this yields a benefit attributable to forestry only of £104m.

Compared to this the hedonic pricing study of Garrod and Willis (1992) estimates net benefits from unpriced visits to Forestry Commission (FC) sites (i.e. the aggregate net amenity value for all FC woodlands in Britain) of £353,323 per annum. As about 35 per cent of the British woods and forests are managed by the FC (Forestry Commission, 1998) this would imply a net amenity value of all UK woodlands of approximately £1m.[1]

Ancient woodlands (which amount to 1.25 per cent of the UK land area) have probably to be considered as a special case. Hanley and Munro (1994) in a contingent valuation study calculated a discounted annual WTP in the range of £1.03 to £1.52 per head for the local population. They thus estimated the use and non-use values of woodland preservation to this population. However, as this study used a once-and-for-all payment to a trust fund as a bid vehicle it is crucial if respondents implicitly discount benefits as otherwise their bids actually represent annual amounts (Kahneman and Knetsch, 1992). Based on these figures and the district population of 140,000 and a Yorkshire population of 4.8 million people (Hanley and Spash, 1992) aggregate WTP would be in the range of £144,200 to £7.3m for the woodland surveyed. The total area of ancient woodland in Britain amounts to 340,000ha (Hanley and Spash, 1992). The area of the woodland studied is 29.5ha and hence the ratio between both is approximately 11,525:1. Assuming that the population sample was representative for the whole of Britain and that population densities for all areas with ancient woodland are similar and using the above factor, a total benefit value for all British ancient woodlands would be in the range of £1.7 milliards to £84 milliards.

This range is considerable higher than the estimate derived from the study of Adger and Whitby (1991). This could either mean that the CV method is not reliable or that the non-use values of these woodlands are considerably greater than their use values.

Willis and Garrod (1991) used the travel cost method to estimate the consumer's surplus for the value of a day trip to a British forest and calculated values in the range of £1.44 to £2.60 per trip and head, based on a zonal travel cost model. The total number of day visits to forests in the UK in 1994 was at least 346 million trips (Costigan and O'Connor, 1997)

From this a consumer's surplus in the range of £500m to £900m can be estimated. Based on these estimates summarised in Table 2, the total benefit value of British woodland for recreational purposes would be in the range of £2.3 milliards to £85 milliards assuming no double counting occurred.

[1] Consequently the costs for providing these values should amount to £103m.

Table 2: Benefit value estimates for British woodland

Study	Estimated benefit	Benefit value (in £m)
Adger and Whitby (1991)	Landscape benefit	104
Garrod and Willis (1992)	Net benefits of FC sites	1
Hanley and Munro (1994)	Ancient woodlands	1,700 – 84,000
Willis and Garrod (1991)	Forest day trips	500 - 900

3 AGRICULTURAL LAND

In the study of Adger and Whitby (1991) a value of landscape benefits of £802m has been estimated. There are also several special agri-environment programmes the government operates to conserve the countryside, e.g. the Environmentally Sensitive Areas scheme (ESA), the Nitrate Sensitive Areas scheme and the Countryside Stewardship scheme. Of these, the ESA scheme which was introduced by the Agricultural Act 1986 is probably the most important, both in terms of payments and area covered. The estimated value of the UK ESAs will therefore be used as a first approximation of the total benefit value of the agri-environment programmes. Hanley (1998) also reports significant non-use values in a study on a Scottish ESA what might as well justify this approach. Hanley et al. (1996) estimated a total value of conservation benefits of £22m and £13m for the Scottish Breadalbane and Machair ESAs, respectively. The Breadalbane ESA represents 16 per cent of the total Scottish ESA area (Hanley, 1998). This yields a maximum benefit value for the Scottish ESAs of £135m. This value would have to be added to the figure reported by Adger and Whitby (1991) who did not take into account recreational and existence values of ESAs. Garrod and Willis (1995) conducted a CV study into the WTP of visitors, residents and the general public for two English ESAs. Although WTP figures for residents were fairly similar to those obtained in Scotland, visitor values were considerably lower. Hence the value obtained for the Breadlabane ESA can be taken as a maximum value and can be extrapolated to the total UK ESA area of 2.25 million hectares (MAFF, 1998 and MLURI, 1998). This recreational value of all British ESAs to be added to the figure of £802m would be £281m and hence the maximum total benefit value of the UK agricultural land for recreational purposes could be assumed to be £1,083m.

4 HEATHLANDS

A third habitat type that is important for recreational activities in the countryside are the British heathlands. Hanley et al. (1991) in their CV study measured the WTP for a lowland heath (Avon Forest Park) in Dorset using a payment card bid collection mechanism and alternative bid vehicles. This study also carried out a convergent validity experiment comparing CV-based values with results from travel cost measurements. The option price

was to be estimated and an annual consumer's surplus of £30,784 and £317,900 was calculated for visits to Avon Forest, based on CV and travel costs, respectively. This would imply a total value for the UK heathlands in the range of at least £5.5m to £56.8m based on the size of Avon Forest and a total UK heathland area of 57,222 ha (Hanley and Spash, 1992). Based on the 5.9 million residents in the major UK heathland countries, Hanley et al. (1991) estimated a preservation value of £9.03m assuming that the sample of their study was representative. This figure includes existence benefits as well as non-use values. If the bids in the above study actually represent annual values, then the total benefit value of UK heathlands would be £150m per annum (Hanley and Spash, 1992). Therefore the benefits from lowland heaths for recreational activities lie probably in the range of £5.5m to £150m. This number is relatively small, and studies in other countries (e.g. Germany) have found considerably higher numbers (Müller, 2004). The higher figures are likely due to the fact that in the UK, relative large areas of heathlands exist, whereas in other countries heathland areas are comparatively scarce and therefore valued higher. For example, the Lueneburg Heath in Germany is one of the very few large heathlands in Germany. As well, different elements of a heathland have differing value to visitors (Hellmann, 2003) and heathlands differing in composition may thus be valued differently.

5 COASTAL AREAS AND OTHER AQUATIC AND MARINE RESOURCES

Finally, water recreation has to be considered. In their study of the Scottish Flow Country, Hanley and Craig (1991) estimated a mean WTP of £16.80 per visit. On the basis of a total figure of 391 million day visitors to the sea or coast and to canals or rivers in Britain in 1996 (Costigan and O'Connor, 1997) this would result in a total economic value of water-related recreation of approximately £6.57 milliards. However, considering UK expenditure figures by Costigan and O'Connor (1997) this might be an overestimate. They found expenditures of £10.20 and £6.30 for sea or coast and canal or river visits, respectively. Based on these results, the benefit value of the countryside for water recreation would be £3.2 milliards, still a considerable high figure.

6 AGGREGATED TOTAL ECONOMIC VALUE

Aggregating the figures obtained for all four habitat types allows an estimate of the total economic value of the countryside for recreational use. Table 3 summarises maximum and minimum estimates that have been calculated in the previous sections. It is assumed that the errors related to double-counting are broadly negligible. Also problems of substitution and complementary that might lead to overestimates as well as under-estimates of benefit values (Adger and Whitby, 1991) were not considered.

Table 3: Minimum and maximum estimates for total economic value

Habitat type used for recreational activity	Maximum benefit value (in £ milliards)	Minimum benefit value (in £ milliards)
Woodlands	85	2.3
Agricultural land	1. 083	0.802
Heathlands	0.150	0.0055
Coasts and rivers	6.57	3.2
Total economic value	92.80	6.31

The total economic value of the countryside as a recreational resource as estimated in this study would therefore be in the range of £6.31 milliards to £92.80 milliards. The fact that the maximum value is approximately 1500 per cent higher than the minimum value shows the considerable difficulties that are attached to such estimates.

7 DISCUSSION

The estimates obtained in the previous sections raise several issues. One major point are the problems related to benefit transfer. Transferring mean values is only justified if the benefiting populations are identical and the sites for which the transfer is done are identical (Desvouges et al., 1992; Boyle and Bergstrom, 1992). If this is not the case, mean values would have to be adjusted before a transfer can be done. However, the contingent valuation method is likely to show poor performance in this respect, as it is unable to break down environmental goods into their constituents (Hanley et al., 1997). Although in the case of this study no adjustments have been made it seems to be acceptable to transfer CV-based mean WTP values as this at least allows to calculate a first approximation of the total economic value of the countryside for recreational activities. As well, designated areas of one category should have been chosen on the basis of a fairly homogenous set of choice criteria and therefore their distinct characteristics should be at least broadly comparable in value. Also,

the viability of CV estimates itself compared to real payments might be of at least similar magnitude than the issue of benefit transfer. Foster et al. (1997) undertook a non-experimental comparison to reveal potential divergence between hypothetical and real payments, focusing on differences in the underlying structure of incentives between those payments. For different CV studies, they calculated ‘calibration factors’ which give the ratio of the hypothetical to the real payments, although strict comparability of data from CV studies and real payments was not given, due to population and information effects. Table 4 lists some of the studies that were compared and the calibration factors that were obtained for them.

Table 4: Calibration factors for WTP values from CV studies

Authors	Study area	Calibration factor
Hanley and Craig (1991)	Scottish Flow Country	1.30 – 3.64
Hanley and Munro (1994)	Southern England Heathlands	1.26 – 25.32
Hanley and Spash (1993)	Birkham Wood	1.16 – 4.26

Thus, Foster et al. (1997) provide evidence (for the narrowly defined case of open-ended mail surveys based on charitable donation payment vehicles) that the hypothetical WTP is up to four times larger than real payments.[2] This should be taken into account in the above TEV estimates. To do this, the values obtained from the above studies are corrected by the maximum calibration factor. As well, the value of forest day trips to woodlands is a maximum estimate which is based on a zonal travel cost model. Willis and Garrod (1991) also obtained values based on an individual travel cost model which were considerably lower. Based on these values the maximum benefit value of forest day trips would be £802.7m whereas the minimum value would be £138.4m. Taken together, the two adjustments yield the following results.

Table 5: Corrected Minimum and Maximum Estimates for the Total Economic Value of the Countryside for Recreational Use

Habitat type used for recreational activity	Maximum benefit value (in £ milliards)	Minimum benefit value (in £ milliards)
Woodlands	20.6	0.643
Agricultural land	1. 083	0.802
Heathlands	0.0059	0.00022
Coasts and rivers	3.2	1.8
Total economic value	24.89	3.25

It should nevertheless be noted, that the use of calibration factors is still debated in the literature, since (assuming that one defined monetary metric for measuring consumer surplus is used in all cases) differences between e.g. hypothetical WTP/WTA and real payments (and related differences in benefit value) are not necessarily only method-related (for a discussion of method-related biases see Bateman et al., 2002). List and Gallet (2001) use meta-analysis techniques to assess method related influences on such differences. They

[2] The study finds this is mainly due to a reduced extent of extreme free-riding, rather than existence of incentives for strategic over-bidding in the hypothetical context.

identify also the use of WTP versus WTA as a determining factor for differences. Kuriyama and Takeuchi (2001) find that large differences are more likely in the case of monetary valuation and Carson et al. (2001) point out that many issues especially of the contingent valuation method can be circumvented by careful choice of method and design.

Differences can furthermore also result from the fact, that the study object is not held constant across studies (e.g. different studies do not all analyse the same forest). In such a case, an important *ceteris paribus* assumption of cost-benefit analysis in general is violated. Use of calibration factors seems most adviseable, if method-related influences are clearly stronger than other (e.g. object-related) influences and if they are based on direct comparison an experimental with a hypothetical treatment. (see Mitchell and Carson (1989) and Neill et al. (1994) for a discussion of various aspects surrounding differences between hypothetical and real payments).

8 CONCLUSIONS AND OUTLOOK

The results of this study show that considerable use and non-use values of the British countryside for recreational use exist. Cautious estimates would result in a total economic value of the countryside for such activities of £3.25m whereas a maximum estimate would be around £92.8m. The factor of nearly 1:30 between these two values indicates the methodological problems that are attached to valuation techniques, especially those based on revealed preferences (i.e. contingent valuation and travel costs) as well as the general problem of benefit transfer. Further refinement, especially concerning the relation between hypothetical and real payments, the application of individual travel cost methodologies and the necessary and sufficient conditions of successful benefit transfer can yield more precise figures. However, the figures estimated here seem to be reasonably high to justify current and future conservation policies and the costs they impose on society. Especially the considerable existence values justify further preservation of designations with low use value but with large existence values that depend on maintaining a sufficiently large habitat area. Areas of future research should however be the analysis of differences in valuation amongst stakeholder groups in society (see Luz (2000) and Stoll-Kleeman (2001) for details on these aspects), and how the precautionairy principle can be integrated more strongly with cost-benefit analysis (see Kuntz-Duriseti (2004) for an innovative approach). Also, next to traditional cost-benefit analysis, novel methods of analysis, e.g. based on happiness research could be applied to the issue (Frey 2005).

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