Summary of the case study on valuation of the forest ecosystem services

Title of the valuation study: **Social & Environmental Benefits of Forestry Phase 2: The recreation value of woodlands**
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Objectives of the study

The largest scale benefit valuation study from woodland recreation sharing a common contingent valuation survey instrument is the European Union funded CAMAR study conducted in 1992. Data extension of CAMAR provided an opportunity for both validating the value estimates based on the old data and for expanding the set of forest attributes values to gain new willingness to pay (WTP) estimations. A new contingent valuation survey format was therefore conducted in 2002, which replicated and improved EU-CAMAR studies.

The objective of the study was to find the total and marginal recreational value of the UK woodland. Estimates were obtained from a contingent valuation (CV) survey carried out in 2002 in selected woodland sites of England and Wales. Thus, the study obtained both open-ended and closed-ended responses which were used to derive benefit estimates. A secondary aim was to design benefit functions which make it possible to transfer benefit values to recreational woodlands without comparable primary data.

Scope of the study

The ecosystem services valuated in the study were cultural services (recreation).

The geographical scope was national, as seven study sites were chosen in England and Wales. The distribution of the respondents was the following: Sherwood/England (N=72), Delamere/England (N=58), Epping/England (N=76), New Forest/England (N=56), Dartmoor/England (N=55), Thetford/England (N=55), and Brenin/Wales (N=56). These woodlands had a recreational use higher than average and were thought as highly recreationally valuable.

Valuation method(s) applied

The contingent valuation questionnaire followed a **dichotomous choice** design with **follow-up**, and one final **open-ended question**. Hence, respondents were asked whether they were willing to pay (WTP) a given entrance fee rather than going without the experience. A positive response led to reiteration with a higher WTP amount, whereas a neglecting led to a reiteration with a lower WTP amount. Thus, 279 valid observations were collected.

When maximum WTP values were stated after a sequence of dichotomous choice elicitation questions, the responses could be subject to "**anchoring**". The linear dependency of the maximum WTP values on the initial bid-response was hence tested by a **least square regression**. Additionally, to those unwilling to pay anything, debriefing questions were asked to check **true zero-WTP behaviour**. Thus, a **probit regression** was estimated to identify protest votes. For further analysis, **the linear in the bid, log-linear in the bid single** and **double bounded models** were chosen in order to be comparable with previous EU-CAMAR studies.

In the following, **two benefit transfer methods** were used to derive estimates of benefits from single recreational visits in the forests:

Firstly, the **site-specific estimates** were obtained by **data pooling.** Therefore, the old dataset of 1992 was extended preliminary by woodland descriptions and updated to the 2002 bid values by the **consumer purchase parity index**. This created a dataset of 12 185 discrete-choice CV all linked to forest attributes. Secondly, the **generic estimate** was calculated using the expected value of **compensating variation** out of the contingent valuation method. Out of both approaches, the **benefit function** then was employed to predict the values of the mean **WTP** by applying the formula for **probit models with linear indirect utility**.

Additionally, an estimation of the recreational value was calculated using the respondent´s individual **travel costs** for a single forest visit. The provided aggregated value estimation for England, Scotland and Wales was assessed on basis of the estimated number of visits of the **UK Leisure Day Visits** (1996/1998).

Key results

- The mean maximum WTP out of open-ended questions was £1.66 (±1.4) per visit.
- The single-bounded linear-in-the-bid model offered a WTP of £2.19 (±0.30), the double-bounded linear-in-the-bid model showed £2.75 (±0.68) and the double-bounded log-in-the-bid model indicated £2.75 (±0.68) per visit. Thus, the media WTP out of closed-ended questions was estimated to be £1.91 (±0.24). The WTP for a visit to woodland was higher in 2002 than in 1992.
- The total forest area size, broadleaves species, the amount of larch and nature reserves had positive effects on utility.
- The WTP estimation out of the travel cost method added up to a total estimate for woodland recreation of approx. 392 million pounds per year for the UK.
- After all, the total recreation benefit values for the UK were assessed to be between 574 million pounds (open-ended CVM estimates) and 962 million pounds (highest close-ended CVM estimates) in the study.