Valuing Forest Recreation Activities

Technical Annex

Report to the Forestry Commission

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1. Introduction

This technical annex provides further details of the theory, methodologies, and analysis used in the Forestry Commission's commissioned report '*Valuing Forest Recreation Activities*' (Christie *et al.*, 2006). The structure of this annex is based around the four research methods adopted in the study. Section 2 therefore provides further detail of the economic impact study, Section 3 the travel cost count model, Section 4 the contingent behaviour model, and Section 5 the choice experiment (CE) model. Copies of the survey questionnaires used in the research are reproduced in Section 6.

2. Economic impact analysis

Economic impact analysis was used in the research to estimate the size of the local economic (income and employment) impacts of forest recreation. In this section, we provide: further details of the theory relating to economic impact analysis; an overview of the approach use in data collection; and a discussion of the selection procedure used to identify the 'local economies' in which the economic impacts were measured.

2.1. Theory

Forest recreation has the potential to bring significant economic benefits to a local economy, including the generation of incomes and creation of jobs. These impacts come in three main forms: *direct*, *indirect* and *induced* expenditures. Direct impacts result from forest users spending their money on food and drink, accommodation, forest recreation services, souvenirs, equipment, car parking, admission fees and so on. This is known as *direct expenditure*, which creates direct revenue for the businesses and public organisations concerned. A proportion of this direct revenue will be needed to pay for supplies. The revenue that remains, which comprises wages, salaries and profits, is known as *direct income*. Similarly, *direct employment* relates to the number of jobs directly supported by the expenditures of forest users. The overall impact of the introduction, or 'injection', of additional expenditure by forest users into the local economy is not, however, restricted merely to these direct impacts. The businesses and public organisations that receive the direct expenditures will need to re-spend some of this direct revenue on the purchase of supplies, a proportion of which will be from other businesses in the local economy, the rest being spent outside of the local economy. Those retained in the local economy generate *indirect* impacts, taking the form of *indirect incomes* and *indirect employment*. Spending on supplies from outside the local economy, meanwhile, is known as 'leakage' from the local economy. The third type of impact, *induced* impacts, arise from the re-spending of wages, salaries and profits earned directly or indirectly as a result of the initial injection of expenditure. As local residents become wealthier they will spend some of this additional wealth in the local economy. The incomes created in this way are known as *induced incomes* and the jobs created in this way represent *induced employment*. The overall impact of an increase in spending, for example on recreation in a particular forest, is thus the sum of the direct, indirect, and induced impacts. Additional expenditure by forest users thus has a 'ripple effect' in the local economy, the final impact being a multiple of the initial expenditure injection. This is caused by the re-circulation of expenditure around the local economy and is known as the 'multiplier effect'. The magnitude of the multiplier effect is determined to a significant extent by the propensity of expenditure to be retained in the local economy concerned.

Economic impact analysis can be used to measure the size of these impacts, enabling a single multiplier coefficient to be identified which will determine how large the overall impact on income or employment will be in comparison to the initial injection of expenditure. There are a number of approaches to estimate the size of the multiplier effect: input-output analysis, computable general equilibrium modelling and multiplier analysis – see Phase 1 report (Christie *et al.*, 2005) for a review of these methods. The approach chosen for this research was the Local Multiplier 3 (LM3) method, which is a form of multiplier analysis. The LM3 coefficient is estimated using data on the first three rounds of spend:

- Round 1 (R1): Initial incomes of local businesses, i.e. total visitor spend in local economy;
- Round 2 (R2): The proportion of local businesses spend retained in local economy;
- Round 3 (R3) : The proportion of Round 2 local spend that is then re-spent by local staff and suppliers in the local economy.

The LM3 coefficient is then estimated using the following equation:

$$LM3 = \frac{R1 + R2 = R3}{R1} \qquad (1)$$

The LM3 coefficient is in effect the ratio of the local spend during the first three rounds of spending against the initial impact. A value of '3.0' would indicate that all of the spend is retained within the local economy over the three rounds. Lower values would reflect the level of leakage from the local economy. The fact that LM3 truncates data collection after the third round of spend limits the amount of information required to generate functional multiplier coefficients. Furthermore, studies have shown that, in most cases, the majority (around 85%) of relevant spending and re-spending tends to takes place during first three multiplier rounds (New Economics Foundation, 2002). Thus, LM3 would appear to produce reasonably accurate indicators of the actual multiplier coefficients. A comprehensive discussion of the LM3 methodology can be found in New Economics Foundation's (2002) report 'The Money Trail'.

The overall size of the economic impacts in terms of local income and job creation can then be estimated by multiplying the total injection of visitor expenditure in the local economy by the LM3 coefficient.

2.2. Data collection

Information required for the economic impact analysis included:

- data on visitor expenditure within the local economy;
- information on the establishments where this money is spent;
- and the estimation of income and employment multiplier coefficients.

Data on forest visitor spend was collected in Section F of the forest visitor questionnaire: see Section 6.1 for a copy of the questionnaire. Questions 23 to 24 respectively asked respondents to detail the total amount spent associated with that day's trip to the forest (respondents could provide this information as individuals or groups depending on their preferences), the proportion of that expenditure spent locally. Q25 then asked respondents to identify where this money was spend. It should be noted that due to limitations on the length of the questionnaire, only a very basic breakdown of the expenditure data was collected in this research.

Data for the LM3 analysis was collected from businesses receiving income from forest visitors: a copy of the LM3 questionnaire is reproduced in Section 6.3 of this report. In the LM3

questionnaire, businesses were asked to identify the proportion of business spend that is retained within the local economy and the proportion of which is spent outside the local economy. In addition to the expenditure survey, businesses were also asked to collect information from their employees on what proportion of the employee's income is spend locally. Businesses for inclusion in the LM3 analysis were identified from Q28 of the forest visitor survey which asked visitors to identify the local businesses that were the main recipients of the visitor's spend. Over 100 businesses were identified in this exercise. These businesses were then contacted by telephone to ask whether they would be willing to participate in the study. A questionnaire was then sent to the businesses for completion. Two reminders were also made for businesses who failed to return their questionnaires after three weeks and five weeks. Only a disappointing 25% of businesses responded to the LM3 questionnaire. A number of reasons are thought to have contributed to this poor response. First, the questionnaire was initially sent out in early December, and it was thought that the festive period affected response. Second, the survey was undertaken using a mix of telephone and postal techniques. Although this approach has been successfully used by the research team in the past (Hyde *et al.*, 2005), the businesses interviewed in the earlier study were all recipients of a development grant and therefore they had a much greater incentive to response than that of the businesses in the current research. Thus, in hindsight, it was thought that a face-to-face approach would have been more successful for the current application. As a consequence of the low response, it was considered that for this application it would be more appropriate to determine a single LM3 coefficient for all surveyed forests, rather than determine separate LM3s for each individual forest. It should however be noted that, in reality, it would be unlikely that a single LM3 coefficient would accurately reflect the exact size of the multiplier effects at all of the case study forests, thus some caution should be taken when interpreting the size of the income and employment impacts at the case study forests. The actual results from the economic impact analysis can be found in the main report, and are therefore not repeated here.

2.3. Defining the local economies

A key decision in economic impact analysis is the definition of the size of the 'local' economy in which the impacts are being measured. Generally speaking, a largely area will retain more expenditure within the local economy than a smaller defined area: thus size matters. Also, in this research we were interested to compare economic impacts between the case study forests and therefore it was important to define similar sized economies across the forests. To achieve this, we investigated a number of official area designations in terms of their suitability for this research. The areas investigated included regional development areas (RDA), EU structural funds areas, Forestry Commission areas and local authority areas. Generally, the local authority areas were considered too small for this research and the EU structure fund areas generally did not match well with any of the case study forests. Thus, the main two contenders were the regional development areas and Forestry Commission areas. The following reports our conclusions regarding the most appropriate area for each of the six case study forests. Basically, it was concluded that apart from Abernethy, the Forestry Commission areas were the most suitable and consistent areas to define the local economy for this research.

- *New Forest*

The New Forest is located on the border between two large English RDA areas: South East England and South West England. It was considered that the use of only the SE England area would be unsuitable since much of the expenditure would be leaked to the South West region. However, combining both areas was thought to represent too large an area to be defined as 'local'. The Forestry Commission New Forest region, however, provides a good coverage of the area surrounding the New Forest and therefore it was argued to be the most suitable.

- *Thetford*

The two possibilities for Thetford are the East of England Development area or the slightly smaller Forestry Commission East Anglia area. To ensure that 'local' does relate to the local area and to maintain consistency with other sites, it was concluded that the Forestry Commission area should be used.

- *Dyfnant*

Dyfnant is located at the edge of two Forestry Commission areas Coed y Gororau and Coed y Mynydd and also between the WDA North Wales Division and Mid Wales Division. Since the WDA Mid Wales Division includes Powys and Ceredigion, it was argued that this division incorporates too much of southern Wales to be regarded as the local economy. The Forestry Commission boundaries on the other hand only include the top half of Powys and therefore it was argued that the combined Forestry Commission areas Coed y Gororau and Coed y Mynydd would be most suitable to represent Dyfnant forest.

- *Cwm Carn*

Again, there were two options for Cwm Carn. The first was to use the WDA South East region, which includes the counties of Newport, Cardiff, Vale of Glamorgan, Bridgend, Monmouthshire, Blaenau Gwent, Torfaen, Caerphilly, Merthyr Tydfil, and Rhondda. The Forestry Commission area Coed y Cymoedd covers a similar area to the WDA area, but also includes the counties of Neath Port Talbot, Swansea and a bit of Carmarthenshire. For consistency, it was concluded that the Forestry Commission area should be used.

- *Glentress*

The Forestry Commission Scottish Borders area and the Scottish Enterprise Scottish Enterprise Borders region appear identical and adequately cover the area around Glentress, without including Edinburgh (from which many of the users originate). Thus, to maintain consistency with other forests, it was concluded that the Forestry Commission area should be used.

- *Abernethy*

At Abernethy, the Forestry Commission areas would appear unsuitable since Abernethy is located at the edge of several areas including 'Inverness' which extends into NW Highlands. The Moray, Badnenoch and Strathspey regional development area has a good cover of the Abernethy area and therefore was concluded to be the most suitable definition of the local economy.

3. Travel cost 'count' model

The objective of the travel cost 'count' model was to estimate the value of a day's visit to the forest (the consumers' surplus per visit) for different groups of 'specialist' recreationalist.

3.1. Theory

Count models are a development of the individual travel cost model, which recognise the rather particular nature of the data generated in recreation demand surveys. The basis is thus the standard travel cost relationship, stated in terms of individual behaviour:

$$V_{ij} = \phi\left(TC_{ij}, Q_j, S_i\right) \qquad (2)$$

where V_{ij} are visits per period to site j by individual i, Q_j are the environmental characteristics of site j and S_i are the socio-economic characteristics of individual i. When the analyst collects information on, say, walking trips to a forest, she finds that the dependent variable can only take whole number values (1 trip per year, 7 trips, 20 trips ...). Econometrically, this means that count data techniques such as Poisson or Negative Binomial regressions are more appropriate than standard OLS (Hellerstein, 1991). Poisson regressions are used where there is no over-dispersion in the dependent variable - in other words, if mean trips are roughly equal to the variance. Recreation data is often over-dispersed, however (variance > mean), so a Negative Binomial regression must be used (see Haab and McConnell (2002) for details on how to formally test for this). If an on-site survey has been undertaken, then no zero values will be recorded (since someone has to make at least one trip to be recorded) and also more frequent users will be over-sampled. Data is thus truncated at one trip and endogenous. Haab and McConnell (2002) demonstrate variations to the basic Poisson regression to account for this. If off-site surveys are undertaken (e.g. of local residents), then zero trips will be recorded for many, in which case a Zero Inflated Poisson model can be used. In this research, we ran models using the Poisson and Negative Binomial models, as well as the truncated versions of these models.

3.2. Data collection and analysis

In this research, user group specific count models were used to produce estimates of per trip consumers' surplus by five alternative recreation user groups: Cyclists; horse riders; nature watchers; walkers; and general forest visitors.

The key data requirements for the travel cost count models included:

- Main recreational activity undertaken during current visit;
- Number of trips to current site for current activity over the past 12 months;
- Details of travel costs to current site;
- Details of the quality attributes of current site;
- Number of trips to all sites for current activity over the past 12 months;
- A list of alternative sites where the respondent undertakes this particular activity, including details on travel costs to alternative sites and their quality attributes.

Data for the count models was collected during on-site interviews with forest users – see Section 6.1 for a copy of the forest visitor questionnaire used.

The dependent variable in the count model is the number of trips made to the forest during the last 12 months. To account for problems of endogenous stratification, we used (trips minus one) as the dependent variable in the Poisson models (Englin *et al.*, 1995). A key independent variable is travel costs. For each user group, we constructed a travel cost variable which was equal to (2 * distance travelled to forest * 15p/mile). Lacking detailed labour market data for each respondent,

travel time was included in hours rather than as an opportunity cost of leisure time. Trips taking more than 120 minutes one-way were excluded from the analysis, since this may represent over-night visitors for whom the total distance travelled from home to the forest of interest was likely to be greater than the distance that can be specifically attributed to the forest along. An index of the comparative quality of the alternative forests was also included in the models using dummy variables to represent which forest any given user was sampled in. These dummy variables are referred to as (D2, D3…D6) in the results; see notes in Table 2 for the definition of these dummy variables. These forest dummies can be seen as representing the current characteristics of each forest site for cyclists, horse-riders etc, and to pick up the effect of these characteristics on the number of trips taken. Since travel costs to substitute sites are expected to be a potentially important variable affecting trips to a given forest, we also include a variable to represent this. Note that, since we are not using a random utility site choice model here, the effects of travel distances to alternative sites, and of the relative levels of characteristics at each site, cannot be handled with any precision. However, the approach outlined above does enable us to capture the main effects of these variations. Finally, it is plausible that socio-economic characteristics such as respondent age, income and level of education have an effect on their demand for recreation. We thus include these three variables in the count models.

3.3. Results

Table 1 gives a concise summary of the four count models estimated for each group of forest users: Poisson; negative binomial; truncated Poisson; and truncated negative binomial. In this table, the focus is on the parameter estimate for travel costs, since this is the key to the consumers' surplus per visit calculation. As may be seen from Table 1, the truncated models performed very badly, as in most cases they failed to converge after 60 iterations. The horse-riders' model was the only truncated model to converge. Comparing the Negative Binomial models with the Poisson, we see that (i) in four out of five cases, the over-dispersion parameter is significant; but that (ii) in general, the level of significance of the travel cost variable falls, and in two cases requires us to drop travel time from the estimation.

Table 1: **Summary of model results in terms of travel cost parameter estimate.**

	Model 1: Poisson	Model 2: Negative Binomial (only shown if over-dispersion parameter significant)	Model 3: Truncated Poisson	Model 4: Truncated negative binomial
Cyclists	-0.0668	-0.0703 *	WNC	WNC
Horse-riders	-0.0704	Travel cost not significant	-0.058	-
Nature Watchers	-0.1265**	Travel cost not significant	-	-
Walkers	-0.0689	-0.0832 $	_	WNC
Others	-0.0667	-0.0914 $	WNC	-

Notes:
All parameters were significant at 95% unless stated otherwise.
*For cyclists, the Negative Binomial model gave insignificant estimates on travel costs unless travel time was dropped.
** for nature watchers, there are only 71 people in the sample once rows with missing data have been dropped. This estimate on travel costs comes from omitting the variable "distance to substitute site", which raises the number of observations to 118.
$ only significant at 90% level
WNC – model would not converge

An example of the full travel cost model, for cyclists, is provided in Table 2 below. Interpreting these values, we can say that higher travel costs and longer travel time to the forest where people are sampled reduce visits, as required by the travel cost model. The closer one lives to other cycling sites, the more trips one makes to the forest being sampled. This is clearly not a

substitution effect, but may be more of a habit formation effect: living close to alternative sites making it more worthwhile to invest in cycling equipment. People from higher income households make more trips, as do younger persons. Higher education seems to imply fewer trips, an unexpected result. Finally, relative to the excluded dummy variable forest – Rothiemurchus – visitors to all of the other forests make significantly more cycling trips, with the exception of the New Forest, where the effect is insignificant.

Table 2: Example of Poisson count model: cyclists.

	Coefficient	t stat (absolute value)	Prob value
Forest Dummy D2	2.39	33.78	0.000
Forest Dummy D3	2.61	3.64	0.000
Forest Dummy D4	3.61	60.44	0.000
Forest Dummy D5	2.11	16.96	0.000
Forest Dummy D6	0.44	1.16	.2426
Travel cost	-0.0668	7.35	0.000
Travel time	-0.0122	13.57	0.000
Distance to substitute	-0.133	15.42	0.000
Education	0.192	12.3	0.000
Age	-.060	3.62	0.000
Income	0.128	16.69	0.000
N = 361 Log likelihood value: -3467.373 restricted LL = -5662.294 R squared (deviance) = 0.41 Chi-square test that all coefficients are equal to zero is rejected at 0.000 level of significance.			

Notes:
Poisson regression (omitting rows with missing values, and cases for income =12, ie undisclosed)
Variable coding: D2- Glentress = 1, others = 0; D3 – Dyfnant = 1, others =0; D4 – Cwm Carn = 1, etc.; D5 – Thetford = 1; D6 – New Forest = 1;
Travel cost in £s. Travel time in minutes. Distance to substitute is in miles from home (one way); Education is coded from 1 (highest) to 5 (lowest); Age is in age classes from 1 (youngest) to 5 (oldest); Income is in income class from 1 (lowest) to 11 (highest).

Since the main point of this exercise is to *compare* consumers' surplus estimates across different recreational groups, the decision was taken to base these comparisons on the simple Poisson regression results, since these are the most consistent across groups. Table 3 gives results across the five user groups. Consumers' surplus values per visit were around £14-£15 per visit for all user groups other than nature watchers which had a value of £7.90 per visit.

Table 3: Point estimates of consumers' surplus per visit.

User type	***Consumers surplus (£ per visit)***

Cyclists	14.97
Horse riders	14.20
Nature watchers	7.90
Walkers	14.51
Others	14.99

4. Contingent Behaviour Models

The objective of the contingent behaviour model was to value changes in consumers' surplus associated with improvements to recreational facilities in forests.

4.1. Background

Contingent behaviour is a methodology which combines revealed preference (RP) data on existing trips to a recreation site and stated preference (SP) data on changes to their behaviour if some aspect of the recreation sites (such as the costs of travel to the site or some environmental quality attribute of the site) changed. Early contingent behaviour models (e.g. Englin *et al.*, 1996) examined how intended behaviour in terms of trip frequency changes with price changes. A natural extension of this was to examine contingent behaviour when *environmental quality* changes. Such an approach was followed by Hanley *et al.* (2003), who look at the benefits of improved water quality standards on Scottish beaches. In this application, we adopted a method similar to that used by Hanley.

4.2. Method

The contingent behaviour models required two observations. The first observation (row in database) related to the actual number of trips to the forest facility in its current state. Included in this observation was data on a 'focus variable'; which in this case related to the attributes in which it was proposed to make improvements to the forest recreation facilities. Also included in this observation was respondent's rating of the attributes in their current state. Respondents were then presented with a description of the proposed change in the quality of the forest facilities (again described in terms of attributes), and asked to indicate how many more, or less, trips they would make to the forest if the proposed changes were implemented. Details of the actual wording used in this question can be found in Section C of the forest visitor questionnaire (see Section 6.1 for a copy of the questionnaire). Thus, contingent behaviour analysis combined both revealed preference data (actual trips) and stated preference data (predicted changes in the number of trips made). These two observations for each person in the sample were pooled, and a panel estimator was used to estimate an equation which was used to predict (i) changes in the number of visits to the site if improvements were made and (ii) the change in consumers' surplus for the improvement in the recreation attributes.

Key data requirements for the contingent behaviour model therefore include:

- Number of trips to current site for current activity over the past 12 months (as in the count model – see Section 3 above).
- Number of trips to all sites for current activity over the past 12 months (again, as in the count model – see Section 3 above).
- Details of travel costs and quality site attributes of current site.
- Predicted number of trips to improved forest for current activity over typical 12 months.

In this application, two forest recreation improvement scenarios were developed for each of the four main forest users groups: cyclists, horse riders, nature watchers and general forest visitors. Details of these contingent behaviour scenarios can be found in Figure 1 below.

Cyclists A *– "suppose that next year a range of new optional trail obstacles were built along side the existing mountain bike trails at this forest. The types of challenges would include:*

- *jumps,*
- *drop-offs and,*
- *sections of 'northshore' (raised wooden bike trails). "*

Cyclists B *– "suppose that new shower and changing facilities were built at this forest next year. These facilities would be free to use and would include:*

- *showers,*
- *changing room and,*
- *secure lockers."*

Horse riders E *– "suppose that next year a range of new optional trail obstacles were built along side the existing horse trails at this forest. The types of challenges would include jumps and ditches. The severity of these challenges would range from easy to difficult. all challenges would be situated on a short loop off the main horse trail and therefore would not directly affect the difficulty of existing trails."*

Horse riders F *– "suppose that a new horse-friendly parking facility was built at this forest next year. This facilities would be free to use and would include:*

- *Horse box friendly parking facilities that had plenty of room to park and manoeuvre large vehicles with horse boxes,*
- *Safe horse corrals (pens) and tie up points."*

Nature watchers I *– "suppose that next year several new wildlife viewing hides were built at various locations within this forest. The hides would be built throughout the forest in areas where various types of wildlife are known to congregate. All of the hides are likely to be located at least 1 mile from a car park and several will be built in quiet remote areas of the forest over 5 miles from a car park. Although all hides would be accessible by trails, these trails generally would not be suitable for pushchairs / wheel chairs."*

Nature watchers J *– "suppose that next year a new wildlife viewing centre was built at a central location within this forest. It is expected that you would be able to see a variety of birds and some large mammals from the centre. Active wildlife management (including the use of feeding stations) would be used to attract the wildlife to the centre. The viewing centre would be built near a main car park in the forest. The viewing centre would be accessible using a short 'all access' path suitable for pushchairs and wheelchairs".*

Forest visitors M *– "suppose that next year a new art / sculpture trail was built within this forest. The Art / Sculpture trail would be approximately 1 to 2 miles long. The art / sculpture exhibits would depict images of the forest / countryside and be built with materials that blend in with the forest. The actual trail would be suitable for people of all abilities."*

Forest Visitors N *– "suppose that next year a new family play facility was built at a central location within this forest. The play facilities would include play equipment for all ages including:*

- *An enclosed safe play area for toddlers,*
- *Traditional and 'adventure' play facilities for older children, and*

- *High wire 'Go Ape' facilities for teenagers (and the odd adult!).*

All facilities would be built with material that blends in with the forest."

Figure 1: Description of forest improvement scenarios used in the contingent behaviour analysis.

4.3. Contingent behaviour results.

Eight contingent behaviour models were estimated. In each case, we were interested in (i) whether the travel cost parameter was significant (if not, then no welfare estimates could be made), and (ii) whether the dummy variable for the change in site quality was significant (if not, no prediction of the change in visitor numbers could be made).

The econometric approach used a panel data estimator; rather than simply pooling the data and using OLS. A panel data estimator takes into account the correlation in the errors between each person's two choices – actual and intended behaviour. We used a random effects rather than a fixed effects specification, since this fits the nature of our data better. Finally, since the dependent variable was still a "count", as in the travel cost 'count' model, we tested whether a Poisson or Negative Binomial panel estimator was most appropriate. All models were estimated in Stata.

We initially ran both Poisson and Negative Binomial versions of each of the eight models. In all cases, tests on the over-dispersion parameter showed that the Negative Binomial was preferred over the Poisson. We also tested whether a panel specification was preferred to a pooled specification in each case, and the Log-likelihood ratio (LR) test statistics in all cases confirmed the need for a panel rather than pooled regression. Table 4 below thus gives the results for all eight recreation improvement scenario models, but just for the Negative Binomial random effects panel specification.

Variables used in the model were travel costs, travel costs to the nearest substitute site, income, gender, age, education, site dummies for each of the forests sampled, minus one; and the "Cont Beh" variable, which is a dummy representing whether the visits we are explaining were actual, with current facilities, or hypothetical, with improved facilities.

Looking at the number of observations in each group, we see that there are very few observations, relatively speaking, for both horse-riding scenarios and for both nature-watching scenarios. This is probably the main reason why the models do not perform very well for these four scenarios. In all four models, travel costs are significant and correctly signed. The contingent behaviour 'Cont Beh' dummy variable is significant and positive in the cyclists, nature watcher and forest visitor models, indicating that hypothetical improvements in recreational facilities have (on average) the effect of increasing planned trips. The 'Cont Beh' dummy, however, was not significant in the horse riders' model and therefore we were unable to generate value estimates from these models.

Table 4: Negative Binomial random effects panel models

	Cycling A	Cycling B	Horse Riders E	Horse Riders F	Nature Watchers I	Nature Watchers J	Forest Visitors M	Forest Visitors N
TC	-0.052	-0.075	0.084	-0.092	-0.095	-0.112	-0.043	-0.024
	(4.97)**	(7.10)**	(2.58)**	(3.10)**	(3.74)**	(2.51)*	(3.80)**	(2.32)*
TCsub	0	-0.038	0.126	-0.011	0	0.023	-0.007	-0.009
	-0.57	(5.87)**	-0.44	-0.13	-0.03	-1.9	(2.11)*	(2.21)*
Q34inc	0.109	0.219	0.227	0.632	-0.244	0.314	-0.111	-0.032
	-0.93	-1.67	-0.57	(2.43)*	-0.85	-1.61	-1.13	-0.32
Q26Female	-0.667	-0.705	0.624	0.74	0.158	0.106	0.048	-0.047
	(2.71)**	(2.90)**	-1.09	-1.87	-0.74	-0.27	-0.35	-0.37
forcode==3	-0.788	-0.969	-1.425	-1.805	-0.526	-1.833	-0.533	-0.237
	-0.85	-0.62	-1.2	(2.50)*	-1.5	(4.15)**	-1.43	-0.69
forcode==4	0.153	0.136			-0.184	-0.799		
	-0.72	-0.57			-0.35	-0.97		
forcode==5	0.614	-0.008	-5.008	-0.861	-0.514	-1.89	-0.997	-0.339
	-1.91	-0.03	(2.66)**	-0.64	-1.77	(3.48)**	(2.96)**	-1.2
forcode==6	-0.777	-1.537	-3.845	-2.453	0.733	-0.847	-0.178	0.144
	-1.61	(2.23)*	(3.07)**	(3.35)**	-0.7	-0.64	-0.5	-0.47
forcode==7	-1.785	-2.652			-1.535	-2.898	-1.32	-0.618
	(2.80)**	(2.47)*			(3.51)**	(5.73)**	(3.93)**	(2.26)*
forcode==9	-1.666	-3.136	-1.944	-0.985	-0.553	-2.248		
	-1.68	(2.98)**	-1.09	-0.79	-1.26	(3.76)**		
Q27Age	-0.075	0.192	-0.388	0.292	-0.072	0.003	0.014	0.119
	-0.74	-1.71	-1.77	(2.09)*	-0.57	-0.02	-0.25	(2.33)*
y2	-0.01	-0.018	-0.013	-0.037	0.015	-0.022	0.008	0.003
	-1.17	(2.03)*	-0.42	(2.04)*	-0.79	-1.55	-1.21	-0.47
ed==3	0.296	-0.841	0.435	2.078	0.062	-0.314	0.014	-0.285
	-0.79	(2.13)*	-0.61	(3.37)**	-0.14	-0.54	-0.07	-1.4
ed==4	0.524	0.085	-1.043	1.326	0.69	0.182	-0.139	-0.421
	-1.4	-0.2	-1.12	(2.16)*	(2.35)*	-0.4	-0.66	(1.99)*
ed==5	0.063	-0.391	-1.863	0.534	0.163	0.028	0.392	-0.257
	-0.19	-0.98	(2.54)*	-0.86	-0.47	-0.06	(2.03)*	-1.39
ContBeh	0.183	0.052	0.12	0.121	0.751	0.363	0.167	0.209
	(5.16)**	(2.31)*	-1.47	-1.85	(5.39)**	(3.07)**	(3.19)**	(3.47)**
Constant	3.984	15.784	19.804	14.53	17.854	17.003	3.723	2.354
	(6.10)**	-0.05	-0.05	-0.02	-0.02	-0.03	(6.04)**	(4.36)**
Observations	436	406	58	94	90	82	558	549
Number of RespID	218	203	29	47	45	41	281	278
Wald Chi ^{2}(16)	111.78	149.37	64.3	84.22	87.36	83.31	73.38	48.79
Log Likelihood	-1244	-1175	-132	-222	-155	-145	-1151	-1095

Likelihood Ratio versus Pooled Model	593.11	645.58	61.93	111.23	10.69	60.97	661.70	557.58

* significant at 5% ** significant at 1%

To estimate the recreation benefits from these improvement scenarios, two steps are needed. First, predict trips under current and hypothetical conditions, to calculate the change in predicted trips (note that it is wrong to use actual trips under current conditions, rather than predicted trips, since otherwise we are not comparing like with like). Second, use the travel cost parameter estimate from the panel models to value this increase in trips in monetary terms. Table 5 gives the predicted trips from each model under current and improved situations.

Table 5: Predicted visits per year under different conditions

	Predicted trips under current conditions	Predicted trips under improved conditions	% change in trips over base
Cyclists A	3.48	3.66	5%
Cyclists B	15.38	15.43	0.30%
Horse Riders E	-	-	-
Horse Riders F	-	-	-
Nature Watchers I	15.91	16.66	4.50%
Nature Watchers J	15.45	15.82	2%
Forest Visitors M	2.51	2.63	4.50%
Forest Visitors N	2.05	2.26	10.24%

NB: Since the 'Cont Beh' variable was not significant in the horse riders' model, we were unable to predict trips.

Several features are apparent from this table. First, cyclists were predicted to make more trips under both conditions than general forest visitors, but about the same number of trips in version B as nature watchers. Second, the increase in predicted trips across all scenarios was small – between 0.3% and 10.2%. This accords with results reported in Hanley *et al.* (2003) which also used this methodology, and produced increases in trips of less than 10%. The biggest proportional change in visits is from investing in a family play facility, since this increases general purpose visits by 10.2%. The smallest increase is from investing in shower and changing facilities for cyclists.

Error! Reference source not found., column 2, gives the estimates of consumers' surplus per visit from the contingent behaviour models – this can be thought of as a consumers' surplus estimate which takes into account the improvement in site condition. This point estimates was then multiplied by the change in the number of trips (the 'contingent behaviour' dummy variable) to provide an estimated of the annual value the change in predicted trips associated with the improvements to recreation facilities (last column in **Error! Reference source not found.**).

Table 6: Value of different forest improvements

	CS/trip £ (point estimate)	Change in number of predicted trips	Economic benefits of improvement, per visitor per year, £
Cyclists A	19.23	0.18	3.46
Cyclists B	13.33	0.05	0.67
Horse Riders E	-	-	-
Horse Riders F	-	-	-
Nature Watchers I	10.52	0.75	7.89
Nature Watchers J	8.93	0.37	3.30
Forest Visitors M	23.25	0.12	2.79
Forest Visitors N	41.67	0.21	8.75

As may be seen, the biggest values are attached to providing new family play facilities (8.75) and installing new wildlife hides (£7.89). A benefit of £3.46/visitor/year is generated by constructing new mountain bike trails, and a rather similar benefit of £3.30 generated by constructing a new wildlife centre. Only a small value is associated with shower and changing facilities (£0.66).

5. Choice experiments model

The aim of the choice experiment (CE) model was to estimate of the value of changes in consumers' surplus associated with improvements to a range of forest recreation attributes.

The CE method again relies on surveys to gather data. Within the survey, respondents are presented with a series of choice tasks in which they are asked to choose their preferred policy option from a list of (usually) three options; one of which normally includes the status quo or do-nothing option. Each choice option is described in terms of attributes; in this case facilities provided at the hypothetical forests and a travel distance attribute (which was used to present the 'price' attribute). An alternative, but rarely used option in choice experiments is to use frequency of use data instead of the traditional choice-based choice data. In this application, we used both a choice-based and frequency-based choice task to establish forest users' values for a range of enhancements to forest recreation facilities. Four versions of the CE model were developed, one for each of the recreation user groups: cyclists, horse riders, nature watchers and general visitors.

5.1. Theory

The analysis of respondent's choices in CE is based on random utility maximisation (RUM) theory. According to RUM, the respondent's utility function is comprised a deterministic, observable component (V) and a random, unobservable component (ε) (Hanemann, 1994). Let the utility of alternative i from choice set C be represented by

$$U_i = V_i + \varepsilon_i \tag{3}$$

where U_i represents the utility of choosing alternative i, V_i represents the deterministic component, and ε_i represents the random error term. The selection of alternative i implies that the utility of alternative i is greater than the utility of any other alternative. Thus, the probability of an individual choosing alternative i can be expressed as

$$\begin{aligned} \Pr[i \mid C] &= \Pr\left[U_i > U_j\right], \forall j \in C \\ &= \Pr\left[\left(V_i + \varepsilon_i\right) > \left(V_j + \varepsilon_j\right)\right] \\ &= \Pr\left[\left(V_i - V_j\right) > \xi\right], \end{aligned} \tag{4}$$

where $\xi = \varepsilon_j - \varepsilon_i$. By assuming that the error term, ξ, is distributed according to a double log (Gumbel) distribution, the probability of choosing alternative i can be expressed as

$$\Pr[i \mid C] = \frac{\exp\left(\mu V_i\right)}{\sum_{j \in C} \exp\left(\mu V_j\right)}, \tag{5}$$

where μ represents a scale factor; which is often normalised to one.

In CE, where there are normally more than two choice alternatives, the choice probabilities may have a convenient closed-form solution known as the conditional logit[1] model. The conditional logit model is structured such that the probability of choosing alternative i depends on the utility of that alternative relative to the utility of all other alternatives. The utility function (Equation 6) represents the utility of the different options in the conditional logit model and in its basic format

[1] More sophisticated models such as the nested logit and random parameters logit models are also available that relax some of the assumption in the conditional logit model.

comprises the attributes of the policy option, as well as the bid (in this case travel costs) and the intercept. Thus, the CE utility function can be expressed as

$$V_i = \alpha_i + \beta(Y - Bid_i) + \gamma(Z_i) \quad (6)$$

where $i = 1,...,N$ indexes options available, α_i is an alternative specific constant that captures the effect of systematic but unobservable factors on the respondent's choice, Y is income, and β represents a parameter, Z_i is composed of variables measuring attributes of choice site and γ represents its parameter.

Welfare estimates in the form of compensating surplus can be derived from the conditional logit models using the following formula

$$CS = -\frac{1}{\beta_M}\left[In\left(\sum_i \exp(V_0)\right) - In\left(\sum_i \exp(V_1)\right)\right], \quad (7)$$

where β_M is the marginal utility of income (assumed to be equal to the negative of the monetorised travel cost variable); V_0 and V_1 respectively represents the indirect utility functions before and after the change under consideration. Equation (7) can be used to estimate the compensating surplus associated with changes in quality of environmental goods where there are multiple sites. However, the choice set usually only includes a single change in a policy option. In such situations, equation (7) may be reduced to

$$CS = -\frac{1}{\beta_M}(V_0 - V_1). \quad (8)$$

A further reduction is possible if the marginal value of a change with a single attribute is estimated. This implicit price (which is sometimes referred to as the part-worth) can be estimated as a ratio of coefficients

$$IP = -\frac{\beta_{Attribute}}{\beta_M}. \quad (9)$$

5.2. Method

The data requirements for the CE model included:

- respondents choices over a series of CE choice tasks;
- choice task follow-up question.

This data was again collected during on-site interviews. Separate CE scenarios were developed for each of the four main forest recreation user groups investigated in this research: cyclists, horse riders, nature watchers and general forest visitors. The use of a CE model therefore provided a direct estimate of the value of changes in consumers' surplus associated with improvements to a range of attributes of forest recreation.

Section D of the questionnaire (which is reproduced in Section 6.1) related directly to the CE model. In this section respondents were asked to complete a series of four choice tasks (Q17). Within each choice task, respondents were first asked to identify whether they preferred Forest A or Forest B. Following this, respondents were then asked to allocate their next five trips between Forest A, Forest B or a 'Stay at home' option. Finally, after completing all four choice tasks, respondents were asked a follow-up question (Q18) in which they were asked to indicate which statement most closely related to the way that they allocated their next five trips between forests. Detail of the exact wording used in the CE section of the questionnaire can be found in Section 6.1 of this report.

As noted above, this research adopted a unique a combination of choice tasks in which, for each scenario, respondents were asked to consider both a choice-based question and a frequency-based question. The use of this combination of the two types of choice questions was considered to be important for this research for a number of reasons.

First, it was considered that the standard choice-based approach used in the majority of choice experiments models (which require respondents to select their preferred option from normally two choices and a status quo) may fail to pick up the dynamic nature of people's actual recreation behaviour. To illustrate, consider the following example that was highlighted during the developmental focus groups in Phase 1. When visiting forests, many forest users stated that they tended to go to a local, more convenient forest on a regular basis, but then go to a forest with specialist recreation facilities on a less regular basis. More often than not, most of these forest users stated that they preferred the forest with specialist facilities compared to the local forest. This potentially has important implications for the way the choice task is asked. If forest users were simply asked to state their preferred forest, then it is likely that they would identify the forest with the specialist facilities. In other words, the recreationist's 'ideal' forest would be identified. However, this may not relate directly to their actual demand for forest recreation behaviour. An alternative approach to capturing more precise information on intended use would be to ask forest users how they would allocate their next *n* trips between various forests (including a stay at home option). Such a frequency-based choice task would appear to have a number of appealing features including:

- The capacity to more closely model actual recreation behaviour instead of simply identifying the 'ideal' forest which would be the case in the traditional choice task. The frequency-based analysis would therefore be more realistic in terms of what people actually do. Also note that in more traditional applications of choice experiments, the analyst tends to be exploring values related to a one-off policy decision which lends itself to the traditional choice-based choice task, whereas recreation behaviour is often something which is done on numerous occasions, and therefore less suited to a single choice task.
- A frequency-based choice task also allows the respondents to account for the expected number of trips to the forests in questions. For example, if a frequency-based question asked forest users to allocated their next five trips and that a respondent only expects to visit a forest on two occasions over the next year, then that respondent is able to respond by stating that they would make a maximum of two trips to either Forest A or Forest B and then choose the 'stay at home' option for the remaining three trips.
- A frequency-based choice task enables the researcher to pick up respondents who might visit a forest once to 'try it out to see what it is like'. A choice-based decision would not be able to identify this behaviour.
- A frequency-based choice task also enables the analyst to identify whether the provision of new forest facilities would increase the total number of trips to a forest compared to the current level of usage. This could be achieved by comparing data on the current number of trips to forests with the data on the frequency of trips to forests if new facilities were provided.

A frequency-based choice task would therefore appear to have a number of endearing features. However, there have been only a handful of studies been undertaken using frequency data. Therefore, it was considered useful to be able to compare frequency data with choice data. To our knowledge, no studies have directly compared these two types of choice models. Furthermore, it is unclear as to whether the two types of choice decisions lead to the same values or different

values. It was therefore proposed that this study adopt both types of choice model. The forest recreation attributes used in the choice experiment

The forest recreation attributes and levels used in the CE model were based on information collected in the review of literature and the recreational user and forest manager interviews (as described in the Phase 1 report; (Christie *et al.*, 2005)). In each of the four recreation groups, seven attributes were specified (see Table 7 for summary of attributes). The actual descriptions of the attributes and levels used in the study are reproduced in Figure 2 to Figure 5 in Section 6.2 of this report.

Table 7: Summary of attributes used in the choice experiments model.

CYCLING	HORSE RIDING	NATURE WATCHING	GENERAL FOREST USERS
Type of trails	Type of trails	Trails / routes	Walking trails
Optional trail obstacles	Optional obstacles	Hides	Mountain bike trails
Bike wash facilities	Horse box friendly parking	Wildlife viewing centres	Horse riding trails
Changing and Shower facilities	Horse corrals and tie up point	Guided nature walk	Nature trails / wildlife hides
General facilities	General facilities	General facilities	General facilities
Information	Information	Information	Information
Surroundings	Surroundings	Surroundings	Surroundings
Distance	Distance	Distance	Distance

There are a number of important issues to highlight regarding the design of attributes and levels. First, the number of attributes and the number of levels of each attribute was consistent across all four recreation user groups. This allowed a consistent experimental design to be used across the different user groups. Furthermore, four of the attributes ('general facilities', 'information', 'surroundings', and 'distance' attributes) and their respective levels were identical over all four user groups. This was done to allow comparisons of values for these attributes and levels across all survey respondents. The four activity-specific attributes (i.e. the first four attributes (rows) in Table 7), however, were designed to be specific to the respective recreation activities. So for example, for cycling, the attributes were 'type of trail', 'optional obstacles', 'bike wash facilities' and 'changing and shower facilities'. In the 'general forest user' study, these activity specific attributes related to improvements in the main recreation activities undertaken at forests, i.e. walking, cycling, horse riding and nature watching.

In the study design, there were five attributes with two levels of provision and three attributes with four levels of provision. A complete factorial design $2^5 \times 4^3$ would involve 2 x 2 x 2 x 2 x 2 x 4 x 4 x 4 = 2048 combinations. Clearly attempting to make all of these combinations within a single study would be impractical. Therefore, following standard practice in choice modelling, the attributes and levels were allocated to choice tasks according to an orthogonal main effects fractional factorial design. The procedure adopted in the experimental design followed that reported in Street *et al.* (2005). Using this procedure, the $2^5 \times 4^3$ orthogonal main effects fractional factorial design produced 16 choice cards. Since it was considered that 16 choice tasks would be too demanding for a single respondent to complete, the choice tasks were split into four sub-samples each containing four choice tasks. A similar experimental design was applied to all four recreation activity investigated.

5.3. Results

A series of choice experiments models were ran for the forest recreation data. These models are reported in Table 8, Table 9, Table 10 and Table 11 respectively for cyclists, horse riders, nature watchers and general forest users. Implicit prices for the various levels of the forest attributes are reported in the main research report and are therefore not reproduced here. We now summarise these models in turn.

5.3.1. Cyclists

Table 8 reports a series of CE models for cyclists; i.e. the sample includes only those respondents who indicated (in Question 2) that cycling was the main activity undertaken during the trip to the forest. Models 1 and 2 include all cyclists as defined above. Model 1 reports the model based on a traditional choice task, i.e. where the respondent was asked to choose one option from a choice of Forest A and Forest B. Model 2 reports the model based on frequency data, i.e. respondent were asked how they would allocate their next five trips between Forest A, Forest B or stay at home.

Models 3, 4 and 5 disaggregate that data into different sub-groups of cyclists. Model 3 is restricted to include 'leisure cyclists' only; i.e. those who indicated (in Question 9a) that they were not riding on cross country trails, technical single track, down hill or dirt jumping. Model 4 includes 'mountain bikers'; defined as those respondents who indicated (in Question 9a) that they were riding on either cross country trails or on technical single track. Finally, Model 5 includes 'Downhill riders'; defined as those riders who indicated (in Question 9a) that they were downhill cycling or dirt jumping. It should be noted that there is a degree of overlap between the respondents categorised as 'mountain bikers' and 'downhill riders' in that some respondents indicated that they partook in both activities. Models 3, 4 and 5 are all based on frequency data. The Models reported in Table 8 only show data on the forest attributes and an ASC based on the status quo option; socio-economic and attitudinal variables are not shown in these Models.

In Models 1 and 2 all of the cycle-specific attributes (i.e. the dedicated cross country, single track and downhill trails attributes, the obstacle attribute, bike wash attribute and changing and shower facilities attribute) were significant and positive. This suggests that cyclists consider these attributes to be important and that they are more likely to visit a forest if these attributes are provided. Overall, the level of significance of these attributes is slightly higher in the frequency-based model (Model 2) than in the choice-based model (Model 1). It is also interesting to note that the value of these parameter coefficients is lower in the frequency-based model; in other words, respondents were less likely to choose the policy options in the frequency-based model. None of the non-cycle-specific forest attributes (i.e. general facilities such as picnic sites, cafés, play areas, information and enhance surroundings) were significant in either of the two Models. This suggests that cyclists did not consider these attributes to be important in their choice decision. Finally, in both models the distance attribute was (as expected) significant and negative; i.e. cyclists would be less likely to go to a forest if the distance required to travel was greater.

The significance of these models, considered in terms of whether the inclusion of the forest attribute parameters significantly improves the overall LL function (i.e. statistically closer to zero), can be estimated using the LL ratio test. The formula for the LL ratio test statistic is:

$$\text{LL ratio test} = -2(LL_{\text{base model}} - LL_{\text{estimated model}})$$

The LL ratio statistic is a Chi-square statistic with degree of freedom equal to the difference in the number of parameters estimated in the two models. In both Models, the LL ratio test statistic is significant (χ^2 = 493 and 1936 respectively for Models 1 and 2). Thus, in both Models, we

reject the null hypothesis that the estimated models are no better than the base comparison model. It is therefore concluded that the inclusion of the forest attribute parameters adds to the predictive power of the model, resulting in a superior model.

The goodness-of-fit of the estimated models may be estimated using the pseudo-R^2 statistic, which is estimated using the following formula:

$$Psuedo - R^2 = \frac{LL_{\text{Estimated model}}}{LL_{\text{Base model}}}$$

The Psuedo-R^2 values for Models 1 and 2 are 0.103 and 0.08 respectively. According to Louviere *et al.* (2000) the adjusted pseudo R^2 should be above 0.1 to accept the model, whereas a value between 0.2 and 0.4 is considered as an extremely good fit.

A further approach to measuring how well the models are performing is to determine the proportion of choices correctly predicted. This is achieved using data from a contingency table of the predicted choice outcomes for the sample based upon the estimated model versus the actual choice outcomes as they exist within the data (Hensher *et al.*, 2005). In Model 1, 43.2% of predictions are correct compared to 42.9% correct in Model 2. Thus, in terms of goodness-of-fit, the choice-based model (Model 1) slightly outperforms the frequency model (Model 2).

Models 3, 4 and 5 relate to different sub-groups of cyclists. Model 3 is based on 'leisure cyclists'. Within this Model, only three parameters are significant: the ASC (stay at home), the bike wash facilities and the distance parameter. The parameter on the bike wash facilities was positive, indicating that leisure cyclists would prefer forests with bike wash facilities. The parameter on the 'distance' attribute is significant and negative indicating that respondents were less likely to choose an option if the distance required to travel to the forest was greater. None of the other forest attributes were significant in Model 3.

Model 4 is based on mountain bikers. In this Model, all of the cycle-specific attributes are positive and significant. The largest coefficients are for the 'dedicated single track' trail (0.182), the 'dedicated downhill' trails (0.162) and the 'obstacles' (0.134). The 'distance' attribute was again significant and negative as expected. The general facilities attributes were not significant in this model.

Finally, in the 'downhill riders' model (Model 5), the 'Dedicated downhill' (0.342), 'obstacles' (0.192) and 'bike wash facilities' attributes were all significant and positive. In addition, the 'detailed information' attribute was also positive and significant (0.050), while the 'enhanced surroundings' attribute was significant but negative (-0.069) suggesting that downhill riders did not want enhanced opportunities for view wildlife and points of interest. The 'distance' attribute was again significant and negative.

In terms of the significance of these models, the LL ratio tests indicated that the inclusion of the forest attributes significantly improved the overall LL function of the three models. The Pseudo=R^2 values were 0.12, 0.08 and 0.07 respectively for Models 3, 4 and 5. Finally, the number of correct predictions of all models was around 41%.

Table 8: Choice experiments models - cyclists

	Model 1 All cyclists (Choice)	Model 2 All cyclists (Frequency)	Model 3 Leisure Cyclists (Frequency)	Model 4 Mountain bikers (Frequency)	Model 5 Downhill riders (Frequency)
ASC	0.099	-0.324***	-0.532***	-0.369***	-0.427***
	(0.802)	(-6.246)	(-2.800)	(-6.544)	(-4.639)
Trails (Dedicated cross country)	0.124**	0.106***	0.033	0.125***	0.018
	(2.377)	(4.550)	(0.386)	(4.934)	(0.456)
Tails (Dedicated single track)	0.358***	0.154***	0.083	0.182***	0.002
	(6.672)	(6.488)	(0.981)	(7.122)	(0.060)
Trails (Dedicated downhill)	0.245***	0.178***	-0.053	0.162***	0.342***
	(4.320)	(7.334)	(-0.597)	(6.15)	(8.298)
Obstacles (jumps and drop-offs)	0.264***	0.138***	0.030	0.134***	0.192***
	(9.406)	(11.512)	(0.681)	(10.346)	(9.365)
Bike wash facilities	0.060**	0.078***	0.092**	0.073***	0.045**
	(2.128)	(6.386)	(2.010)	(5.572)	(2.160)
Changing and shower facilities	0.076***	0.029**	-0.001	0.031**	-0.011
	(2.854)	(2.451)	(-0.028)	(2.444)	(-0.544)
Parking, toilets, picnic	0.008	0.014	0.031	0.023	0.051
	(0.121)	(0.497)	(0.320)	(0.734)	(1.004)
Parking, toilets, picnic, café, shop	0.066	0.019	0.010	0.006	0.042
	(1.011)	(0.669)	(0.108)	(0.181)	(0.842)
Parking, toilets, picnic, café, shop, play areas	0.066	0.029	0.103	0.033	-0.033
	(0.990)	(0.991)	(1.064)	(1.035)	(-0.633)
Detailed information	-0.006	0.003	0.004	0.007	0.050**
	(0.205)	(0.269)	(0.096)	(0.556)	(2.437)
Enhanced surroundings	0.011	-0.004	0.039	-0.011	-0.069***
	(0.379)	(-0.335)	(0.871)	(-0.842)	(-3.358)
Distance	-0.018***	-0.018***	-0.028***	-0.018***	-0.015***
	(15.019)	(-35.555)	(-13.962)	(-6.544)	(-17.371)
LL model	-2153.108	-11181.10	*-1061.04*	*-9416.237*	*-3607.905*
LL (Constants only)	-2399.951	-12149.13	-1202.45	-10244.06	-3888.635
LL ratio test (χ^2)	493.68	1936.00	282.81	1655.65	561.46
p-value	0.00	0.000	0.000	0.000	0.000
Pseudo-R^2	.103	0.08	0.12	0.08	0.07
Correct predictions	0.432	0.429	0.418	0.414	0.411
Number of respondents	566	566	54	480	183

Notes:
t-stats in parenthesis
* significance at p=0.1
** significance at p=0.05
*** significance at p=0.01

5.3.2. Horse riders

Table 9 reports the CE models for horse riders, i.e. those respondents who indicated (in Question 2) that horse riding was the main activity undertaken during the trip to the forest. As with the cyclists (above) Model 1 reports the findings from the choice-based choice task, while Model 2 reports the findings from the frequency-based choice task. Models 3 and 4 in Table 9 report two sub-groups of horse riders. Model 3 includes those horse riders that indicated that they were 'family / leisure riders' in Question 9a. Model 4 includes those horse riders that indicated they were participating in either endurance riding or carriage driving. In both Models 3 and 4, the frequency-based choice task is used in the analysis.

In Model 1 (all horse riders and the choice-based choice task) only the 'general facilities: parking, toilets and picnic area' and the 'distance' attribute are significant. The 'general facilities' attribute is positive indicating that these facilities increase horse riders' utility. The 'distance' attribute is negative as expected. The use of the frequency-based model (Model 2) increases the number of significant attributes to seven. The provision of 'dedicated carriage driving' facilities increases utility, while the provision of 'dedicated long distance routes' was found to reduce utility. There appears to be some confusion with respect to the provision of general forest facilities. The provision of parking, toilets and picnic areas increased utility, while the added provision of a café or shop reduced utility. A further increase in general facilities to include play areas then increased utility. The enhancement of the forest surroundings for viewing features of interest also increased utility. In both models, the LL ratio test statistics were significant at p=0.05, indicating that the inclusion of the forest attributes significantly improves the overall LL function of the models. The pseudo-R^2 measure of goodness-of-fit was 0.12 in both models; suggesting that the models are acceptable. Finally, approximately 42% of choice outcomes were correctly predicted.

Model 3 (family and leisure horse riders) was very similar to Model 2 both in terms of attribute coefficients and goodness-of-fit. This, however, was not surprising since the majority of horse riders (95 out of the 105 in the full sample) were included in this sub-group. Perhaps the main difference in this model was that the 'enhanced surroundings' was not significant in Model 3.

Model 4 included only those riders who were participating in endurance rides or carriage driving. Only 10 respondents were included in this sub-sample. In this model, the 'dedicated carriage driving trails' and 'dedicated long distance trails' were not significant. However, the 'horse corrals and tie-up points', 'detailed information' and 'enhance surroundings' attributes were significant and positive in this sub-group. Finally, the goodness-of-fit measures for this sub-group indicated that the model was within the recommended levels with a pseudo-R^2 value of 0.23. Furthermore, the number of correct choice predictions was increased to 50%.

Table 9: Choice Experiments Models - horse riders

	Model 1 All horse riders (choice)	Model 2 All horse riders (frequency)	Model 3 Family / leisure riders (frequency)	Model 4 Endurance riders / carriage drivers (frequency)
ASC	-0.014 (-0.042)	-0.067 (-0.474)	-0.009 (-0.061)	-1.425*** (-2.957)
Trails (Dedicated horse riding)	0.012 (0.083)	0.062 (0.982)	0.092 (1.390)	-0.089 (-0.410)
Trails (Dedicated carriage driving)	0.216 (1.574)	0.235*** (3.894)	0.220*** (3.483)	-0.212 (-0.893)
Trails (Dedicated long distance trails)	-0.147 (-0.992)	-0.155** (-2.360)	-0.165** (-2.378)	0.110 (0.576)
Obstacles (Jumps and ditches)	0.062 (0.864)	0.033 (1.055)	0.027 (0.830)	-0.151 (-1.404)
Horse friendly parking	0.024 (0.324)	-0.004 (-0.138)	0.009 (0.277)	0.131 (1.166)
Horse corrals and tie-ups	-0.010 (-0.134)	0.018 (0.557)	0.031 (0.897)	-0.177* (-1.708)
Parking, toilets, picnic	0.457*** (3.190)	0.426*** (6.654)	0.506*** (7.556)	-0.640*** (-2.789)
Parking, toilets, picnic, café, shop	-0.245 (-1.533)	-0.219*** (-3.103)	-0.309*** (-4.187)	0.701*** (2.944)
Parking, toilets, picnic, café, shop, play areas	0.147 (0.977)	0.181*** (2.721)	0.236*** (3.360)	-0.638*** (-2.865)
Detailed information	0.006 (0.087)	0.028 (0.893)	-0.020 (-0.609)	0.466*** (4.056)
Enhanced surroundings	0.120 (1.645)	0.063** (1.997)	0.028 (0.837)	0.426*** (3.718)
Distance	-0.027*** (-8.412)	-0.027*** (-18.718)	-0.026*** (-17.456)	-0.040*** (-7.433)
LL model	-401.858	-2022.282	*-1829.171*	*-217.618*
LL (Constants only)	-458.050	-2296.042	-2075.314	-284.432
LL ratio test (χ^2)	112.38	547.52	492.29	133.63
p-value	0.000	0.000	0.000	0.000
Pseudo-R^2	0.12	0.12	0.12	0.23
Correct predictions	0.426	0.422	0.421	0.500
Number of respondents	105	105	95	10

Notes:
t-stats in parenthesis
* significance at p=0.1
** significance at p=0.05
*** significance at p=0.01

5.3.3. Nature watchers

Table 10 reports the CE models for nature watchers. As with the other user groups, nature watchers were defined in terms of nature watching being the main purpose of the trip to the forest during the day of interview (Question 2). In Models 1 and 2 (all nature watchers), the 'wildlife hides' and wildlife viewing centres' attributes were both significant and positive. In the frequency-based model (Model 2) 'enhanced surroundings' and 'off the beaten track nature trails' were also positive and significant. As expected, the 'distance' attribute was negative and

significant in both models. Model 3 was restricted to only include those nature watchers who indicated that they were undertaking 'nature watching – general' in Question 9a. The significant attributes within this model were the same as in Model 2. Finally, Model 4 was restricted to include those nature watchers who stated, in Question 9a, that they were using a viewing centre, nature trail or guided walk. Within this Model only the 'Wildlife hides' and 'Enhanced surroundings' attributes were significant and positive. The 'distance' attribute was again significant and negative.

In terms of the overall performance of the models, all of the LL ratio tests were significant; indicating that the inclusion of the attributes increased the performance of the models compared to the constants only model. The pseudo-R^2 values ranged from 0.12 in Model 1 to 0.06 in Models 2 and 4. Finally, around 40% of the choices were correctly predicted.

Table 10: Choice Experiments Models – nature watchers

	Model 1 All nature watchers (Choice)	Model 2 All nature watchers (Frequency)	Model 3 Nature watchers – general (Frequency)	Model 4 Nature watchers - centres & nature trails. (Frequency)
ASC	0.512** (2.032)	0.450*** (4.098)	0.462*** (3.642)	0.622*** (4.685)
Trails (Dedicated easy access nature trails)	-0.067 (-0.523)	-0.008 (-0.150)	-0.005 (-0.083)	0.010 (0.137)
Trails (Dedicated nature trails with information)	0.148 (1.178)	0.075 (1.348)	0.046 (0.714)	0.058 (0.806)
Trails ('Off the beaten track' nature trails)	0.140 (1.105)	0.115** (2.087)	0.117* (1.832)	0.114 (1.599)
Wildlife hides	0.240*** (3.574)	0.121*** (4.180)	0.152*** (4.504)	0.102*** (2.695)
Wildlife viewing centres	0.149** (2.169)	0.100*** (3.406)	0.131*** (3.783)	0.181 (4.723)
Guided nature walks	0.006 (0.089)	0.010 (0.357)	0.019 (0.557)	0.036 (0.987)
Parking, toilets, picnic	0.091 (0.664)	0.084 (1.400)	0.106 (1.537)	0.095 (1.195)
Parking, toilets, picnic, café, shop	-0.010 (-0.076)	0.009 (0.162)	-0.053 (-0.777)	-0.074 (-1.006)
Parking, toilets, picnic, café, shop, play areas	-0.046 (-0.325)	-0.033 (-0.527)	-0.012 (-0.171)	0.054 (0.671)
Detailed information	-0.003 (-0.041)	0.029 (1.003)	0.002 (0.047)	-0.002 (-0.064)
Enhanced surroundings	0.095 (1.411)	0.064** (2.199)	0.071** (2.067)	0.071* (1.851)
Distance	-0.021*** (-7.563)	-0.018*** (-15.163)	-0.020*** (-14.222)	-0.018*** (-12.044)
LL model	-487.190	-2496.812	*-1895.11*	*-1578.538*
LL (Constants only)	-553.420	-2654.437	-2039.41	-1683.511
LL ratio test **(χ^2)**	132.46	315.25	288.60	209.95
p-value	0.000	0.000	0.000	0.000
Pseudo-R^2	0.12	0.06	0.07	0.06
Correct predictions	0.402	0.385	0.396	0.396
Number of respondents	123	123	95.0	79.0

Notes:
t-stats in parenthesis

* significance at p=0.1
** significance at p=0.05
*** significance at p=0.01

5.3.4. General forest users

The final sub-group of forest users were the general forest visitors. This group was defined (in Question 2) as those visitors who did not have cycling, horse riding or nature watching as their main activity during the trip to the forest. Five CE models were generated for this group (Table 11). As per the previous results, Models 1 and 2 were respectively based on the choice-based and frequency-based choice task for all general visitors. In Model 1, attributes that were significant and positive included 'single track mountain bike trails', 'nature trails / wildlife hides', 'parking, toilets and picnic', 'parking, toilets, picnic, café, shop and play areas', and 'enhance surroundings. Attributes that were significant and negative were 'parking, toilets, picnic, café, and shop', and 'distance'. Insignificant attributes included 'easy access trails', 'art / sculpture trails, 'long distance walking trails', 'horse riding trails' and 'detailed information'. Similar results were found in Model 2, with the added inclusion of 'art / sculpture trails' as a significant and positive attribute.

Models 3, 4 and 5 were based on sub-groups of the general forest users. Model 3 (active general visitors) included those general visitors who indicated that they partook in either a cycling, horse riding or nature watching activity whilst in the forest (note that these activities were not considered to be the single main activity undertaken during the trip to the forest). Within this group, 'single track mountain bike trails', 'parking, toilets and picnic' and 'enhanced surroundings' were found to be significant and positive. 'Long distance walking trails', 'parking, toilets, picnic, café, shop and play areas', 'detailed information', and 'distance' were all significant and negative.

Model 4 was based on general forest users who indicated (in Question 9a) that they went on a walk during their visit to the forest. Significant and positive attributes included 'single track mountain bike trails', 'nature trails / wildlife hides', 'parking, toilets and picnic', 'parking, toilets, picnic, café, shop and play areas' and 'enhanced surroundings'. Significant and negative attributes included 'horse riding trails', 'parking, toilets, picnic, café, and shop' and 'distance'.

Finally, Model 5 was based on those general forest visitors who did not cycle, horse ride, nature watch or walk during their trip to the forest. Significant and positive attributes included 'art / sculpture walks', 'single track mountain bike trails', 'nature trails / wildlife hides', parking, toilets and picnic', 'parking, toilets, picnic, café, shop and play areas' and 'enhanced surroundings'. 'Horse riding trails', 'parking, toilets, picnic, café, shop' and 'distance' were again significant but negatively valued.

Table 11: Choice Experiments Models – general forest users

	Model 1 All general Visitors (Choice)	Model 2 All general Visitors (Frequency)	Model 3 Active general Visitors (Frequency)	Model 4 Walkers (Frequency)	Model 5 Non-active general visitors (Frequency)
ASC	0.394***	0.153***	0.024	0.068	0.164***
	(3.866)	(3.368)	(0.395)	(1.310)	(2.801)
Trails (Easy access)	-0.032	0.011	0.018	-0.003	0.039
	(-0.630)	(0.455)	(0.562)	(-0.099)	(1.346)
Trails (Art / sculpture walks)	0.075	0.055**	0.048	0.040	0.088***
	(1.469)	(2.384)	(1.501)	(1.510)	(3.031)
Trails (Long distance walking)	-0.022	-0.015	-0.080**	-0.022	-0.042
	(-0.407)	(-0.620)	(-2.420)	(-0.816)	(-1.396)
Single track mountain bike trails	0.105***	0.088***	0.098***	0.071***	0.088***
	(3.966)	(7.351)	(5.966)	(5.211)	(5.894)
Horse riding trails	0.011	-0.004	-0.017	-0.028**	-0.030*
	(0.391)	(-0.288)	(-0.995)	(-2.022)	(-1.897)
Nature trails / wildlife hides	0.108***	0.030**	0.015	0.025*	0.039**
	(4.054)	(2.473)	(0.908)	(1.848)	(2.571)
Parking, toilets, picnic	0.147***	0.133***	0.157***	0.187***	0.061**
	(2.698)	(5.410)	(4.617)	(6.737)	(1.963)
Parking, toilets, picnic, café, shop	-0.125**	-0.112***	-0.102***	-0.160***	-0.051
	(-2.247)	(-4.450)	(-2.952)	(-5.530)	(-1.620)
Parking, toilets, picnic, café, shop, play areas	0.135**	0.084***	0.043	0.087***	0.107***
	(2.485)	(3.367)	(1.231)	(3.059)	(3.496)
Detailed information	-0.002	-0.002	-0.029*	-0.018	0.007
	(-0.089)	(-0.181)	(-1.730)	(-1.347)	(0.489)
Enhanced surroundings	0.136***	0.052***	0.063***	0.038***	0.050***
	(5.098)	(4.263)	(3.776)	(2.757)	(3.263)
Distance	-0.017***	-0.019***	-0.019***	-0.019***	-0.020***
	(-15.668)	(-38.601)	(-27.402)	(-33.191)	(-31.822)
LL model	-2879.62	*-14281.98*	*-7428.155*	*-11038.29*	*-9114.99*
LL (Constants only)	-3057.99	-15235.14	-7916.58	-11741.4	-9770.897
LL ratio test (χ^2)	356.74	1906.32	976.85	1406.22	1311.81
p-value	0.00	0.000	0.000	0.000	0.000
Pseudo-R^2	0.06	0.06	0.06	0.06	0.07
Correct predictions	0.383	0.387	0.385	0.386	0.390
Number of respondents	706	706	365.5	544	452.3

Notes:
t-stats in parenthesis
* significance at p=0.1
** significance at p=0.05
*** significance at p=0.01

6. Survey questionnaires used in this research.

Copies of the questionnaires used in the research are reproduced as follows:

- Forest visitor survey: Section 6.1;
- Descriptions of the forest improvement attributes used in the CE analysis: Section 6.2;
- LM3 questionnaires: Section 6.3.

6.1. The forest visitor questionnaire

INTERVIEWER SCRIPT

GUIDANCE FOR COMPLETION

SAMPLE SELECTION:

- You should select individuals / groups on a 'next person to pass' basis.
- The questionnaire should be completed by all individuals / group members aged 16+.

THE QUESTIONNAIRE

- There are 5 documents linked to this questionnaire
  - **'Interview script'**: This comprises all sections of the questionnaire and is what the interviewer should follow during the interviewing. The script is colour coded:
    - '**Black' font:** This includes sections which the interviewer should read to respondents. Any questions that are in black ink should be asked to the group as a whole and the interviewer should record responses in the 'interviewer answer sheet'
    - '**Blue' font**: These sections are sections which the respondents should answer individually in the 'respondent answer booklet'. The interviewer should inform the respondents when to answer the various sections of this answer booklet and provide help / clarification if needed.
    - '**Red' font**: These are instructions for the interviewer. You should not read them out to the respondent.
  - **'Interviewer answer sheet'**: The interviewer should record GROUP responses in this answer sheet for Sections A and E. Also, in this answer sheet the interviewer should record details of the interview, as well as assign and record a group reference number (note that you still need to assign a group reference number if you are interviewing an individual). The group reference number is assigned as follows:

    Group ref no: ☐ - ☐☐☐☐ - ☐☐ .

    Forest – D D M M – Group ID

    Where: the first box 'Forest' is the Forest code, i.e.:

    1 – Abernethy
    2 – Glentress
    3 – Lake Vyrnwy
    4 – Cwm Carn

5 – Thetford 6 – New Forest

The next 4 boxes related to the date of the interview: Day Day Month Month.

The last box 'Group ID' is a number that corresponds to a count of the people / groups you have interviewed on that day. Thus, the 'Group ID' would be 01 for the first individual / group that you interview on that day, 02 for the next individual / group and so on.

- **'Respondent Answer Booklet'**: You should hand out a Respondent answer booklet to all group members aged 16+ when you reach Section B of the questionnaire. The respondent answer booklet is used to record responses to Sections B, C, D, F and G. You should guide the respondents through the various sections in accordance with the instructions outlined in the 'Interviewer script'. You should also encourage individuals to answer the questions individually.
- **'Show cards'**: There are 16 sets of show cards labelled A to P. The show cards related to:
  - Q16 in Section C (Card No. 1 only)
  - Q17 in Section D (Card No.s 2 to 6)

  The show card set that you give to respondents depends on the 'main recreation activity undertaken by the individual / group on the day of interview as identified in Q2 of the questionnaire. Show cards should be allocated to individual as follows:

CYCLISTS:	1 set of cards from A, B, C or D
HORSE RIDERS	1 set of cards from E, F, G or H
NATURE WATCHERS	1 set of cards from I, J, K or L
OTHER USERS / MIXED GROUPS	1 set of cards from M, N, O or P

  If you are interviewing a group, you should give each person a different set of cards. Also you should rotate the cards between groups.
- **'Group show cards'**: There are 32 sets of 'group show cards' labelled 'Group Set no' 1 to 32. The cards relate to Q19 in Section E. The groups cards are again linked to the main recreation activity (as identified in Q2) and cards should be allocated as follows:

CYCLISTS:	One from GROUP Card Set No 1 TO 8
HORSE RIDERS	One from GROUP Card Set No 9 TO 16
NATURE WATCHERS	One from GROUP Card Set No 17 TO 24
OTHER USERS	One from GROUP Card Set No 25 TO 32

  Again, cards should be rotated between individuals.

- **Section E:** This is a section for groups of respondents only. Do not complete this section if you are interviewing an individual.
- **Section F:** Only complete this section during the months of June and August.

Interviewer name: ……..……

Interviewer Code ☐ .

Location:

Forest name: ☐.

Forest code ☐ .

Access point ☐☐ .

Date of interview ☐☐ / ☐☐ / 2005.

Time of interview ☐☐ : ☐☐ . (24 hour)

Weather: (circle)

Rain 1 2 3 Dry

Overcast 1 2 3 Sunny

Cold 1 2 3 Hot

Windy 1 2 3 Still

Group ref no: ☐ - ☐☐☐☐ - ☐☐ .

Forest – D D M M – Group ID

FILL IN THE ABOVE INFORMATION IN THE 'INTERVIEWER ANSWER SHEET'

Good morning / afternoon, I am an interviewer from University of Wales Aberystwyth. We are conducting a survey on behalf of the Forestry Commission on visitor use of forests in Great Britain. The Forestry Commission is currently reviewing the way it provides facilities in its forests for different types of forest users. In this survey, we would like to ask you how YOU would like to see forest facilities improved for the activities that you are undertaking today in this forest. The information you provide will be used to help the Forestry Commission and others better manage the forests in the future for different groups of forest users. For this study, we need to interview you as a group, based on the people you are travelling with today. As an incentive, we will provide you with some refreshments while you complete the interview. Can you spare 15 to 20 minutes to answer some questions?

SECTION A: GROUP DETAILS

ASK SECTION A TO THE GROUP AS A WHOLE.
THE INTERVIEWER SHOULD RECORD THE GROUP'S RESPONSES IN THE 'INTERVIEWER ANSWER SHEET'

Q. 1 First of all, can I check that you have not been interviewed already at this site:

Yes (… have been interviewed already) ☐ (0) STOP INTERVIEW

No (… have not been interviewed before) ☐ (1) CONTINUE INTERVIEW

Q. 2 What is the main activity that your group is undertaking in this forest today?

Cycling	☐ (1)	USE THIS RESPONSE TO IDENTIFY WHICH SHOW CARDS TO USE IN SECTION C.
Horse riding	☐ (2)	
Nature watching	☐ (3)	
Other e.g. walking or mixed group activity	☐ (4)	

(Please specify other)……

Q. 3. What is the age and gender of all the people in your group ?

WRITE THE NUMBER OF PEOPLE IN EACH CATEGORY

MALE			
Under 16	☐ (1)	Under 16	☐ (3)
16 +	☐ (4)	16 +	☐ (4)
FEMALE			

Q. 4. Which of the following best describes your group? READ OUT

By myself	☐ (1)
Family	☐ (2)
Friends	☐ (3)
Other	☐ (4)

(specify) ……..

SECTION B: BASIC TRIP INFORMATION

HAND OUT 'RESPONDENT ANSWER SHEET' TO EACH PERSON AGED >16 YEARS.
RESPONDENTS SHOULD COMPLETE SECTION B OF THE ANSWER SHEET

I would now like you to individually answer the questions in Section B of this questionnaire. These questions ask you to provide some background information on your trip to THIS FOREST today. This map (SHOW MAP 1) shows the boundaries of THIS FOREST. Please let me know if you need me to clarify any of the questions. You will notice that Q.5 asks you to write down a group reference number. Your group reference number is …

PROVIDE THE ASSIGNED GROUP REFERENCE NUMBER

Q.5 Insert group reference number (provided by interviewer): ☐ - ☐☐☐☐☐ - ☐☐ .

Q. 6 Are you currently...

On a short day out from home (lasting less than 3 hours) ☐ (1)
On a day out from home (lasting more than 3 hours) ☐ (2)
On holiday away from home ☐ (3)
Other (SPECIFY) ..... ☐ (4)

Q. 7 a) Where have you travelled from today?

Nearest town ☐.
County / LA ☐.
Postcode (full if known; part better than nothing) ☐☐☐☐ ☐☐☐ .

b). How far have you travelled (one way) to get here? ☐☐☐ miles

c). How long did it take you to get here? ☐☐ hrs ☐☐ mins

Q. 8. Approximately how long do you intend to spend in THIS FOREST TODAY?

☐☐ Hours ☐☐ minutes.

Q. 9a Which of the following ACTIVITIES have YOU personally done or expect to do during your visit here TODAY?

(01)	Cycling - family / leisure ride	☐	(30)	Dog walking	☐
(02)	Mountain biking -cross country	☐	(31)	Running	☐
(03)	Mountain biking – technical single track	☐	(32)	Walking - short family / leisure walk	☐
(04)	Mountain biking - downhill course	☐	(33)	Rambling	☐
(05)	Biking – dirt jumping	☐	(34)	Hill walking	☐
(06)	Other cycling (specify)	☐	(35)	Other walking (specify)	☐
(10)	Pony trekking	☐	(40)	Picnic / BBQ	☐
(11)	Horse riding – family / leisure ride	☐	(41)	Art (e.g. sculptures trails)	☐
(12)	Horse riding – endurance	☐	(42)	Photography	☐
(13)	Carriage driving	☐	(43)	Children's play	☐
(14)	Other horse riding (specify)	☐	(44)	'Go Ape' high wire adventure	☐
(20)	Nature watching – general	☐	(50)	Climbing	☐
(21)	Nature watching – at viewing centre	☐	(51)	Orienteering	☐
(22)	Nature trail	☐	(52)	Motor sports	☐
(23)	Guided nature walk	☐	(53)	Other activities (Specify)	☐
(24)	Other nature watching (specify)	☐			

b) Which of these activities do you consider to be the main activity for YOUR trip here today? ☐☐ (INSERT NUMBER FROM ABOVE).

c) How often, on average, do you do this activity?

Daily	☐ (1)	1-3 times a year	☐ (4)
1-3 times a week	☐ (2)	Less often	☐ (5)
1-3 times a month	☐ (3)	Don't know	☐ (6)

Q. 10 Which of the following FACILITIES have YOU personally used or plan to use TODAY in THIS FOREST? (Note that not all listed facilities may be present in this forest**)**

Trails

(01) Multi-user trails (walkers, bikers and horses) ☐.
(02) Dedicated single track bike trails ☐.
(03) Dedicated downhill / 4 cross bike trails ☐.
(04) Dedicated horse riding trails ☐.
(05) Dedicated nature trails ☐.

Cycling facilities

(10) Bike wash ☐.
(11) Showers / changing rooms ☐.
(12) Jumps / drop-offs ☐.
(13) North shore (raised wooden cycle trails) ☐.

Horse riding facilities

(20) Horse corals / tie up points ☐.
(21) Horse box friendly parking ☐.

Nature watching facilities

(30) Wildlife hides ☐.
(31) Wildlife viewing centre ☐.

General facilities

(40) Car parking ☐.
(41) Toilets ☐.
(42) Baby changing facilities ☐.
(43) Forest shop ☐.
(44) Forest café ☐.
(45) BBQ / picnic area ☐.
(46) Children's play equipment ☐.

Information

(50) Information provided along trails ☐.
(51) Information provided at forest centre ☐.
(52) Information provided in leaflets ☐.
(53) Information provided on internet ☐.
(54) Information provided by forest staff ☐.

Q. 11 Is this your first visit to this forest ?

No ☐ (0) GOTO Q. 12
Yes ☐ (1) GOTO Q. 13

Q. 12 How many trips have YOU personally made to this forest in the last 12 months for each of the following activities?

Cycling ☐ trips
Horse riding ☐ trips
Nature watching ☐ trips
Walking / rambling ☐ trips
Other activities ☐ trips

Q. 13 Is this forest where you go to most often to do the activity that you are doing here today (i.e. the activity that you indicated in Q. 9b above) ?

No ☐ (0) GOTO Q. 14
Yes ☐ (1) GOTO Q. 15

Q. 14 If no, where do you go to most often to undertake today's activity.

Location ☐ *How far is this place from your home?* ☐ *Miles*

What is it about this other place that attracts you to go to it more often than this forest?

☐

Q. 15 If for some reason this forest were closed today, where would you go / what would you do instead?

(i) Stay at home ☐ (1)

(ii) Do today's activity at another forest ☐ (2)

Where? ☐ How far is this from your home? ☐ Miles

(iii) Do today's activity at another non-forest location ☐ (2)

Where? ☐ How far is this from your home? ☐ Miles

(iv) Do something else ☐ (3)

SECTION C: IMPACT OF A CHANGE IN FOREST FACILTITIES.

INDIVIDUAL RESPONDENTS SHOULD ANSWER THESE QUESTIONS IN THE 'RESPONDENT ANSWER SHEET'

CARD 1 CAN BE FOUND IN THE SHOW CARD BOOKLET

Q. 16. Impact of change in forest facilities.

I would now like to ask you how your use of THIS FOREST might change if new facilities were created next year. The proposed changes are described on the **Card 1** in your booklet.

a) Suppose that next year, the changes described on this card were implemented in this forest, would you change the number of trips you would take to this forest over the next 12 months? When answering this question, you should consider the number of trips that you made to this forest last year (i.e. the number of trips you stated in Q12 above).

No change in number of trips	☐ (0) (Skip to next question)
More trips	☐ (1) (GOTO b and then skip to next question)
Fewer trips	☐ (2) (GOTO c)

b) How many *more* trips would you take to this forest? ☐ more trips.

… To allow you to take these trips, would you:

(i)	Reduce the number of trips to other forests	☐.
(ii)	Reduce the number of trips to other non-forest locations	☐.
(iii)	Reduce the time spent on other activities	☐.

c) How many *fewer* trips would you take to this forest? ☐ fewer trips.

What would you do instead? Would you:

(i)	Go to a different forest	☐.
(ii)	Go to a non-forest location	☐.
(iii)	Do a different activity	☐.
(iv)	Stay at home	☐.

Are there any additional comments you would like to tell us about your choices?

SECTION D: YOUR OPINIONS ON FORESTS FACILITIES

THIS SECTION OF THE QUESTIONNAIRE DIFFERS FOR DIFFERENT USER GROUPS AS IDENTIFIED IN Q2. YOU SHOULD ALLOCATE DIFFERENT SHOW CARD BOOKLET TO EACH PERSON BEING INTERVIEWED ACCORDING TO THE FOLLOWING PROTOCOL:

CYCLISTS:	1 booklet from BOOKLET A, B, C or D
HORSE RIDERS	1 booklet from BOOKLET E, F, G or H
NATURE WATCHERS	1 booklet from BOOKLET I, J, K or L
OTHER USERS	1 booklet from BOOKLET M, N, O or P

ROTATE BOOKLETS BOTH WITHIN AND BETWEEN GROUPS

RESPONDENTS SHOULD WRITE ANSWERS IN THE 'RESPONDENT ANSWER SHEET'

First of all, could you write down the 'Booklet number' in Section C of your answer sheet. The booklet number is the letter (A to P) displayed on the front of the booklet that I have just given you.

This next section of the survey should be interesting and fun. We want to find out what types of facilities YOU PERSONALLY prefer when you go on a <cycling / horse riding / nature watching / on a day visit> trip to a forest.

We are going to present you with a series of four cards similar to CARD 2 in the handout. On each card, you will see three options. Forests A and B describe facilities at two hypothetical forest located a specified distance from your home. The third option is that you choose neither forest. In other words, you don't go to either forest and instead stay at home or do something else. Your task is as follows.

- First, you need to examine each card and decide whether you prefer Forest A or Forest B. You should indicate your preferred forest on your answer sheet.
- Next, imagine that YOU are planning your next five <cycling / horse riding / nature watching / day visit> trips. We are asking you to look at the facilities at the two forests shown on the card and then decide how YOU PERSONALLY would allocate your NEXT FIVE <cycling / horse riding / nature watching / day visit> trips between Forest A, Forest B or stay at home. When you answer this questions, you need to consider the following:
    - The trips can only be taken to the **two forests described** on the card and **with the people that you are here with today.**
    - **The five trips have to be taken within the next year**. If your group don't normally take five <cycling / horse riding / nature watching / day visit> trips a year, you should allocate the trips you don't normally take to 'stay at home'.
    - When allocating trips, you need to think about the **facilities provided at the two forest and also the distance that you would have to travel to get to each forest.** You should assume that the further the forest is from your home, the more costly it will be for you in terms of both money and time. You therefore need to consider whether the facilities at a particular forest are worth the time and cost travelling to that forest.
    - When allocating your five trips, try to give us as realistic responses as possible. In other words, only allocate your five trips to a forest if you truly believe that you would actually visit that particular forest in reality.

Have you any questions relating to this task?

Q. 17 I *would now like you to examine, in turn, cards 3 to 6 in the booklet. For each card, consider each forest carefully, and then:*

(i) indicate which forest (A or B) you prefer

(ii) indicate how you would allocate your next 5 trips (to be taken within the next 12 months) between Forest A, Forest B and stay at home.

	(i) PREFERRED FOREST		(ii) ALLOCATION OF NEXT FIVE TRIPS		
	Forest A	Forest B	Forest A	Forest B	Stay at home
Card 3:	[ ]	[ ]	[ ]	[ ]	[ ]
Card 4:	[ ]	[ ]	[ ]	[ ]	[ ]
Card 5:	[ ]	[ ]	[ ]	[ ]	[ ]
Card 6:	[ ]	[ ]	[ ]	[ ]	[ ]

Q. 18. Which of the following statements most closely explains how you allocated your 5 trips between the forests during the previous exercise?

I tended to allocate trips to the forest with the facilities that I personally liked ☐.
I tended to allocate trips to the forest with the facilities that I thought my group would prefer ☐.
I tended to allocate trips between Forest A and B since I like to go to different places ☐.
I did not allocate all 5 trips to Forest A or B since our group does not go on 5 trips a year ☐.
I did not allocate all 5 trips to Forest A or B because I didn't like the facilities at either forest ☐.
I did not allocate all 5 trips to Forest A or B since both forests were located too far away. ☐.
I randomly allocated the trips between the two forest. ☐.
Other reason (please specify ……..……). ☐.

SECTION E: GROUP OPINION ON FOREST FACILTIES

ONLY ASK THIS SECTION IF YOU ARE INTERVIEWING A GROUP

ASK THIS SECTION TO THE ENTIRE GROUP
RECORD THE GROUP'S RESPONSES IN THE 'INTERVIEW ANSWER SHEET'
THIS SECTION OF THE QUESTIONNAIRE DIFFERS FOR DIFFERENT USER GROUPS AS IDENTIFIED IN Q2. YOU SHOULD ALLOCATE ONLY ONE SET OF '**GROUP'** CARDS TO THE GROUP ACCORDING TO THE FOLLOWING PROTOCOL:

CYCLISTS:	One from GROUP Card Set No 1 TO 8
HORSE RIDERS	One from GROUP Card Set No 9 TO 16
NATURE WATCHERS	One from GROUP Card Set No 17 TO 24
OTHER USERS	One from GROUP Card Set No 25 TO 32

ROTATE THE GROUP CARDS SETS BETWEEN DIFFERENT GROUPS

Q. 19. Group choice

I would now like you to look at two more cards, but this time you need to decide AS A GROUP how you would allocate your next 5 trips between the forests presented. When completing this task, try to resolve any conflict is opinions as you would do when actually deciding which forest to go to.

WRITE GROUP CARD NUMBER HERE **Group Set number (1 to 32)** ☐ **.**

	ALLOCATION OF NEXT FIVE TRIPS		
	Forest A	Forest B	Stay at home
Card 7:	[ ]	[ ]	[ ]
Card 8:	[ ]	[ ]	[ ]

Q. 20 As a group, how did you decide where to allocate you five trips?

We have similar preferences and found it easy to agree	☐. (1)
We have different preferences and found it difficult to agree	☐. (2)
We didn't really agree	☐. (3)
One person decided for us and we generally agree with his decision	☐. (4)

Q. 21. Were the group decisions about trip allocations the same as you personally would have made? ASK RESPONDENTS TO INDICATE 'YES' / 'NO' BY RAISING HANDS.

Yes	☐	WRITE NUMBER OF PEOPLE STATING 'YES'
No	☐	WRITE NUMBER OF PEOPLE STATING 'NO'

If 'No', please explain why they were different.

Q. 22. As a group, what attracts you to a specific forest?

SECTION F: EXPENDITURE

SECTION F SHOULD ONLY BE COMPLETED DURING THE MONTHS OF JUNE AND AUGUST
INDIVIDUAL RESPONDENTS SHOULD ANSWER THESE QUESTIONS IN THE 'RESPONDENT ANSWER SHEET'

To understand the effect of forest recreation on the surrounding businesses, we need to find out how much money you expect to spend today relating to your trip to this forest. That is the amount of money already spent and an estimate of how much you will spend later today. When thinking about your spending, you should consider the following:

- Include any spending on accommodation, food, drink, transport, car parking, admissions, shopping, equipment etc. (Note that for car fuel costs, only include actual spend on fuel and not an estimate of the cost of fuel used).
- Include the amount that you will spend on any others (adults and children) for whom you will pay. If you are on a business trip please include any expenditure paid for by your company.

Q. 23. How much do you expect to spend today relating to your trip to this forest? You may indicate this amount either as how much you spend individually OR as group spend.

My individual spend = £[ ] .

OR

Total group spend = £[ ] .

Q. 24. What proportion of this was spent in the local economy, i.e. the area shown in the Map 2 (SHOW MAP 2).

[ ] % spent locally

Q. 25 . As part of this research, we will be contacting some local businesses that supply goods and services to forest visitors to try to assess the further impacts on their suppliers and workers. To help us to identify which businesses to contact, we are asking you tell me the name and location of up to three 'local' business where you spend your money today.

Name of business	**Location**

SECTION G: DEMOGRAPHICS

INDIVIDUAL RESPONDENTS SHOULD ANSWER THESE QUESTIONS IN THE 'RESPONDENT ANSWER SHEET'

Finally, we wish to collect some information on you. This information will help us better understand how household characteristics influence individual's use of forests. It will also help us to determine how representative our sample is in terms of the wider population. All of your answers are strictly confidential. The information will only be used to report comparisons among groups of people. We will never identify individuals or households with their responses.

Q.26 Gender: Male ☐ (0) Female ☐ (1)

Q. 27 Age:

16 – 24	☐ (1)	45 – 59	☐ (4)
25 - 34	☐ (2)	60+	☐ (5)
35 - 44	☐ (3)		

Q.28 *What is your marital status?*

Married	☐ (1)	Separated	☐ (4)
Cohabiting	☐ (2)	Divorced	☐ (5)
Single	☐ (3)	Widowed	☐ (6)

Q29. Household size.

Including you, how many people are in your household between for following ages?

0 to 5 years	☐.	11 to 18 years	☐.
6 to 10 years	☐.	Over 18	☐.

Q30. Ethnic group

White	☐.	Pakistani & Bangladeshi	☐.
Mixed	☐.	Black or Black British	☐.
Indian	☐.	Other ethnic group	☐.

Q31. *What is your highest level of educational achievement*

Degree or degree equivalent and above	☐. (1)
A. levels, or equivalent and above	☐. (2)
Other qualifications below A. level	☐. (3)
Other qualification	☐. (4)
No qualifications	☐. (5)

Q32*: Employment status*

Full time (30+ hrs / week)	☐. (1)
Part time (Less 30 hrs /week)	☐. (2)
Retired	☐. (3)
Student	☐. (4)
Looking after family / home	☐. (5)

Sick / disabled ☐ (6)
Other ☐ (7)

Q33: If working, which of the following categories best describes the type of work you do?

Managerial and professional occupations ☐ (1)
Intermediate occupations ☐ (2)
Routine and manual occupations ☐ (3)
Other ☐ (4)

Q. 34 Which of the following income groups best reflects your household's approximate income before tax?

Less than £10,000	☐ (1)	£60,000 to £69,999	☐ (7)
£10,000 to £19,999	☐ (2)	£70,000 to £79,999	☐ (8)
£20,000 to £29,999	☐ (3)	£80,000 to £89,999	☐ (9)
£30,000 to £39,999	☐ (4)	£90,000 to £99,999	☐ (10)
£40,000 to £49,999	☐ (5)	£100,000 and over	☐ (11)
£50,000 to £59,999	☐ (6)	Undisclosed	☐ (12)

Q. 35 ***Are you a member of any of the following sports or environmental organisation?***

Cycling / MTB ☐ (1)
Horse riding (e.g. BHS) ☐ (2)
Walking (e.g. Ramblers) ☐ (3)
Conservation (eg RSBP) ☐ (4)

QUALITY ASSURANCE

ASK RESPONDENTS TO CONSIDER 1 TO 3 BELOW IN RECORD INFORMATION IN THEIR 'RESPONDENTS ANSWER SHEET'

1. I confirm that I was interviewed by an SERS interviewer on 'Forest Recreation' and that the interview was conducted in accordance with instructions and SERS Code of Conduct

Interviewee..... Date _ _ / _ _ / _ _

2. As part of our quality assurance procedures, my supervisors will contact a small, but random sample of people that I have interviewed to check that I have conducted this interview in an appropriate manner. Would you be willing to take part in our quality assurance check?

No ☐ (0)

Yes ☐ (1)

If YES, could you provide us with the following information to allow us to contact you.

Respondent's name ……. Tel. No. ☐.

3. Finally, it is likely that we will conduct a follow-up survey to this research. This is likely to involve either an internet questionnaire or a group meeting. Would you be willing to participate in the follow-up work?

Internet questionnaire: No ☐ (0)

Yes ☐ (1) Email address: .

.

Group meeting: No ☐ (0)

Yes ☐ (1) Tel. : .

.

INTERVIEWER DECLARATION: I confirm that I conducted an interview with the respondent named above in accordance with instructions and SERS Code of Conduct

Interviewer..... Date _ _ / _ _ / _ _

6.2. Descriptions of various levels of forest attributes used in the study.

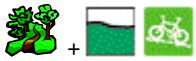
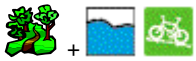
CYCLING	Level 1	Level 2	Level 3	Level 4
Type of trails	Only multi-user trails (walkers, cyclists and horse riders) available. No dedicated cycle trails. 	Multi-use trails + dedicated way marked, long distance (+ 20 miles) cross country bike trails. 	Multi-use trails + dedicated technical single track mountain bike trails. 	Multi-use trails + dedicated steep and technical downhill / 4 cross bike trails. 
Optional trail obstacles	No optional trail obstacles. 	A range of optional trail obstacles provided including jumps, drop-offs, and north shore. 		
Bike wash facilities	No bike wash facilities. 	Bike washing facilities available. 		
Changing and Shower facilities	No changing / shower facilities. 	Changing / shower facilities available. 		
General facilities	Facilities include car parking and toilets only. 	Facilities included car parking, toilets and BBQ / picnic areas. 	Facilities included car parking, toilets, BBQ / picnic area, café and forest shop. 	Facilities included car parking, toilets, BBQ / picnic areas, café, forest shop, and children's play areas. 
Information	Only basic information on the forest, trails, and wildlife provided. 	Detailed and up-to-date information on the forest, trails, and wildlife provided at forest centre, in leaflets, along trails and on website 		
Surroundings	No special management to increase opportunities to view wildlife, points of interest and view points. 	Forest enhanced to increase opportunities to view wildlife, features of interest and view points. 		
Distance	Forest located **20 miles** from your home.	Forest located **75 miles** from your home.	Forest located **150 miles** from your home.	Forest located **300 miles** from your home.

Figure 2: Attributes and levels of 'Cycling' facilities used in the CE model.

HORSE RIDING	Level 1	Level 2	Level 3	Level 4
Type of trails	Only multi-user trails (walkers, cyclists and horse riders) available. No dedicated horse trails. 	Multi-use trails + dedicated horse riding trails with horse friendly trail surfaces. 	Multi-use trails + dedicated horse riding trails, which are also suitable for carriage driving. 	Multi-use trails + dedicated long distance (+20 miles) horse riding trails. 
Optional obstacles	No optional obstacles provided. 	A range of optional obstacles provided including jumps, ditches etc.		
Horse box friendly parking	Horse friendly parking NOT provided. 	Horse box friendly parking provided at forest. 		
Horse corrals and tie up point	No horse corrals and tie up points available. 	Horse corrals and tie up points available at forest. 		
General facilities	Facilities include car parking and toilets only. 	Facilities included car parking, toilets and BBQ / picnic areas. 	Facilities included car parking, toilets, BBQ / picnic area, café and forest shop. 	Facilities included car parking, toilets, BBQ / picnic areas, café, forest shop, and children's play areas. 
Information	Only basic information on the forest, trails, and wildlife provided. 	Detailed and up-to-date information on the forest, trails, and wildlife provided at forest centre, in leaflets, along trails and on website 		
Surroundings	No special management to increase opportunities to view wildlife, points of interest and view points. 	Forest enhanced to increase opportunities to view wildlife, features of interest and view points. 		
Distance	Forest located **20 miles** from your home.	Forest located **75 miles** from your home.	Forest located **150 miles** from your home.	Forest located **300 miles** from your home.

Figure 3: Attributes and levels of 'Horse riding' facilities used in the CE model.

NATURE WATCHING	Level 1	Level 2	Level 3	Level 4
Trails / routes	Only multi-user trails (walkers, cyclists and horse riders) available. 	Multi-use trails + short dedicated, easy access nature trails. 	Multi-use trails + dedicated medium length nature trails with many information boards on forest wildlife. 	Multi-use trails + quiet 'off the beaten track' trails into areas of high wildlife interest. 
Hides	No wildlife hides. 	Wildlife hides available. 		
Wildlife viewing centres	No wildlife viewing centre. 	A wildlife viewing centre available for unique species. 		
Guided nature walk	No guided nature walks available. 	Guided nature walks available 		
General facilities	Facilities include car parking and toilets only. 	Facilities included car parking, toilets and BBQ / picnic areas. 	Facilities included car parking, toilets, BBQ / picnic area, café and forest shop. 	Facilities included car parking, toilets, BBQ / picnic areas, café, forest shop, and children's play areas. 
Information	Only basic information on the forest, trails, and wildlife provided. 	Detailed and up-to-date information on the forest, trails, and wildlife provided at forest centre, in leaflets, along trails and on website 		
Surroundings	No special management to increase opportunities to view wildlife, points of interest and view points. 	Forest enhanced to increase opportunities to view wildlife, features of interest and view points. 		
Distance	Forest located **20 miles** from your home.	Forest located **75 miles** from your home.	Forest located **150 miles** from your home.	Forest located **300 miles** from your home.

Figure 4: Attributes and levels of 'Nature watching' facilities used in the CE model.

GENERAL FOREST USERS	Level 1	Level 2	Level 3	Level 4
Walking trails	Only multi-user trails (walkers, cyclists and horse riders) available 	Multi-use trails + short dedicated, easy access walking trails. 	Multi-use trails + art / sculpture walks. 	Multi-use trails + dedicated long distance (+20 miles) walking routes. 
Mountain bike trails	No dedicated technical single track mountain bike trails. 	Dedicated technical single track mountain bike trails in forest. 		
Horse riding trails	No dedicated horse riding trails 	Dedicated horse riding trails in forest. 		
Nature trails / wildlife hides	No nature trails / wildlife hides. 	Nature trails / wildlife hides in forest 		
General facilities	Facilities include car parking and toilets only. 	Facilities included car parking, toilets and BBQ / picnic areas. 	Facilities included car parking, toilets, BBQ / picnic area, café and forest shop. 	Facilities included car parking, toilets, BBQ / picnic areas, café, forest shop, and children's play areas. 
Information	Only basic information on the forest, trails, and wildlife provided. 	Detailed and up-to-date information on the forest, trails, and wildlife provided at forest centre, in leaflets, along trails and on website 		
Surroundings	No special management to increase opportunities to view wildlife, points of interest and view points. 	Forest enhanced to increase opportunities to view wildlife, features of interest and view points. 		
Distance	Forest located **20 miles** from your home.	Forest located **75 miles** from your home.	Forest located **150 miles** from your home.	Forest located **300 miles** from your home.

Figure 5: Attributes and levels of 'General forest user' facilities used in the CE model.

6.3. Questionnaire used in the LM3 study

Dear <<<NAME>>>

Re: Survey of business and employee spend

The University of Wales Aberystwyth has been contracted by the Forestry Commission to conduct research into the local economic impacts of visitors to its forests. This research involves asking forest visitors questions relating to how much they spend during their trip to the forest and also where they spend this money. Using this information, we can then trace how visitor expenditure is subsequently circulated through the local economy to generate knock-on (or multiplier) effects such as the generation of local income and jobs. Such information can then be used to help the Forestry Commission decide where to investment in its forest to help maximise the benefit to local communities.

<<< FOREST NAME>>> forest has been identified as one of the forests for this research. Over the summer we interviewed over 1500 visitors to <<<FOREST NAME>>> forest and asked them to tell us how much they spend locally during their trip to the forest and also where they made this expenditure. From this exercise, your business (<<<BUSINESS NAME>>>) was identified as a key recipient of forest visitor spend.

We are therefore interested to find out how the money you receive from visitors to <<<FOREST NAME>>> forest helps stimulate income and jobs within the local economy. To this end, we would like to ask you to complete the following:

- You should complete the 'Business Spend Survey'; you may *either* use Version A which relates to your actual expenditure on different items, *or* Version B which asks you to allocate percentages of your expenditure between the items.
- You and up to ten of your employees should complete the 'Personal Spending Survey'. Again, you may *either* complete Version A (actual £ figures) *or* Version B (% figures). If you have more than ten employees, you should select a sample of ten people who are representative of the people that work for you.

In both of the Business and Personal Spend Surveys, we ask you to consider your expenditures between 'local' spend and 'non-local' spend. We enclose copies of a map that illustrates the area that we are referring to the local area.

We also enclose some guidance notes to help you and your colleagues complete the surveys. However, if you would like further clarification, please feel free to call me on 01970 622217.

Finally, we would appreciate if you could return the completed surveys in the enclosed envelopes by Xmas. Please be assured that any information that we collect from you will be held in complete confidence. We will never link your name or business to the data. The data will be used, along with data from other businesses and individuals, to develop an indicator of the size of local impacts.

Thank you for your assistance.

Mike Christie

Dr Mike Christie
Lecturer in Environmental Economics
University of Wales Aberystwyth.

Notes on completing the Business spend survey

The University of Wales Aberystwyth has been contracted by the Forestry Commission to conduct research into the local economic impacts of visitors to its forests. This research involves first asking forest visitors questions relating to how much they spend during their trip to the forest and also where they spend this money. Using this information, we can then trace how visitor expenditure is subsequently circulated through the local economy to generate knock-on (or multiplier) effects such as the generation of local income and jobs. Data from the forest visitor surveys indicated that your business was a key recipient of forest visitor spend. We are now interested to find out the extent to which the money you receive from forest visitors is re-circulated around the local economy. To allow us to do this, we ask that you to provide us with some basic information on the patterns of spend of your business. You are therefore required to complete the 'Business Spend Survey' for your business. There are two versions of the 'Business Spend Survey': Version A asks for actual £ figures, while Version B asks for % figures. You can choose whether you would prefer to answer Version A or B; note that you only need to complete one version.

To help you complete the survey, we ask that you read the following notes:

Version A: actual £ figures

- **Item** is the payment you made to an identified organisation or individual. We have identified some of the main items that you might spend money on; however, feel free to add in your own items in the space provided.

- **Total £** is the amount of money you spend on each item. The total of this column should equal your total turnover. You should place this total spending figure in the space provide at the bottom of the table.

- **£ Local and £ Non-local** are the amounts that you spend on each item either locally or outside the local area. In this study, the area which we define as 'local' is the shaded area on the attached map. Also, you should note that the total of '£ Local' + '£ Non-local' equals the 'Total £' for each item.

- **Business name and location**. In the final column of the table, you should enter details of the main local business associated with each item of expenditure. Note that we need enough information to allow us to contact them to collect further information on their expenditures. The businesses you list here should only be local businesses, i.e. within the shaded area on the enclosed map.

Version B: %figures

- **Item.** As in Version A above.

- **Total %** is the percentage of your total spend you make on each item. The total of this column should equal 100%.

- **% Local and % Non-local** are the percentage that you spend on each item. In this study, the area which we define as 'local' is the shaded area on the attached map. Also, you should note that the total of '% Local' + '% Non-local' equals the 'Total %' for each item.

- **Business name and location**. As in Version A above.

BUSINESS SPENDING SURVEY
(VERSION A – actual £ figures)

Thank you for taking the time to complete this form. Please refer to the guidance notes to help you complete the survey. Also, you should refer to the enclosed map that indicates what we mean by 'local' spend. Please note your results will be kept in strictest confidence.

Company Name: _____

Address: _____

Contact name and position: _____

How is the business's turnover spend?
You may use either monthly or annual figures, but please be consistent for all items below. For each row, (e.g. staff costs), the 'Total £' should be equal to '£ Local' + '£ Non-local'. If you do not wish to provide us with actual £ figures, you may instead wish to submit % figures using version B of the survey.

Item	**Total £ (Local + Non)**	**£ Local**	**£ Non-local**	Please name and location of the main local businesses you use for each category
Example – using £ figures	*£1200*	*600*	*£1800*	*Forest stores, Woodedge village*
Staff costs (excluding NI and pension)				
NI, Pension, and training				
Drawings (if sole owner)				
Directors fees and expenses (if partnership)				
Supplies				
Subcontractors				
Rent / Mortgage				
Fuel and utilities				
New investments				
Insurance				
Taxes (VAT, corporation tax, and business rates				
Loan repayments				
Other (Please specify)				

Total spending: £_____
The £ figures above are: monthly / annual (Please circle)

If you have any questions regarding this survey, please do not hesitate to contact Dr Mike Christie at 01970 622217.

Once completed, please return the survey to Dr Mike Christie, Institute of Rural Sciences, University of Wales Aberystwyth, Aberystwyth, Ceredigion, Wales, SY23 3AL.

Notes on completing the Personal spend survey

The University of Wales Aberystwyth has been contracted by the Forestry Commission to conduct research into the local economic impacts of visitors to its forests. This research involves first asking forest visitors questions relating to how much they spend during their trip to the forest and also where they spend this money. Using this information, we can then trace how visitor expenditure is subsequently circulated through the local economy to generate knock-on (or multiplier) effects such as the generation of local income and jobs. Data from the forest visitor surveys indicated that the business you work for was a key recipient of forest visitor spend. We are now interested to find out the extent to which the money your business receives from forest visitors is re-circulated around the local economy. To allow us to do this, we ask that each employee of the recipient businesses provides us with some basic information on the patterns of spend of their employees. You, as an employee, are therefore required to complete the 'Personal Spend Survey'. There are two versions of the 'Personal Spend Survey': Version A asks for actual £ figures, while Version B asks for % figures. You can choose whether you would prefer to answer Version A or B; note that you only need to complete one version.

To help you complete the survey, we ask that you read the following notes:

Version A: actual £ figures

- **Item** is the payment you made to an identified organisation or individual. We have identified some of the main items that you might spend money on; however, feel free to add in your own items in the space provided.

- **Total £** is the amount of money you spend on each item. The total of this column should equal your total turnover. You should place this total spending figure in the space provide at the bottom of the table.

- **£ Local and £ Non-local** are the amounts that you spend on each item either locally or outside the local area. In this study, the area which we define as 'local' is the shaded area on the attached map. Also, you should note that the total of '£ Local' + '£ Non-local' equals the 'Total £' for each item.

- **Business name and location**. In the final column of the table, you should enter details of the main local business associated with each item of expenditure. Note that we need enough information to allow us to contact them to collect information on their expenditures. The businesses you list here should only be local businesses, i.e. within the shaded area on the enclosed map.

Version B: %figures

- **Item.** As in Version A above.

- **Total %** is the percentage of your total spend you make on each item. The total of this column should equal 100%.

- **% Local and % Non-local** are the percentage that you spend on each item. In this study, the area which we define as 'local' is the shaded area on the attached map. Also, you should note that the total of '% Local' + '% Non-local' equals the 'Total %' for each item.

- **Business name and location**. As in Version A above.

PERSONAL SPENDING SURVEY
(VERSION A – actual £ figures)

Thank you for taking the time to complete this form. Please refer to the guidance notes to help you complete the survey. Also, you should refer to the enclosed map that indicates what we mean by 'local' spend. Please note your results will be kept in strictest confidence.

Employer Company: _____

Where do you live? (Please circle) : Local Non-local

How do you spend you income?
You may use either monthly or annual figures, but please be consistent for all items below. For each row, (e.g. Income tax), the 'Total £' should be equal to '£ Local' + '£ Non-local'. If you do not wish to provide us with actual £ figures, you may instead wish to submit % figures using version B of the survey.

Item	**Total £ (Local + Non)**	**£ Local**	**£ Non-local**	Please name and location of the main local businesses you use for each category
Example – using £ figures	*£1200*	*600*	*£1800*	*Forest bakery, Woodedge village*
Income tax				
Food (excluding restaurants, takeaways etc)				
Entertainment (e.g. eating out, hobbies, sport, pub etc)				
Clothes				
DIY / Gardening / Household appliances etc				
Transportation (e.g. taxis, bus fares, petrol etc)				
Services (e.g. baby sitting, cleaners etc)				
Rent / mortgage				
Council tax				
Home costs (e.g. electricity, heating, water, phone etc)				
Loan repayments				
Other (please specify				

Total Spending = £_____
The £ figures above are: monthly / annual (please circle)

If you have any questions regarding this survey, please do not hesitate to contact Dr Mike Christie at 01970 622217.

Once completed, please return the survey to Dr Mike Christie, Institute of Rural Sciences, University of Wales Aberystwyth, Aberystwyth, Ceredigion, Wales, SY23 3AL.

7. References

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