Valuing Forest Recreation Activities: Phase 1 report

Report to the Forestry Commission

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1. Executive Summary

Within Great Britain, there are around 2.74 million ha of forest and woodland, of which around 0.78 million ha are managed by the Forestry Commission. As part of its remit, the Forestry Commission endeavours to produce environmental, economic, and social benefits from its own forests and woods, as well as promote these benefits in privately owned woodland. One key mechanism for this is through its aim to increase opportunities for public recreation within forests. Over the past few decades, the Forestry Commission has invested heavily in forest access and recreation. Furthermore, it has recognised that the recreation market is now becoming demonstrably diverse and segmented. The Commission is now seeking to assess the value and impact of the different forms of forest recreation in Great Britain.

This research, commissioned by the Forestry Commission, therefore aims:

- To estimate the effect on consumer surplus of changes in the provision of key forest recreation facilities;
- To examine the heterogeneity of recreational values across different forest users and uses;
- To estimate the economic impact of forest recreation activities.

This document reports Phase 1 of this research; namely the scoping stage of the study. Within this report, the following information sources are utilised to inform the design of the survey instrument to be utilised in Phase 2 of the study:

- Desk review of relevant literature / studies;
- Forest recreation user interviews;
- Stakeholder interviews.

Based on the information gathered from the above, it is proposed that three groups of forest recreation activities are investigated in this research, namely:

- 'Cycling'; defined as incorporating all types and abilities of cycling that occurs within forests including short family rides, cross country riding, single track mountain biking, down hill, 4 cross and jumps .
- 'Horse riding'; defined to include all types of riding that takes place in the forest and would investigate preferences for horse specific facilities similar to those currently provided at Dyfnant and Lake Vyrnwy forest.
- 'General forest visitors'; defined to represent a catch all group of forest users include walkers / hikers, 'play', nature watchers and day trippers, as well as people on multi-activity visits.

It is proposed that survey work is undertaken at the following six forests: Glentress, Abernethy, Thetford, New Forest, Dyfnant and Lake Vyrnwy and Cwm Carn. These forests have been selected to cover a comprehensive range of forest recreation activities and abilities; as well as Forestry Commission and private forests.

It is proposed that several valuation models are employed to value forest recreation, including:

- A count (travel cost) model to estimate *consumers' surplus values per visit* for a range of *forest user groups*.
- A contingent behaviour model to estimate *both changes in predicted number of visits* and *change in consumers' surplus for improvements* in forest recreation facilities.

- Either a choice experiment or a random utility maximisation travel costs model to estimate changes in *consumers' surplus associated with improvements* to attributes associated with forest recreation facilities.
- It is proposed that the attribute based valuation method will focus on eight forest recreation attributes: trails / routes, optional challenges, activity specific facilities, general facilities, information, surroundings, nature, and price / travel distance.
- Although the mix of methods proposed above is our ideal, there is some concern relating to the likely length of the survey instrument. Various contingencies have been proposed and these will be investigated further in Phase 2. Depending on the outcome of this investigation, it may be necessary to reduce the number of valuation questions within the survey instrument, or split the survey instrument between sub-samples.

Heterogeneity of values for forest recreation will be examined by disaggregating the valuation data according to a range of discrete groups based on activities, user characteristics and if appropriate latent classes.

It is proposed that the economic impact for forest recreation be analysed using multiplier analysis combined with the Local Multiplier 3 (LM3) technique. To achieve this:

- Information on visitor spend will be collected either from primary research or secondary data sources (if available), or from primary data collection.
- These expenditure data would then be multiplied by LM3 multiplier coefficients (estimated from primary data collection) to estimate local economic impacts of recreation in the six forests.

The survey will be administered over a period of six month during the summer 2005. It is proposed that the majority of the survey work will be through intercept interviews on site. However, it is also proposed that this work will be complemented using valuation workshops.

2. Introduction

Within Great Britain, there are around 2.74 million ha of forest and woodland, of which around 0.78 million ha are managed by the Forestry Commission. As part of its remit, the Forestry Commission endeavours to produce environmental, economic, and social benefits from its forests and woods, as well as promote these benefits in private woodlands. One key mechanism for this is through its aim to increase opportunities for public recreation within its forests. Over the past few decades, the Forestry Commission has invested heavily in forest access and recreation. The Commission is now seeking to assess the value and impact of the different forms of forest recreation in Great Britain. It is recognised that recreation is a major activity within forests and woodlands in Great Britain; however such recreation is largely unpriced. The few existing studies that have attempted to estimate the consumer surplus of forest recreation (e.g. Benson & Willis, 1992; Scarpa, 2003) have tended to focus on generic recreation. However, the recreation market has become demonstrably diverse and segmented. Understanding of the economic value and impact of forest recreation thus demands an understanding of the range of values and impacts associated with this diversity of recreation activities.

2.1. Aims and objectives

The aim of this research is to estimate the public benefit (consumers' surplus) and the economic impacts of different types of forest recreation activity and users. To achieve this, the following objectives will be addressed:

- *To estimate the effect on consumers' surplus of changes in the provision of key forest recreation facilities;*
- *To examine the heterogeneity of recreational values across different forest users and uses;*
- *To estimate the economic impact of forest recreation.*

This document reports Phase 1 of this research; namely the scoping stage of the study. Within this report, the following information sources are utilised to inform the design of Phase 2 of the study:

- Desk review of relevant literature / studies,
- Stakeholder interviews,
- Forest recreation user interviews.

This Phase 1 report is structured as follows. The review of literature comprises a review of forest recreation (Section 3), a review of the literature relating to the valuation of forest recreation (Section 4) and a review of the literature relating to the economic impact of forest recreation (Section 5). This is then followed by the reporting of the empirical work undertaken during Phase 1 including interviews with forest users (Section 6) and stakeholder (Section 7). Finally in Section 8 we present our proposed methodology for Phase 2. Within the appendices of the report copies of the questionnaire used in the recreation user and stakeholder interviews are attached.

3. Forest recreation: an overview

The Forestry Commission's research strategy includes an extensive research programme '*Forest and Society*' which aims to develop a greater understanding of the ways forestry can benefit society and how these benefits can be delivered. A key theme within this programme is the '*Forest visitor surveys and monitoring*' programme, which has two major aims:

1. to monitor visitor numbers to public forests and woodlands, and
2. to monitor the quality of experience which visitors receive when using these environments.

As part of this programme, the Forestry Commission have undertaken a series of ongoing studies of visitors to forests to examine visitor profile and measure overall levels of satisfaction. Between 1995 and 2001, this work took the form of a national programme of visitor surveys focusing on the larger forest sites (often with visitor centres) throughout Great Britain. Summary results from these surveys can be found on the Forestry Commission website: http://www.forestry.gov.uk/forestry/infd-5pgazz. In 2002, the Forestry Commission developed two new visitor monitoring programmes. The '*All Forests*' visitor monitoring programme which aims to provide more accurate estimates of the number of visits to all types of Forestry Commission woodland (rather than simply focus on the larger forest sites). The '*All Forests*' programme began operating in Wales and Scotland in 2004, with the Welsh results expected in 2005 and the Scottish ones in 2007. The second programme combines both quantitative and qualitative survey methodologies to measure the quality of visitor experience (NFO System Three, 2002a; 2002b; NFO Tourism and Leisure 2003; NFO Worldgroup 2003a[1]). In addition to these general forest recreation studies, the Forestry Commission have also undertake visitor surveys at specific forest sites, for example: at Nant Yr Arian (Forestry Commission, 2002b); and Cwm Carn, (Forestry Commission, 2002c; 2003); also see http://www.forestry.gov.uk/forestry/infd-5pgazz for a comprehensive list of site specific studies). Other studies have focused on specific recreation activities (e.g. cycling / mountain biking (Forestry Commission, 1997; 2002a) and horse riding (Forestry Commission, 1999)).

Although much of this work is useful and relevant to the aims of this research, it is not the intension of this Phase 1 report to provide a comprehensive review of this work (since much of this work is freely available on the Forestry Commission's website). Furthermore, a number of existing reports already provide recent reviews of forestry visitor surveys (Forestry Commission, 2004a; NFO WorldGroup, 2002a). What we propose is to identify the key statistics and to review them in the context of developing a robust methodology for the economic valuation and impact study proposed for Phase 2 of this research project.

[1] Note that all of these reports were produced by the same unit, which has underwent a number of name changes over recent years.

3.1. Forest sites

The area of woodland in Great Britain is approximately 2.54 million ha (11.9% of the total surface area). The distribution of GB woodland between ownership types can be found in Table 1 below.

Table 1: Area of woodland in GB by owner type (1995-99).

Ownership type	England ('000 ha.)	Scotland ('000 ha.)	Wales ('000 ha.)	GB ('000 ha.)
Forestry Commission	223	539	120	882
Other public body (not FC)	27	13	5	45
Local authority	61	11	8	80
Private forestry or timber business	7	28	6	41
Other private business	147	101	26	273
Personal	481	533	96	1110
Charity	68	14	8	90
Community ownership or common land	4	0	1	5
Unclassified	4	13	1	18
Total	**1022**	**1253**	**270**	**2545**

Source: Smith and Gilbert (2001).
Notes: These estimates exclude forest less than 2 ha.

Forest Parks are areas of Forestry Commission land which are of national importance for recreation. It is estimated that Forest Parks cover around 136,000 ha in England, 143,000 ha in Scotland and 13,000 ha in Wales (Forestry Commission, 2004b); it should however be noted that recreation facilities may also be available in many smaller Forestry Commission sites and on non-Forestry Commission woodland.

Table 2 presents information on recreation facilities and activities that are provided at 588 key Forestry Commission sites (identified as those that were included on the Forestry Commission website in August 2004). The numbers in the Table represent the number of sites where a given facility or activity is present. In terms of facilities, 87% of forests have parking facilities, 38% information, 23% toilets, and 8% visitor centres (Table 2). Walking is an activity which could be undertaken at most Forestry Commission sites (80% of sites). Cycling and picnicking were also possible at a large proportion of sites (38%), while horse riding was available at 21% of sites, wildlife activities at 15% of sites (Table 2). Information on the facilities and activities that occur at individual Forestry Commission sites can be found on the Forestry Commission website: http://www.forestry.gov.uk/recreation .

Table 2: Number of Forest Commission sites with recreation facilities and activities

Facility / Activity	England	Wales	Scotland	GB	GB (%)
Facilities					
Parking: free	165	72	218	**455**	**77.4%**
Parking: paid	34	12	12	**58**	**9.9%**
Information	101	17	106	**224**	**38.1%**
Easy access	82	19	42	**143**	**24.3%**
Toilets	66	15	56	**137**	**23.3%**
Refreshments	46	5	23	**74**	**12.6%**
Visitor centre	24	5	20	**49**	**8.3%**
Shop	18	5	11	**34**	**5.8%**
Activities					
Walking	172	70	228	**470**	**79.9%**
Cycling	98	27	104	**229**	**38.9%**
Picnic	94	37	93	**224**	**38.1%**
Horse riding	61	20	43	**124**	**21.1%**
Wildlife activities	51	6	34	**91**	**15.5%**
Educational	47	14	28	**89**	**15.1%**
Viewpoint	16	3	46	**65**	**11.1%**
Heritage	19	4	33	**56**	**9.5%**
Play area	28	7	16	**51**	**8.7%**
Orienteering	28	6	15	**49**	**8.3%**
Fishing	12	12	21	**45**	**7.7%**
Barbecue	24	13	6	**43**	**7.3%**
Forest drive	13	1	10	**24**	**4.1%**
Camping	10	2	12	**24**	**4.1%**
Arts	14	0	8	**22**	**3.7%**
Arboretum	7	4	3	**14**	**2.4%**
Water sports	2	1	3	**6**	**1.0%**
Skiing	0	0	2	**2**	**0.3%**
Total number of forest sites	215	103	270	**588**	

Source: Forestry Commission (2004b)

3.2. Forest recreation activities

The Great Britain (and earlier the UK) Day Visits Survey (DVS) provides one of the most comprehensive estimates of the total number of visits to GB (UK) woodlands. In 2002/03, it was estimated that there were 252 million day visits to all GB woodlands (TNS Travel and Tourism, 2004b) (Table 3). Although this number is lower than earlier UK DVS studies (National Centre for Social Research (1995; 1997; 1999) it is thought that differences in practices between the two survey protocols may be responsible for some of this difference (Forestry Commission, 2004b). Of these day trips to forests, approximately 21% were thought to be to Forestry Commission woodlands, 33% to local authority woodlands, 23% to private woodlands and 7% to voluntary organisations woodlands (TNS Travel and Tourism, 2004b).

Table 3: Number of day visits to woodland (millions of visits)

	England	Scotland	Wales	GB
1994	273	18	12	303
1996	308	26	11	346
1998	321	22	11	355
2002/3	222	18	12	252

Source: National Centre for Social Research (1995; 1997; 1999) UK Day Visits Surveys.
TNS Travel & Tourism (2004b) GB Day Visits Survey.

The DVS also enables day visits to woodlands to be analysed by type of trip. Of the 252 million leisure day trips to GB woodlands in 2002/03, 157 million (62%) had '*walk, hill-walk, ramble*' as the main activity, 20 million (8%) had '*cycling, mountain biking*' as main activity; other activities relevant to this research were not specified in the GB DVS.

The Forestry Commission has also made its own estimates of visitor numbers on Forestry Commission woodland. In the 1980s, it estimated that there were approximately 24-32 million recreational visits per annum (NAO, 1986; Benson and Willis, 1992). In the 1990s, the Forestry Commission revised this figure to over 50 million visits per annum using data from the DVS survey results. As indicated in the previous section, these estimates will soon be updated in Wales and Scotland with the publication of the results from the '*All Forests*' study.

The Forestry Commission have also undertaken studies to identify the type of recreational activities undertaken in forests. Table 4 below summarises data from two Forestry Commission sponsored surveys: the 'key forest sites' data is based on 12 key forests located across GB (Forestry Commission, 2004a), while the pilot 'All Forests' survey is based on a wider range of forest sites within Wales (TNS Travel and Tourism, 2004a). The data reported here illustrates that Dog walking is by far the most popular activity that takes place in forests accounting for between 30% and 40% of all trips. Other forms of walking are also shown to be important, particular in the 'All Forests' survey. In terms of the more active pursuits, cycling is found to be popular with over 10% of trips in key forests (which include forests with dedicated mountain bike trails); however, the level of participation is less in the 'All Forests' survey, which was found to be influenced by the time of year. Nature watching / appreciation accounted for around 7% of trips to key forest sites and 2% of trips in the all forests survey. Horse riding accounted for 2% of trips in the 'All Forest' study. It should however be noted that there is great variability in terms of the activities undertaken within individual forests / woodland and therefore the data presented in Table 4 should only be considered as providing an indication of the overall levels of participation within individual activities.

Table 4: Profile of forest recreation activities undertaken in FC forests.

Activity	Key forest sites - GB[1] (%)	All Forest survey – Wales[2] (%)
Dog walking	31	40
Other walking	16	32
Cycling (including MTB)	13	Between 2% and 11%
Fresh air / exercise	17	N/A
Nature watching / appreciation	7	2
Relax / picnic	13	N/A
Horse riding	N/A	2
Other	4	N/A

1: Source: Forestry Commission (2004a). Figures reported here are based on a sample of 12 local forests sites throughout GB.
2: Source: TNS Travel and Tourism (2004a). *All Forests Monitoring Wales 2004*: Unpublished progress report December 2004. Note that this report only reports the preliminary findings from the Wales pilot study. It is expected that results for Scottish pilot study will be made available in 2007.

3.3. Forest users

Forests attract a large number of visitors from a wide range of socio-economic backgrounds. Summary statistics are available on the average forest users over all forests (Forestry Commission, 2004a; TNS Tourism and Leisure, 2004) and for individual forest sites (Forestry Commission 2002b; 2002c) and user groups (Forestry Commission, 1999; 2002a). It is not the intention here to reproduce these forest user statistics since these may be found in the many visitor surveys reported in the Forestry Commission's website http://www.forestry.gov.uk/forestry/ahen-5gcdvl. However, what is relevant to this research is the Forestry Commission's attempts to categorise various profiles of forest users since such categorisation may usefully feed into our examination of heterogeneity of user demand for alternative forest recreation activities.

Simple approaches used by forest managers (see Section 7) to categorise forest users include categorisation by activity (e.g. walker or mountain biker), by type of visit (day visit or holiday visit) or by simply socio economic groupings (e.g. gender, age). A slightly more sophisticated approach that was found to be commonly used was based around an assessment of user's lifecycle stage:

- *Young independents:* (Under 45, no children on trip)
- *Families:* (Any age, children on trip)
- *Empty Nesters:* (Aged 45+, no children on trip)

Another interesting approach was developed by NFO Worldgroup (2003a) during their '*Monitoring quality of experience in Forests and woodlands in Great Britain'* research. As part of this qualitative research, they identified four groups / segments of forest users based upon the motivations and reasons for visits rather than visitor demographics or origins. The four segments are outlined in Table 5:

Table 5: Segments of forest user based on motivations.

Category	Description	Examples

Convenience users	Very regular/routine visitors, live locally, likely to be visiting to walk dog or other spontaneous visit, wide age spectrum, spend short duration in forest, visit at least once a week. Many *do not actively choose the forest* but use as it is the only alternative	o Dog walkers o People taking shorter walks
Nature users	Enjoy wildlife and natural heritage aspects of forests, actively seek information / interpretation, take days out and visit forests while on holiday, visit one or more forest sites once every two or three months. *Nature is the motivation for visit*	o People who are members of an environmental organizations o People who are not members of an environmental organization.
Social users	Take days out to forests to relax with friends and family. Enjoy picnics and play areas. Require information and interpretation. Visit at least once every couple of months especially during summer months. *Nature is a 'backdrop' to their visit*	o 'Out with friends', no children in household o 'Out with family', children in household
Active users	Such as cyclists, mountaineers and longer distance walkers. Take days out to forests and visit while on holiday. Visit is an adventure, a test of personal limits. Visit at least once every couple of months. *Nature is a 'backdrop' to their visit*	o Mountain bikers o Hill walkers

Source: NFO Worldgroup (2003a).

In addition to the 'standardised' market segments currently used by the Forestry Commission, a more sophisticated approach would be to use 'Latent Class Analysis' (LCA) to identify key groupings of forest users. Unlike the existing approaches (which generally divide individual users according to the demographics), LCA utilises probability models to assign individuals into groupings according to, in this application, their preferences for forest recreation. Thus, through the utilisation of LCA it may be possible to better identify groups of users with similar preferences for forest recreation. Further details of the theory of LCA can be found in Section 4.4.

In this section, we provide a brief overview of the literature on forest recreation. It is clear from this review that there is a wealth of general information on the forest resource and the recreation activities that take place within it. This information will be used, along with data collected in the recreational user and stakeholder interviews (Sections 6 and 7) to help identify key issues to be researched in Phase 2 of this project.

4. Valuing forest recreation

Walkers, cyclists, horse riders and other recreational users obtain utility (i.e. well-being) from the forest recreation resource. Total economic value (TEV) is the term used by environmental economists to describe the sum of non-market impacts associated with an environmental (forest) resource. This value or utility may take the form of both use and passive use value elements. Use values relate to the utility gained by an individual from direct use of a resource (e.g. visiting a forest recreation trail). Passive-use values are perhaps less obvious and relate to the utility gained by an individual for the option to use a resource in the future (option value), and the utility gained from the knowledge that the recreation resource is maintained for others to use (vicarious values) and for future generations to use (bequest values). The forest recreation resource may display some or all of these values.

Market prices generally do not exist for many aspects of TEV, and therefore specialized economic evaluation techniques have been developed to measure these values. These include stated preference methods, revealed preferences methods, and combined methods. In addition, it is also useful to consider latent class analysis which can be combined with the valuation techniques to enable the heterogeneity of forest recreation demand by different users groups to be evaluated.

4.1. Stated preference techniques

Stated preference methods function through proxy markets or referenda in which individuals make preference statements or choices relating to the environmental good in question. The two main stated preferences techniques are the contingent valuation method and choice experiments.

Data for contingent valuation (CV) analysis is typically gathered through the use of a survey instrument. In the survey, respondents are provided with a description of a hypothetical market for the environmental good in question and then asked a discrete Yes / No question as to whether they would be willing to pay £X for the good described. The analysis of the discrete choice responses to establish benefit estimates is based on random utility maximisation theory (RUM): we discuss RUM in more detail later in this section. Details of the CV methodology and analysis have been well documented (see Mitchell and Carson, 1989; Arrow *et al*., 1994; Bateman *et al.* 2002), and therefore are not repeated here. The contingent valuation (CV) method has been used extensively in the past to value various aspects of forest recreation, for example, Scarpa (2003) derived benefit estimates in the form of compensating variation for foregoing a visit to the woodland, Willis and Benson (1989) examine forest recreation and wildlife, Hanley and Ruffell (1993a) examine the influence of forest characteristics on forest recreation, while Bishop (1992) examine the value of community woodlands. Other related valuation research on countryside recreation include Christie (1999) who examined enhancements to the countryside recreation resource; Bateman *et al.*, (1994) who valued UK National Parks; Cobbing & Slee, (1993) who valued Mar Lodge Estate in Scotland; and Bennett *et al.* (1995) on footpath provision. However the CV technique is largely restricted to valuing a single composite good. To some extent, the technique is now being superseded by the more sophisticated choice experiments technique.

Similar to CV, choice experiments (CE) also rely on surveys to gather data. However, rather than being given a discrete Yes / No choice, 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 normal includes the status quo. Each policy option is described in terms of a bundle of attributes (including a price attribute) presented at various levels according to an orthogonal main effects fractional factorial experimental design. The analysis of respondent choices is again based on RUM theory; however, in CE preference values are estimated for a range of levels of the policy attributes (as opposed to a single policy option which is the case in CV). For a complete discussion of the process of administering a CE study see Louviere *et al*., (2000).

To our knowledge, there are no UK CE studies that have specifically examined the value of forest recreation. CE has however been used to examine the value of different forest landscape attributes (Willis *et al.,*2003; Hanley *et al.* 1998).

It was noted above that both the CV and CE methodologies are based on the random utility maximisation theory (RUM). According to RUM, the respondent's utility function is comprised a deterministic, observable component (V) and a random, unobservable component (ε) (Hanemann, 1994). It is important to point out that the respondent has full knowledge of their utility function. Utility is only random from the point of view of the researcher. Let the utility of alternative i from choice set C be represented by

$$U_i = V_i + \varepsilon_i \qquad (1)$$

where U_i represents the utility of choosing alternative i, V_i represents the deterministic component, and ε_i represents the random error term. Note that in discrete choice CV the choice set C comprises two alternatives (Yes and No), while in CE it normally comprises three alternatives (Choice A, Choice B and the status quo). 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

$$\begin{aligned} \Pr[i \mid C] &= \Pr\left[U_i > U_j\right], \forall j \in C \\ &= \Pr\left[\left(V_i + \varepsilon_i\right) > \left(V_j + \varepsilon_j\right)\right] \\ &= \Pr\left[\left(V_i - V_j\right) > \xi\right], \end{aligned} \qquad (2)$$

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

$$\Pr[i \mid C] = \frac{\exp\left(\mu V_i\right)}{\sum_{j \in C} \exp\left(\mu V_j\right)}, \qquad (3)$$

where μ represents a scale factor (which is often normalised to unity).

One of the main differences between the two stated preference valuation methodologies that affect the analysis of the responses is the way in which the utility functions, V_i, are expressed. In CV, the basic utility function normally contains the bid (price parameter) and the intercept. Thus, the CV utility function can be expressed as

$$V_i = \alpha_i + \beta\left(Y - Bid_i\right) \qquad (4)$$

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. The CV discrete choice probabilities may then be solved using a logit statistical model (Hanemann, 1994).

In CE, where there are normally more than two choice alternatives, the choice probabilities have a convenient closed-form solution known as the conditional logit[2] 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 CE utility function (Equation 5) represents the utility of the different options in the conditional logit model and in its basic format comprises the attributes of the policy option, as well as the bid and the intercept. Thus, the CE utility function can be expressed as

$$V_i = \alpha_i + \beta(Y - Bid_i) + \gamma(Z_i) \qquad (5)$$

where *i,* α_i, β and Y are as in the CV example above, while 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 both the logit and conditional logit models using the following formula

$$CS = -\frac{1}{\beta_{Bid}}\left[In\left(\sum_i \exp(V_0)\right) - In\left(\sum_i \exp(V_1)\right)\right], \qquad (6)$$

where β_{Bid} is the marginal utility of income (assumed to be equal to the negative of the coefficient of the monetary 'bid' variable); V_0 and V_1 respectively represents the indirect utility functions before and after the change under consideration. Equation (6) 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 (6) may be reduced to

$$CS = -\frac{1}{\beta_{Bid}}(V_0 - V_1). \qquad (7)$$

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

$$CS = -\frac{\beta_{Attribute}}{\beta_{Bid}}. \qquad (8)$$

Choice experiments arguably have the advantages over CV in that it can be used to examine the preferences of an individual to changes in the attributes that make up a recreation resource; CV is largely restricted to the valuation of the composite good. The method is also cost efficient; through sophisticated experimental design and analysis, CE attains a much greater wealth of data from a single survey instrument than would be possible using CV. CE also overcomes some of the technical problems apparent in CV. The format of CE causes the respondent to make considered decisions. As a result 'yea-saying' (a respondent's propensity to make unconsidered choices in survey situations) is reduced and the considered compensatory choice assumed by economists is enacted. Finally, the method is statistically robust and provides results which are acceptable to policy and decision makers; the method is approved in the Government's Green Book (HM Treasury, 2003) and is the subject of industry standards outlined in Bateman *et al*. (2002). There are, however, still some issues with regard to CE. First, as a stated preference method, CE is subject to many of the potential problems (such as bias effects) that affect CV. However, it should be noted that many of these issues have been successfully addressed in CV and that the solutions may be directly transferred to CE. The basic conditional logit model that is used to analyse CE studies is based on a number of assumptions, including the independence

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

from irrelevant alternatives (IIA). Violation of this assumption renders the analysis meaningless. However, there are tests available to determine whether this assumption holds, and if violated more sophisticated models such as the nested logit and random parameters logit models can be used which relax this assumption. Finally, it is generally considered that survey respondents require a good understanding of the environmental good under investigation and its components in order to make sound choice decisions. Thus, respondents may find it difficult to make sound choice decisions for complex goods.

4.2. Revealed preference approaches: Travel Cost models of recreation demand

Revealed Preference (RP) methods differ from Stated Preference (SP) methods in that they use as their source of data people's actual behaviour in real markets, rather than their conjectured behaviour in hypothetical markets. However, this actual behaviour occurs in markets which are only related to the environment good in question: they do not exist for the environmental good itself, since by definition we are talking about non-market values here. For this reason, RP methods are sometimes known as indirect methods, since the analyst has to infer the value people place on a non-market good indirectly from their behaviour in a market somehow related to that good.

In Travel Cost (TC) models, the environmental good of interest is outdoor recreational resources, such as public forests and beaches. The behaviour we study is the number and distribution of visits, or trips, that people make to such sites, as a function of, most importantly, the cost of a trip. The travel cost measured for any individual *i* visiting site *j*, is actually a proxy, since the full costs to this individual are unknown to the researcher (Randall, 1994). The working assumption is that travel costs are somehow related to the distance travelled by the individual, and perhaps the time taken to travel there. More recently, the environmental qualities (attributes) of alternative sites, and the costs of visiting these alternatives, have become an important focus for modelling (Hanley *et al.*, 2003).

The simple TC model was originally developed in the late 1950s by Wood and Trice (1958) and Clawson (1959). In its early form, a zonal version was employed, which divided visitors to an individual site into different zones of origin, and which then related zonal visits V_k to the cost of travel from that zone, TC_k:

$$V_k = f(TC_k, S_k) \qquad (9)$$

Assuming that visits were negatively related to travel costs, this function could be used to simulate what would happen to trips as the variable TC was increased, driving up costs until V_k became zero (this value for TC is known as the choke price). In this way, consumers' surplus for visits under current conditions could be calculated. This zonal version of the TC model continued to be used into the 1980s, but problems were emerging: the approach assumed that other determinants of visits, such a socio-economic factors (S, above) had to be homogenous within zones of origin, whilst it was hard to link the approach firmly to demand theory, since the approach did not define/describe the behaviour of an individual, but the behaviour of arbitrarily-chosen groups.

An important advance was thus to specify travel cost models in terms of individual behaviour whereby the number of trips an individual makes to a site within a specific time period (e.g. one year) became the dependent variable. Now individual-specific data on items such as income and recreational experience could be used in the estimation, and a firmer link made with demand

theory. Another advance was to include groups of similar recreation sites in the analysis, so that a demand system could be estimated (Burt and Brewer, 1971), and to start to include the environmental attributes of these sites as determinants of trips (Morey, 1981).

Two types of TC model now dominate the literature: count models and random utility maximisation (RUM) models. We explain each of these in detail, before discussing whether they can be combined, and whether RP data for recreation demand can be combined with SP data.

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:

$$V_{ij} = \phi\left(TC_{ij}, Q_j, S_i\right) \tag{10}$$

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 trip 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.

Count models are often estimated for single sites, thus what they tell us is the value of consumers' surplus per visit under existing conditions. This number is relevant if we want to test:

- whether consumers surplus per visit varies across types of recreational use,
- or if the need is to predict how total visits will change if any of the variables determining trips change.

Often, however, the relevant policy question is how economic values will change if some of the attributes of recreational resources change, for instance, if felling regimes are altered in forests used by hikers. Whilst systems of count models can be estimated in which the quality of attributes can be allowed to vary (see, for example, Larson and Shaikh, 2003), this can be difficult with many sites and/or many attributes. A better approach in this context is random utility maximisation modelling.

The random utility maximisation (RUM) model as applied to travel cost data is similar to the choice experiments method. All that really differs is the source of the data, which is real rather than hypothetical. Accordingly, assume that the utility function can be broken down into two parts, one deterministic (V) and one which is a random error term (ε). Assume that recreationalists, in choosing which site to visit, select from the set of all possible sites (C) according to the relative utility they obtain from each site, which in turn depends on the

characteristics of that site. The deterministic part of utility is usually assumed to be a linear function of site characteristics:

$$V_{ij} = \beta_1 + \beta_2 X_{ij2} + \beta_3 X_{ij3} + ... + \beta_n X_{ijn} + \mu(Y_i - P_{ij}) \ , \qquad (11)$$

where X_{ij} represent site attributes, Y is income and P_{ij} is travel costs of visiting site *j* for individual *i.* The probability that site *i* will be chosen all over sites in C depends, for individual *i*, on:

$$\pi_i(j) = \text{Prob}[V_{ij} + \varepsilon_{ij} \geq V_{ik} + \varepsilon_{ik} ; \forall k \in C] \qquad (12)$$

If we assume that the error term is IID with a Weibull distribution, then this gives us the familiar conditional logit model which we used in the choice experiment section (note that this still assumes that the Independence of Irrelevant Alternatives hypothesis holds):

$$\pi_i(j) = \frac{\exp(V_{ij})}{\sum_{k \in C} \exp(V_{ik})}. \qquad (13)$$

Compensating variation welfare measures can now be obtained, using the standard Hanemann (1994) formula, where V_0 is (deterministic) utility in the initial situation, and V_1 is utility in some different situation: for example, when forest characteristics have been improved at one site within the choice set.

$$CV = -\frac{1}{\mu}[\ln(\sum_{j \in C} \exp(V_{j0})) - \ln(\sum_{j \in C} \exp(V_{j1}))] \ , \qquad (14)$$

Notice that this welfare expression asks us to sum up utility changes over all the different sites in the choice set, and also controls for the changing probabilities that we will visit any given site. Utility changes are converted into money-metric using the inverse of the marginal utility of income, which is here the parameter on the travel cost variable.

RUM travel cost models are now very widely reported in the literature, and have proved very useful in policy analysis and in environmental management (see, for example, Parsons and Massey, 2003). One development of such models is to use a nested RUM - indeed, this is one solution to finding that the IIA assumption does not hold up. A nested RUM divides the recreational "decision" into different stages. For example, decide whether to go hiking or cycling, and then decide which cycling site to go to. Repeated, nested RUMs are used when we also want to examine the effect of changing site qualities on the number of trips taken in total - since these are fixed in a standard RUM, which just allocates this pre-determined number across sites. A repeated, nested RUM looks at the effects on both the total number of trips and where they are taken when site qualities change.

One methodological issue needs to be mentioned here that affects both count models and RUM TC models, and this is the value of travel time. Travel to recreation sites is undertaken during leisure time, and time is scarce. This implies there is an opportunity cost of travel time which should be included into the calculation of travel costs. But at what rate? Most people will not be giving up an hour of work to drive to a forest for a picnic - so using the wage rate is unlikely to be correct. Many analysts in the 1970s and 1980s made use of standard fractions of the wage rate as the price of leisure time (e.g. Smith, Desvouges and McGivney, 1983), and this approach is still used in some studies. Chevas *et al.* (1989) however argued that there was also a commodity value

to time spent in recreation, whereby the expenditure of time both on-site and travelling produced utility (if people enjoy the experience of driving to a site): a net value of time was thus the difference between the commodity value and the scarcity value. More recent work suggests that, in most situations, it will be better to include travel time as a separate variable alongside travel cost, since the data requirements to estimate the value of leisure time at the individual-specific level are so great (Feather and Shaw, 1999).

It was noted above that repeated, nested RUM travel cost models can be used to estimate the change in the number of trips to a group of sites if site qualities change. Count data models also predict changes in participation, so an obvious question is whether count models can be combined with RUM models. The count portion of the combined model would then estimate changes in total trips, whilst the RUM model would predict where these will be taken. The answer is yes, but there is some debate over how best to do this (Parsons, Jakus and Tomasi, 1999). Crucial features are that a feed-back loop is needed between the change in site characteristics and the associated change in (the deterministic component of) utility, and that both components should be estimated simultaneously. This is technically quite difficult.

4.3. Combining stated and revealed preference methods

An increasing use of combined SP and RP models is now apparent in environmental economics. But what are the reasons for combining these two sources of data?

- as a check on "convergent validity": SP and RP data from the same sample can be compared to see whether they reveal the same underlying model of preferences.
- as a means of more efficient sampling. In most (but not all) combined approaches, each individual in the sample provides more than one observation; and
- to combine the desirable features of the two approaches. We might want to ground SP estimates in actual behaviour, but extend the range of environmental variables of interest beyond that currently observed.

Two main approaches to combining SP and RP data exist. These are random utility maximisation (RUM) models combining SP/RP data, and the Contingent Behaviour approach relating to either price or environmental quality changes.

In the former approach, Adamowicz *et al.* (1997), for example, have used RP and SP data based on recreational choices, where choice alternatives are described in terms of site attributes, where the monetary attribute is actual travel costs. This pooled RUM approach is probably most suitable when the analyst wishes to focus on the value of different attributes of recreational goods; and where changes in environmental quality produce site substitution effects across a group of sites (e.g. a group of forest when forest characteristics alters).

Contingent Behaviour (CB) models are somewhat different. Here, the word "contingent" implies that what is being measured is intended behaviour in some contingent market, rather than actual behaviour. Observations from contingent behaviour can be combined with observations of actual behaviour from the same individuals, using either pooled or panel data models. In Englin and Cameron (1996), anglers were asked how many fishing trips they had taken during the past year, and the starting point for these trips (the key pair of observations for a conventional travel cost model). They were then asked how their total trips would change if travel costs increased by 25%, 50% and 100%. Four price-quantity estimates were thus made for each respondent, one real and three hypothetical. The main empirical conclusions that emerged were that the RP data gave

lower welfare estimates per angler than the hypothetical data and that combining the real and hypothetical data improved the precision of model estimates.

The main feature of the Englin and Cameron paper is that the contingent behaviour relates to changes in trip frequency as *prices* change. A natural extension is then to look at 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. What is required to make this method work is that (i) a significant relationship is found between the site attribute of interest and visits; and then (ii) to ask visitors how their intended number of trips would change if this site attribute was altered. Alternatively, one could ask what they were willing to pay for this change in the site attribute, and try to combine this information with the standard travel cost model. Finally on this topic, it is of interest to note the paper by Grijalva *et al.* (2002), who test whether contingent (stated) behaviour is a good predictor of actual behaviour when environmental quality changes, or in their case, when access conditions to a rock climbing site change. The authors concluded, "climbers do not appear to overstate (intended) changes in trip behaviour when presented with hypothetical questions about site access". If this holds for changes in site quality also, then the implication is that combined revealed preference-contingent behaviour models do not suffer from the hypothetical market bias often associated with contingent valuation.

Finally, it is useful to discuss administrative approaches for all of the valuation approaches discussed above. Generally, it is accepted that in-person interviews are the most appropriate administrative protocol for the valuation methodologies outlined above; as opposed to mail or telephone interviews. However, in-person interviews (particularly if undertaken on site) are often restrictive in terms of the amount of time available to explore in detail the qualitative issues affecting resource usage. Valuation workshops provide an alternative approach that allows much greater exploration of user preferences. For example, the fact that each workshop comprises around ten individuals enables the dynamics between different forest user groups to be explored. Furthermore, the workshops also provide an opportunity to explore methodological issues with respect to the valuation instruments. Typical procedures used in valuation workshops are outlined in Christie *et al.* (2004), and MacMillan *et al.* (2002). Generally, the workshop would involve participants completing a valuation questionnaire both before and after a detailed discussion of the environmental resource. The results from valuation workshops may be used to complement, enhance and validate the in-person interview valuation studies. The workshop setting also provides opportunities to gather qualitative information on the environmental good, which in turn would enrich the quantitative assessments.

4.4. Latent class analysis

One of the key objectives of this study is the exploration of the heterogeneity of preferences of different user groups. A simple but crude way of examining this would be to run a series of models for alternative sub-populations of user, e.g. walkers versus cyclists, or models based on user's socio-economic variables. However, although often used, such a simplistic approach tends to result in imprecise indicators of resource utilisation decision making since a more complex series of drivers often underlie resource use decision. Latent class analysis (LCA) offers an alternative means of classifying individuals into approximately homogeneous groups.

Latent class analysis (LCA) is a versatile classification technique used in a wide range of disciplines. Few applications, however, have been attempted in econometrics. The theory and

method of LCA presented below are expounded together with discussion of examples of its application in disciplines in which it has been employed.

Social science concepts are, in general, weakly defined. This vagueness, or *fuzziness* (Dayton, 1998), is evident in concepts such as honesty, ability and other aspects of the individual. Lazarsfeld and Henry (1968) provide the classic work on specifying such vague concepts. They argue that the latent concept, such as honesty, is apparent through manifest variables such as behaviour. The two are linked, given the fuzziness, not by rigid laws but by probabilistic relations. Latent structure models have been developed for a wide range of applications. Each is distinguished, primarily, on the structure of both the latent and manifest variables. Latent class analysis is applied in cases in which both manifest and latent variables are assumed discrete. Model type may be further defined through the structural assumptions of the response vectors. The extreme-types model assumes an ordered, or Guttman, scale. Dayton and Sheers (1997) apply the assumption to academic cheating data. Response vectors are assumed to range from {0 0 0} to {1 1 1} being ordered responses, from left to right, of greater transgressions of academic honesty. The former is the response of an individual consistently answering no and therefore demonstrating honesty, the latter demonstrates a large degree of dishonesty; the extreme types on the model nomenclature. Intermediate of the extreme types are grades of honesty answering yes to one or more of the questions. The response vectors are assumed ordered, therefore logical in that an individual is unlikely to return, for example, the vector {0 0 1}. Whitehouse *et al.* (1980) have employed the extreme-types model to the assessment of children's mastery of specific tasks. Both non linear scales (e.g. Airasian, 1969 cited in Dayton, 1998) have been proposed and modifications of the Guttman scaling have been proposed. Proctor (1970), Dayton and Macready (1976) and Goodman (1974) propose models which permit non scale response, see Dayton (1998) and McCutcheon (1987) for overviews of latent class modelling techniques.

Swait and Adamowicz (1997; 2001) have used the technique to analyse respondent decision strategy over repeated choices in an environmental valuation context. To summarise, the latent variable was complexity of choice. Respondents were found to operate one of three strategies, dependant on complexity of the present task and a cumulative cognitive burden. In only one of the three did decision making conform to the assumed compensatory strategy, the other two being heuristic or simplified strategies based on known brand or few of the available attributes. Scarpa *et al.* (2003) use endogenous segmentation of a choice model to segment Yucatan peasant farmers regarding preference of indigenous of exotic breed of pig. Segmentation is made using the choice data, thus the classification is denoted endogenous.

The issue of respondent heterogeneity in random utility maximisation models is investigated by Boxall and Adamowicz (2002) who employ a finite mixture model to simultaneously estimate choice and latent class membership. The model, they state, can be compared to a random parameters logit model with a finite number of support points specified by the analyst; hence 'finite mixture'. Support points are class means on the latent coefficient. It is usual to estimate several models of differing numbers of support points and subsequently select the most appropriate on measures of information criteria. Segmentation is endogenous. Classification is made using psychometric and socio economic data. The model therefore serves to both explain and account for heterogeneity. It is notable in the model that if the classification parameters = 0 then the model reduces to the conditional logit model normally employed in choice modelling. The model is thus situated within a range extending from a single segment model, the model of perfectly homogenous preferences, and, given enough segments, one in which each individual is considered a segment.

Latent class analysis is thus statistically robust, using probability modelling techniques. It is based in the notion that certain characteristics are difficult to observe, but may be described by a series of observable conditions. LCA offers the means to analyse such taste preferences in a statistically valid manner through the identification of the statistically 'correct' number and range of classes and to allocate individuals to the appropriate classes. Preferences regarding recreation are well within the capabilities of LCA. Hyde (2004) provides a detailed example of the benefits that may be attained from the analysis of heterogeneous preferences using LCA.

4.5. Review of forest recreation valuation studies

To date, there have been over 30 studies have been undertaken on the value of recreation in UK woodland, yielding over 100 benefit estimates (see Jones *et al.,* 2003 for a review). Estimates of the national aggregate consumer surplus value that FC woodlands produce range between £40 million (Bateman, 1996) and well over £50 million (Benson and Willis, 1992). Jones *et al.* (2003) provides a review and meta analysis of forest recreation studies (see Table 6 below for a summary of these studies, or Appendix 2 of the Jones' report for a further breakdown of benefit estimates.

Table 6: Studies of open-access woodland recreation value in Great Britain.

Value type	Recreation value unit	Valuation method	No. of studies	Date conducted[1]	No. of value estimates	Value range (£, 1990) (m = million)
Use	Per person per visit.	CV	8[a]	1987 – 1993	28	£ 0.28 - £ 1.55
Use + option	Per person per visit.	CV	3[b]	1988 – 1992	16	£ 0.51 - £ 1.46
Use	Per person per visit.	ZTC	3[c]	1976 – 1988	17	£ 1.30 - £ 3.91
Use	Per person per visit.	ITC	3[d]	1988 – 1993	16	£ 0.07 - £ 2.74
Use	Per person per year	CV	3[e]	1989 – 1992	7	£ 5.14 - £ 29.59
Use	Per household capital[2]	CV	3[f]	1990	3	£ 3.27[3] - £ 12.89
Use	FC forests/ conservancy[4]	TC	1[g]	1970	13	£0.1m - £1.1m
Use	Total UK value	TC	6[h]	1970 – 1998	6	£6.5m - £62.5m
-	All studies	-	30	1970 - 1998	106	-

Notes:
1 = Dates refer to the year of study survey rather than publication date.
2 = These studies use a once-and-for-all willingness to pay per household question.
3 = We have recalculated this figure by including those who refused to pay as zero bids.
4 = The FC at the time divided the area of Great Britain into a number of Forest Conservancies and large forests to which these estimates relate.

Study references:
a = Whiteman and Sinclair (1994); Hanley and Ruffell (1991); Bishop (1992); Willis and Benson (1989); Hanley (1989); Willis et al (1988); Bateman and Langford (1997); Bateman (1996).
b = Bishop (1992); Willis and Benson (1989); Willis et al (1988)
c = Benson and Willis (1992); Hanley (1989); Everett (1979)
d = Willis and Garrod (1991); Bateman (1996); Bateman et al., (1996)
e = Whiteman and Sinclair (1994); Bishop (1992); Bateman (1996)
f = Hanley and Munro (1991); Hanley and Ecotec (1991); Hanley and Craig (1991).
g = H.M. Treasury (1972)
h = H.M. Treasury (1972); Grayson et al (1975); NAO (1986); Willis and Garrod (1991); Benson and Willis (1992); Bateman (1996).

Source: Jones *et al.* (2003)

Although it would appear that much research has been undertaken for forest recreation, little of this research relates to specific recreational activities, or specific groups of forest users. For example, a number of studies only value generic forest recreation (e.g. Scarpa, 2003; Bishop, 1992) or forest recreation as a single attribute of wider forests values (e.g. Willis and Benson, 1989; Hanley and Ruffell, 1993a; Hanley, 1989). However, to date, few studies have actually examined the economic value of specific recreation activities that take place in the forest (e.g. walking, cycling etc.), nor does any of the research attempt to disaggregate consumers' surplus values according to alternative users groups.

To summarise, there are a wide range of non-market valuation techniques available for the valuation of forest recreation. Stated preference models include contingent valuation and choice experiments. In the former values can be estimated for composite changes in the forest recreation resource, while choice experiments enable values to be estimated for the attributes of that resource. Revealed preference techniques include count models which can be used to estimate consumers' surplus per visit. Recent advances in valuation research now enables revealed and stated preference methods to be combined. Examples of combined models include RUM travel cost models and contingent behaviour models. RUM travel cost models are similar to choice experiments except that the price attribute is actual travel costs to the site. Contingent behaviour models also combine revealed data on the number of trips to a recreation site with stated preference choices to predict changes in intended behaviour (frequencies of trips) and values for site quality changes. Finally, heterogeneity of preferences may be further investigated in all of the above models either by including respondent characteristics in the right hand side of the models, disaggregating the models according to alterative user groups or through more sophisticated latent class analysis.

5. Economic impacts of forest recreation

Forest recreation can bring significant positive economic impacts in the local economy, including the generation of incomes and creation of jobs. These impacts come in three main forms: *direct*, *indirect* and *induced*. 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 are 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. Extreme care is however needed in the interpretation of multiplier coefficients, there being a number of different versions in common use. Unfortunately, many reports quoting multiplier coefficients fail to specify which version of the multiplier is being referred to and this creates considerable scope for errors to be made in applying the technique.

First there are three major varieties of multiplier, corresponding to the three major measures of economic activity: income, output, and employment. The *output multiplier* measures the relationship between initial expenditure on the level of production. It therefore measures the effect of additional expenditure on the level of output of the local economy. The *income multiplier* is the most commonly quoted of all multipliers and is usually regarded as the most important indicator of the impact of spending in the local economy. It measures the relationship between an initial injection of expenditure and the increase in incomes in the local economy associated with this, including wages, salaries, and profits. The *employment multiplier*, meanwhile, measures the increase in employment associated with a specified increase in initial expenditure, usually in terms of the number of full-time equivalent jobs associated with a specified amount of initial expenditure.

Secondly, there are two different formulations of each of these three major varieties of multiplier coefficient: *Keynesian* (proportional) and *ratio* (conventional) multipliers. Ratio multipliers for a particular measure of economic activity relate the total impact associated with any increase in expenditure to the direct impact. Consequently, ratio multipliers are always greater than unity. The advantage of a ratio multiplier is that the numerator and denominator are measured in the same units. These multipliers can be compared easily across counties and over time. They tend, however, to be of limited use to planners and policy makers because the level of expenditure required in order to produce the direct impact is often not readily discernable. Keynesian multipliers, on the other hand, express the total impact in relation to the level of direct expenditure in question. This makes Keynesian multipliers somewhat easier to interpret and apply. It is also a simple matter to compute the equivalent ratio multiplier from the Keynesian multiplier, while the reverse is not necessarily true. With Keynesian multipliers, the variable measured in the numerator – output, income, or employment – is different from the variable measured in the denominator – expenditure. Keynesian multipliers may therefore have a value of less than, greater than or even equal to unity.

Thirdly, there are two types of each variety and formulation of multiplier, known as *Type I* and *Type II*. Simply put, Type I multipliers include only the direct and indirect impacts of the initial increase in spending, while Type II multipliers include not only the direct and indirect impacts but also the induced impacts.

The different versions of the multiplier coefficient are summarised in Table 7, along with a worked example of each in the case of an income multiplier.

Table 7: Illustration of alternative versions of the income multiplier coefficient

Type of multiplier coefficient	Definition	Worked examples	
Keynesian, Type I	$\frac{D + I}{E}$	$\frac{40 + 20}{100}$	= 0.6
Keynesian, Type II	$\frac{D + I + N}{E}$	$\frac{40 + 20 + 10}{100}$	= 0.7
Ratio, Type I	$\frac{D + I}{D}$	$\frac{40 + 20}{40}$	= 1.5
Ratio, Type II	$\frac{D + I + N}{D}$	$\frac{40 + 20 + 10}{40}$	= 1.75

E = initial injection of expenditure, e.g. £100
D = direct income, e.g. £40
I = indirect income, e.g. £20
N = induced income, e.g. £10

The size of the multiplier coefficient depends ultimately on the extent to which injections of expenditure are retained and re-spent in the local economy. Consequently, the more narrowly the local economy is defined, the lower the multiplier will tend to be. This is because there is a greater propensity for expenditures to leak out of a more narrowly defined economic space. It also tends to be the case that remoter, more rural locations have a higher multiplier value, even after

allowing for the above effect. This is because poor communications are likely to reduce expenditure leakages from the local economy. Islands in particular tend to have higher multipliers than equivalent mainland economies.

Actual multiplier coefficients for specific activities associated with particular local economies can be established in a number of different ways. Economists tend to distinguish between *input-output (IO) studies, computable general equilibrium modelling* and *multiplier analysis*.

5.1. Input-output modelling

Input-output (IO) studies enable multiplier coefficients to be derived using a specially constructed input-output table or "transactions" table. This is a disaggregated set of accounts which gives sales and purchase information for all the industrial sectors that make up an economy; the rows in the table representing sales and the columns purchases. A number of columns are also included for sales to final demand (households, government, investment, and exports) and additional columns for purchases of factor services (labour, land, and capital). Input-output coefficients are then estimated for each industry-sector combination. These figures give the fraction of the value of output of any particular sector that is made up of intermediate inputs supplied by another given sector. The input-output table thus represents a detailed model of the local economy, which takes into consideration all of the interdependencies between industrial sectors. Once the table has been constructed, multipliers can be calculated to show the effect of an increase in exogenous expenditure in any chosen economic sector, for example forestry. These are normally given in the form of ratio multipliers, but can as easily be calculated as Keynesian multipliers.

The IO approach is considered to be theoretically superior to multiplier analysis because of its ability to track accurately changes in expenditure as they flow through the economy. Conventional Keynesian multiplier analysis, on the other hand, implicitly assumes that industry sectors do not vary greatly in terms of their individual responses to an injection of expenditure into the economy. The major difficulty with the IO approach, however, is that input-output tables are expensive to construct using survey methods. This means that input-output tables are often only to be available for regional or national economies. Their construction also tends to be undertaken relatively infrequently. Consequently it is extremely rare for an up-to-date input-output table to be readily available for a chosen local economy. IO tables for smaller areas can be constructed through non-survey methods but these will be less accurate and might miss local idiosyncrasies in production or consumption.

A more common approach, which retains some of the benefits of the full IO method, is known as *proportional multiplier analysis*. This combines Keynesian multiplier analysis with a modified form of IO analysis which uses a 'partial' input-output table. This table concentrates only on specific industrial sector activities, reducing the data requirements and making it much less technically demanding and costly to construct. It is also possible to use this technique to develop sub-regional and even local input-output tables from regional input-output tables. A shortcoming of this approach, however, is that a degree of subjectivity is introduced into the analysis arising from the selection of particular businesses that are thought to be the most relevant to the analysis.

The main problem with the use of IO analysis for small-area impacts is the construction of the local IO table. These are too expensive to construct from specially commissioned industrial and household surveys. They therefore have to be generated primarily using non-survey technique (although their construction could make use of any relevant locally-available information).

There are three key problems here. First, to construct the local table, it is most convenient to work from a more aggregated table. For locations in Scotland and Wales this is not a major problem in that officially produced IO tables are available for Scotland for 2001 and tables generated by the Welsh Economic Research Unit at Cardiff Business School are available for Wales for 2000. However, an appropriate official UK table was last produced for 1995 (although promised for 2000). This implies that for English sites, the first step would need to be the construction of a UK table from the available data. Members of the research team have done this at a fairly aggregated sectoral level for 1999 and are currently updating to 2000. Other research groups and consultancies do have IO tables for smaller areas but access to these is not freely available.

Second, the construction of the table relies on sectorally disaggregated employment data. This is available at local authority (and in some cases at a greater geographic disaggregation) level.

Third, the main assumptions in constructing such a table is that one typically assumes that the production technology and consumption patterns do not vary between the lower and higher geographic levels (local vs. regional/national) but that the trade patterns will differ. The smaller the local area, typically the more open the local economy will be to trade from out with its boundaries. This means that import content and the proportion of final demand going to exports will be higher. However, the nature of the trade adjustments is somewhat mechanical. Finally, the existing national/regional tables are a little dated.

It is therefore concluded that the use of IO tables for the research would not be feasible.

5.2. Computable General Equilibrium (CGE) Modelling

In this context of impact analysis, CGE analysis can be thought of as an extension of IO modelling. A key characteristic of IO modelling (and in fact all the multiplier approaches discussed here) is that they have a passive supply side. They are demand driven, and assume that supply can respond to changes in demand by increasing economic activity in a linear way. Essentially CGE analysis augments the IO approach by incorporating supply-side considerations such as capacity constraints in individual industries and labour market crowding out. CGE models use an augmented set of IO accounts, called a Social Accounting Matrix (SAM). They also require the imposition of a set of production trade and consumption parameters (primarily elasticities). The construction of such models is out with the range of this project but they have been used to look at the impact of similar sorts of tourism demand (Blake *et al*, 2004).

5.3. Multiplier analysis

Multiplier analysis, on the other hand, tends to imply fewer data requirements and is therefore widely considered to be the more practical approach to assessing the local economic impacts of particular activities. Essentially there are three approaches to developing estimates of actual multiplier coefficients.

The first is through the collection of the primary data needed to establish the relevant coefficients; this requires data on expenditure leakages from the local economy in question. This method tends, however, to be technically complex and rather data intensive. It is considered that the establishment of multiplier coefficients in this way would not be justified for this research.

An alternative and more practical approach, which has been developed by the New Economics Foundation, is known as Local Multiplier 3 (LM3). This rather less data-intensive approach uses surveys of local businesses and households to estimate the proportion of expenditure leaking from the local economy during only the first three 'rounds' of circulation as opposed to all rounds of expenditure. 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. Although this could potentially be a problem, 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 be a cost effective approach to produce reasonably accurate *indicators* of the actual multiplier coefficients. A comprehensive description of the LM3 methodology can be found in New Economics Foundation (2002).

The third commonly used approach is to 'borrow' coefficients from previous studies of similar economic activities. This, of course, tends to introduce a degree of subjectivity in the analysis, since the researcher must decide how applicable the coefficients derived from other studies are likely to be to the specific context at hand. Sometimes researchers choose to adapt these borrowed multiplier coefficient so as to make them more applicable to the activity and/or local economy in question. This adds additional subjectivity to the process and means that such coefficients must be interpreted with extreme care. The approach is, nevertheless, quite widely adopted in local economic impact studies. See Rayment (1997) and Christie *et al.*, (1998) for examples.

5.4. Review of forest recreation impact studies

Studies that examine the economic impact of forest recreation require two key data inputs: (i) information on the level of visitor spend and (ii) information on the size of the local economic multiplier coefficients. In what follows, we review potential sources of data on visitor spend (Section 5.4.1) and then review studies that have attempted to estimates the economic impact of forest recreation and related goods (Section 5.4).

5.4.1. Expenditure surveys of forest users

A key data requirement for economic impact analysis is the identification of the size of the initial injection of expenditure into the local economy. In this research, this relates to the level of expenditure of forest users. Data on visitor expenditure may be established either through primary data collection, or from secondary sources. In this section we review the various source of secondary data on forest visitor expenditure to investigate whether any of these existing datasets would be appropriate to feed into the economic impact analysis.

Historically, the Forestry Commission has not routinely collected data on the level of expenditure of visitors to its forests. However, this is soon to change with the introduction of the new 'All Forest Monitoring' programme. Although the programme will collect data on visitor expenditure that is potentially useful for this research, the data is not yet available and currently is restricted to pilot studies in Wales and Scotland. The Commission has also undertaken a number of *ad hoc* studies that have collected expenditure data. For example, the Wales Mountain Bike survey (Forestry Commission, 2002a) asked mountain bikers to report their 'budget' for various items

(e.g. accommodation, lunch etc.). Unfortunately, this study did not specifically address expenditures in the local economy. Perhaps a better example is the economic impact study of the '7 stances' group of mountain bike centres in southern Scotland. In this study, the net annual expenditure in south Scotland was estimated to be £2.79 million, which contributed to the generation of 71.7 full-time-equivalent (FTE) jobs.

The Forestry Commission has commissioned research projects that specifically examine the economic impacts of forest recreation. The "Forests' role in Tourism" project (Roberts *et al*., 2000; Hill *et al*., 2003) provides a useful insight into the economic significance of forest users expenditures. Their study included a survey of 1900 forest day visitors at 44 forest sites located throughout England, Scotland, and Wales. The expenditure data collected was differentiated according to a matrix that took account of both the differences in the role of forests in influencing visitation decisions and the type of visitor (holiday visitor spending at least one night within the area; holiday visitors visiting the site on a day trip from accommodation outside the area, and Day visitors). Their study estimated that the annual expenditures on tourism day visits attributed to forests were around £2.3 billion.

There are also a number of other surveys that collect data on visitor expenditures on a national scale, including the UK Day Visits Survey, the UK Tourism Survey and the International Passenger Survey. Although these surveys enable expenditure data to be disaggregated to 'visitors to the countryside', most of these surveys so not specifically identify forest visits; the exception being the UK Day Visits Survey. Thus, use of this data would require a number of broad assumptions related to the relationship between 'countryside' user and forest user expenditure.

Thus, there does appear to be some existing datasets on visitor expenditures. Of particular note are the 'All forests' monitoring dataset and the Hill *et al.* (2003) dataset. However, it is unclear as to whether these datasets could usefully feed into a multiplier study. The potential of the datasets needs further exploration and discussion with the project steering group. If these datasets are found to be unsuitable, then primary data collect is recommended.

5.4.2. Economic impact studies

There exists only a small number of studies have directly examined the economic impact of forest recreation.

Slee *et al.* (2004), incorporates the recreational use of forests in three ways: as a forestry activity when forest managers engage in the provision of recreational activities as a commercial activity; as a 'shadow' value when the revenue or profitability of the recreational activity provided by third-party organisations is highly dependent on the use of forest areas as 'free-entry' attractions; and thirdly as non-market values. In the first two cases multiplier analysis can be justifiably applied as financial transactions are clearly involved. The authors go on to present suggested multipliers for one of their study sites, mid-Bedfordshire, which were constructed on the basis of in-depth survey questionnaires among local businesses and households. A multiplier for forest values as a whole (i.e. not distinguishing between forestry and forest recreation activities) of 1.404 is suggested. Meanwhile a multiplier of 1.395 is suggested in respect of the 'shadow value' of tourism in the local economy. Unfortunately the authors do not state whether these are Type I or Type II multipliers, so interpretation is somewhat hampered. Nevertheless they do seem to suggest that forest recreation is capable of having quite a considerable multiplier effect in the local economy.

The RSPB have also examined the economic impact of a number of their reserves including Abernethy Forest reserve (Sheil, 2002).The reserve attracted 70,000 visitors in 2000 and it was estimated that these visitors spent £1.4 million within the local economy. In addition, the RSPB spent £129,000 (excluding staff costs and internal transfers) on the reserve. Although the RSPB report does not estimate the income impacts of these expenditures, it does estimate that the reserve generates 65 FTE jobs.

As mentioned earlier, Hill *et al.* (2003) also examined the economic significance of tourist / visitor use of forests for the Forestry Commission. They estimate that forest-related tourism expenditure in Great Britain to be around £2,268 million; of which £2,054 million is in England, £163 million in Scotland and £51 million in Wales. This level of expenditure on forest tourism is roughly 3% of total tourism expenditure in Great Britain. However, the Hill report does not attempt to estimate the economic impact of this expenditure, nor does it provide data on expenditure by different user groups.

Given the relative scarcity of studies that look explicitly at the economic impacts of the recreational use of forest areas, it is appropriate to examine work which has developed local multiplier coefficients for recreational activities that can be considered to some extent comparable. These studies may be based on data relating to recreation in forest areas or focus on recreational activities that can, and often do, take place in forests.

An example of the construction of multiplier coefficients using secondary data on leakage rates from the local economy is the study by Jones Economics (1996). This study of the economic impacts of hill walking, mountaineering and associated activities in the north of Scotland estimates Type II Keynesian expenditure multipliers of 1.32 for the Highlands and Islands region itself and 1.34 for a slightly larger topographical area which also covers the South West Highlands and Southern Cairngorms.

Crabtree *et al.*. (1994), meanwhile, present the results of a study of the economic impacts of visitors to three wildlife sites in the north of Scotland: Orkney, Highland Perthshire and Wester Ross. These coefficients were determined using extensive surveys of visitor and business expenditures in the local economy. Type II ratio expenditure, employment and income multiplier coefficients were determined. The expenditure multipliers for the three sites were calculated as 1.24, 1.34 and 1.18 respectively. The attribution of lowest expenditure multiplier coefficient to Wester Ross was linked to its economy being the smallest and least diverse. Employment multipliers for the three sites were calculated as £18,000, £18,100 and £14,300 per FTE job respectively, while the income multipliers were calculated as 0.324, 0.319 and 0.231 respectively. These coefficients were considered to be broadly in line with the multiplier coefficients calculated by Crabtree *et al.* (1992) for recreational countryside access in Scotland as a whole, those being an employment multiplier of £21,100 per FTE job and an income multiplier of 0.461.

A good example of the 'borrowing' of multiplier coefficients is the study by Christie and Matthews (2003), which draws on Rayment's (1995) review of UK recreation multiplier studies to estimate the local economic impact of walking in England. Rayment's review suggested a reasonably consistent Type II (Keynesian) income multiplier in the range of 0.24 to 0.45 and an employment multiplier of one FTE job for every £15,000 to £25,000 of expenditure. Another report by the Countryside Agency (2000), meanwhile, suggested a Type II employment multiplier in the region of one FTE per £34,000 of visitor expenditure. The approach taken by Christie and Matthews was therefore to adopt income multipliers of 0.24 and 0.45 to represent the lower and upper bounds respectively of the impact of walking in England on incomes, and £34,000 per FTE

job and £25,000 per FTE job for the lower and upper bounds respectively of the impact on employment.

A similar approach is to be found in a report to the Countryside Council for Wales by Christie *et al.* (1998), which consider the economic impact of recreation at three Welsh nature reserves. The multiplier coefficients used in the study were transferred in from a study of the Kite Country Project in Mid-Wales (Griffiths, 1996) and verified by a small survey of the expenditures of local businesses. These multiplier coefficients were considered to be broadly in line with those referred to above by Rayment (1995). A Keynesian Type II income multiplier of 0.30 was thus adopted, as well as a Type II employment multiplier of one FTE jobs per £18,000 of visitor expenditure.

A study of the economic impact of walking in rural Wales by Midmore (2000), meanwhile, adopts the lowest of a range of employment multipliers identified by Huse *et al.* (1998) as a conservative estimate. These multipliers were developed in the specific context of tourism expenditures in nine small Norwegian towns and demonstrate the tendency for multiplier coefficients to differ from locality to locality. In general, lower multipliers tended to be associated with the more northerly, rural and less structurally integrated communities. Employment multipliers across the nine towns ranged from 1.4 to 2.4 with a mean of 1.9, while the number jobs created by tourist expenditures of $1 million ranged from 12 to 45 with a mean of 26. The employment impact estimates Midmore derived in this way were also considered to be broadly comparable to those found in contemporary studies of the economic impacts of tourism in Vermont and the *Sea Empress* oil spill in Pembrokeshire.

Other studies provide relatively scant information on the sources of the multiplier coefficients that are being recommended or 'borrowed'. Brooke and Rayment (1999), for example, refer briefly to a study by the Surrey Research Group (1993) which suggests that an employment multiplier of one local job per £19,000 to £27,000 of visitor spending is appropriate. Unfortunately, it is also often the case that the variety and type of multiplier coefficient being referred to is not specified. Rayment (1997), for example, reports the findings of a local economic impact study of the RSPB's Dorset Heathland Project and Arne reserve, which relies on the use of an income multiplier of 0.3 and an employment multiplier of one (presumably FTE) job per £30,000 spent on local goods and services. However, it is not made clear whether these represent Keynesian multipliers or merely a component of a ratio multiplier; nor is it made transparent whether these are Type I or Type II multipliers. In the same report, multiplier coefficients of 0.3 for local income and one (presumably FTE) job per £25,000 of expenditure are reported in relation to estimating the economic benefits of the Osprey Centre at the Abernethy Forest reserve in Scotland.

5.5. Summary

Economic impact analysis aims to assess the impact of an injection of expenditure into a local economy. Key information requirements for this include information on the levels of expenditure and the multiplier effect of this expenditure in terms of income and job generation. Although a number of sources of secondary data currently exist on forest user expenditures, it is unclear whether these existing datasets are suitable for the task in hand. Therefore, it is likely that primary data collection will be required. In terms of establishing the multiplier effect, it is argued that some sort of multiplier analysis would be more appropriate than IO or CGE modelling. Furthermore, it is argued that LM3 may be a cost effective option to establish an indicator of the multiplier coefficients.

6. Forest recreation user interviews

A key objective of Phase 1 of this research project was to collate information to feed into the design of the survey instrument to be used in Phase 2. Focus groups and semi-structured interviews are regularly used in this type of developmental research. In the following two sections of this report, we therefore discuss the findings from interviews with a range of forest user groups (Section 6) and forest managers (Section 7).

6.1. Methodology

Section 3 of this report highlighted the diversity of people who recreate in British forests. To capture the range of needs of these different user groups, interviews were conducted at three forests: Dyfnant, Cwm Carn and New Forest. Each forest site was selected, in consultation with Forestry Commission staff, to represent the suite of recreation activities that take place in the forest. As the more specialised users groups, such as mountain biking and horse riding, are more likely to have the most specific resource requirements, two of the selected forests were chosen to capture the views of these groups. Horse riders were recruited in Dyfnant Forest, while mountain bikers were targeted at Cwm Carn forest. The less specific or 'general' forest user groups and ramblers were recruited at New Forest. A mix of interviews and focus group were undertaken with these user groups (the format depended on the circumstances of the users). The interviews probed forest visitors on four key questions:

- How do you use the forest?
- What do you like and dislike about the forest?
- How could the forest be changed to improve your experience?
- What are the key forest improvement attributes that you value?

A copy of the interview *pro forma* used is reproduced in the appendix of this report. The interviews were digitally recorded, and the content was then analysed. The main issues discussed during the interviews are reported below.

6.2. Key outcomes from the forest user interviews

In what follows, we report the main findings from the recreation user interviews for four main activities in turn: general forest user, ramblers, mountain bikers and horse riders.

6.2.1. General forest visitors

Two sub-groups of general forest visitors were apparent from the interviews: local regular users and visiting users. Local users were likely to live close by, either a short car drive or within walking distance of the forest. Most consider themselves as 'regulars' who have some claim to ownership of the forest. Their claim to ownership appears to strongly prejudice their views on other users, including visiting seasonal users. Visitors, on the other hand, tended to use the forests seasonally and at weekends. While the activities undertaken by visitors were often similar to the local users, there was some measure of conflict due, in part, to sheer numbers of visitors at certain times of the year.

Section A: How do you use the forest?

General forest visitors included dog walkers, joggers, casual bikers (as opposed to mountain bikers) and walkers out to enjoy peace and quiet. During the summer, particularly school holidays and weekends, the numbers of people engaged in these activities as well as general visitors increases.

Local users made frequent use of the forest; this may be several times per day for dog walkers, or 'at least three times per week' for joggers. Accordingly, time spent in the woods was often a matter of hours, distances travelled within the forests were relatively short and, due to familiarity signposted paths were not considered as important. Indeed the dog walkers in particular expressed a preference for not being confined to paths and to wandering freely in a mix of woodland and heath; particularly if this allows them to take the dog off the leash. Paths and trails, however, did add an element of social interaction as places where '*regulars*' meet.

In part, the choice of forest was limited; proximity to home being the main criterion. Beyond distance from home, a mix of wood and open area added interest, a car park if needed, a variety of paths/routes and walks which are "*not too muddy*" were factors the regular user looks for.

Section B: Likes and Dislikes

Like all forest users, the general visitors appreciate the scenery, sense of remoteness and peace and quiet of the woodlands. The latter point in particular was valued. The general visitors tend to demand little in the way of facilities; the lack of facilities was mentioned as one of the attractions of the forests. Safe secure car parking was considered to be important; the closure of some car parks during the winter months was an inconvenience to year round users.

Perhaps due to a sense of ownership of their local woods, the regular visitor appeared to be the least tolerant towards others recreationists. A great deal of their dislike is focused on the intrusion of others and their activities. Horse riders are blamed for "*churning up the paths*", summer visitors fill up the car parks and leaving their rubbish.

Section C: Improving the experience

Most of the regular visitors enjoy the forests in the off season. They could make few suggestions for improvement beyond not closing the car parks in the winter. They accept there are problems with relatively remote car parks within easy driving distance of urban areas. A group of locals who had voluntarily collected litter had given up after finding syringes amongst the rubbish. They were unsure how to address such issues beyond the vague and, they admitted, impractical proposition for wardens.

The influx of visitors and holiday makers during the summer is inevitable. The regular users suggest this was the greatest interruption to everyone's enjoyment of the forests. They suggested that the problem may be minimised through some information at the car parks similar to the Countryside Code.

Section D: Suggested attributes

A number of the attributes suggested by the regular users are perhaps less than useful. They include: excluding summer visitors, litter, wardens, car park wardens, parking charges for non-locals and limiting access to locals only! More useful attributes identified included:

- **Surroundings**: peace and quiet; remoteness/wilderness feeling; lack of crowding; variety of terrain/surrounding environment; open spaces.
- **Information**: Information for visitors on proper behaviour in the forests similar to the Countryside Code; warning against dropping litter/take litter home.
- **Facilities**: car parks open all year; no rubbish bins; information at car parks; toilets; warden service.
- **Track/routes**: freedom to roam; places to let dog off leash; restricting horse riders use of paths.

6.2.2. Ramblers

Section A: How do you use the forest?

Ramblers were among the most frequent users of the forest. The New Forest Ramblers club for example have almost 700 members and a further 100 associate members. The group organises four walks per week: longer walks on Wednesday and Sunday, and shorter walks on a Saturday and Thursday. Additional evening walks are often added to their agenda during the summer months. The group estimated that around half of their walking is done in forests and that group sizes on the walks varies between 6 and 55 people; an average of "*around two dozen"* is usually expected. Weather, season and time of walk influence numbers; sunny summer Sundays being more appealing than wet winter Wednesdays.

The choice of route varies for similar reasons: shorter walks over easier terrain, usually staying on paths are often undertaken during an evening walk, while longer walks were predominantly undertaken during the weekend and would tackle tougher terrain and may use the forest only as part of the route. Walks are often organised with some specific aim, examples include family walks with young children, 'cream tea walks' to a known tea room, and nature walks. Given these variables, requirements ranged from circular routes around 4km long on reasonable surface to longer linear paths which may join up with PRoWs outside of the forest.

Section B: Likes and Dislikes

There was much in the forests that the ramblers appreciate, the 'outdoors' being an integral part of the experience. This included the variety of scenery and landscape, forested and open areas, streams, wildlife and the peace and quiet. A variety of routes both circular and linear was considered desirable, not only to add variety to the walking experience but, by facilitating participation of different ages and abilities, enhancing the social experience of rambling.

The ramblers' enjoyment of the New Forest was reduced by the long standing and ongoing problem of footpath erosion. Much of the erosion was thought to be caused by horse riders, especially on the routes used by local riding schools. The problem was often greatest, on occasion dangerous, where a path crossing a stream was badly damaged.

Other forest users were also criticised, dog walkers for not removing dog dirt; visitors who drop litter; and the disturbance and damage caused by 'raves'. The Forestry Commission was not immune to criticism: poor communication, particularly regarding mapping of and changes to routes.

Section C: Improving the experience

The ramblers made suggestions specific to the New Forest which included building bridges over streams controlling the speed of traffic that passes through the forest. Ramblers also suggested that forest user forums be created to allow forest users to discuss and resolve issues with the Forestry Commission and other user groups; for example, to enable constructive discussion on the problems of erosion of paths with the horse riders. Many ramblers, particular those who walked with their children, suggested that the provision of some "*kids' facilities suitable to the forest setting*" would enhance their experiment. Suggested facilities included aerial ropeways, and other features on trails to enhance the excitement and feeling of adventure of the forests. Likewise, a visitor centre and toilets at car parks were thought to help contribute to a more family friendly experience.

Section D: Suggested attributes

- **Track/routes**: circular routes starting finishing at car park; routes of a variety of lengths; open access areas; paths linked to the PRoW network; points of interest on routes; reasonable surfaces on all short/circular routes to improve accessibility.
- **Surroundings**: peace and quiet; remoteness/wilderness feeling; lack of crowding; variety of terrain/surrounding environment; mixture of forest and open spaces; wildlife.
- **Information**: accurate route maps; publish any changes to routes; Forestry Commission to provide OS type maps *not* sketch maps of changes; Forestry Commission to consult with and inform stakeholders; forum of stakeholders.
- **Facilities**: minimum of facilities preferred; car parks; no rubbish bins; no dog bins/dog toilets; kids' facilities (e.g. aerial ropeways). In a large forest, such as the New Forest, a visitor centre with family orientated facilities may be appropriate.

6.2.3. Mountain Bikers

The mountain bikers were predominantly young male professionals. While respondents recognised that they represented the stereotypic mountain biker, it should be noted that the sample interviewed may not represent the views of all types of cyclists who use the forest.

Section A: How do you use the forest?

Mountain bikers enjoyed a range of experiences in their use of the forest resource. All recognised the forest environment and surroundings as an essential part of the activity due to the terrain, surroundings, scenery, peace and quiet, and nature interest. Several combined their cycling trips with other hobbies appropriate to the surroundings such as photography. A number in the sample also suggested that they took part in other strenuous outdoor activities according to season, such as rock climbing and snow boarding.

As the terrain/environment is integral to the pursuit of mountain biking, a number of variations in the mountain biking trip and so choice of site were apparent. First, the majority of mountain bikers did not live in areas with quality terrain. Distance to travel, cost of travel and hours of daylight limit their ability to access the more rugged sites. Midweek riding was, as a consequence, often restricted to local forests and often considered as a means of fitness training to prepare for longer weekend rides.

Mountain bikers accepted, and indeed many seemed to enjoy, the need to travel to the best terrain located in different forests. It appeared to add variation, a chance to interact with riders from other areas, exchange information, learn of new sites/routes and often meet with friends from around the country. Choice of site varied with chosen discipline and season. For example, a mountain biker at Cwm Carn described his experience on the day as "*…playing, not my real interest, more like practice and fitness training for epic (long distance) trips in the summer"*. He expected fewer riders to use the venue as the weather, and so conditions at other sites, improved. Cwm Carn provided predictable, consistent quality whatever the season allowing the rider to continue his activity throughout the winter. While technical difficulties of the trails were an important component of the experience at Cwm Carn, the rider thought he made few demands that would preclude those of lesser experience/ability. Other users included riders on the return leg of a weekend trip. They had completed "*harder rides*" at Coed y Brenin on the previous day: Cwm Carn provided less demanding routes and a stop off point to break their journey home.

Cwm Carn was considered to provide a generalised mountain biking experience, it is neither 'epic' nor highly technical, but satisfies several types of rider. Several riders thought that with the growth of the sport the specialised demands of a segmented mountain biking fraternity would become more precise.

Section B: Likes and Dislikes

The main requirements of all mountain bikers may be termed as 'predictable quality'. No matter their discipline they required the routes to be:

- Usable regardless of weather conditions; suitable surfaces and drainage to allow year round use without environmental damage or degrading of the experience.
- Waymarked routes.
- Safe, "*within the dictates of an inherently risky sport*".
- Routes (or at least parts of routes) which are free of incompatible users. For example, while willing to share on some sections, the safety implications of different users on fast downhill sections preclude mixed use.
- The terrain, surroundings, scenery, peace and quiet, and nature interest of the "*outdoor experience*" and "*getting away from it all*" to provide "*stress busting*".

Suggested improvements included variety in terms of choice of routes based on required fitness levels, technical difficulty and length. Recognising the pragmatic issues of providing separate technical and general routes 'optional features' were suggested. These could be jumps or other features situated on short loops off the main track. Riders could choose to opt in or ignore these features.

In keeping with their young male demographics, most bikers used smaller cars and therefore have some reliance on the on-site facilities. The minimum is some hard standing to park and prepare. Toilets were considered by most to be essential, at least at the popular sites and especially with any on going growth of the sport. The "*old peeing in the bushes is no longer acceptable or possible*" with a burgeoning number of participants. Other desirable on site facilities included a café, and, in preparation for the return journey, a bike wash. Many bikes were partially disassembled and carried inside the car because of security concerns of external bike racks. Similarly, showers would be desirable.

Two female bikers were interviewed; both would prefer some changing facilities "*even if they were very basic*". Both thought that as mountain biking is a predominantly male activity the issue had not been raised.

Mountain bikers also suggested that the presentation of 'emergency' information on-site would be welcomed. Such information might include contact details and directions to the nearest accident and emergency department; contact numbers for forest services to report issues/problems; for those embarking on long/remote routes a log in/log out procedure. Lighting in car parks and the provision of litter bins were also suggested as improvements. Most mountain bikers thought some charge for car parking was acceptable, especially if mountain bike facilities were provided; however charging for use of cycling routes was not considered appropriate.

Section C: Improving the experience

While additional facilities such as a café, bike wash and so on were considered desirable, the value of a mountain biking trip hinges largely on the biking experience. Any interference with this experience reduces the participant's enjoyment:

- Overcrowding on routes tended to hinder the progress of some cyclists and therefore reduced the level of enjoyment.
- Incompatible activities on route created unnecessary risk and/or possible conflict.
- Mixed abilities sharing routes was considered to limit technical possibilities by some riders.
- The value of the trip was enhanced by the variety of routes and the variety of terrain on any given route. Variety was obtained through diversity of surroundings (forest, open area, riverside, hill top), terrain (up/down hill sections, fast/slow sections), length, level of fitness required, remoteness/wilderness feeling, technical ability needed. A selection of routes within a forest widened the rider's options according to weather, previous days riding, time available and other factors.

Mountain bikers wanting to enjoy the best terrain accepted the need to travel, often considerable distance, for their weekend activity. Improvements to the experience were in many respects linked to this effort expended. Bikers wanted a guarantee that they will be able to have a decent ride no matter the conditions: clearly track design, surface quality, drainage and other factors are important in achieving this aim.

Section D: Suggested attributes

Suggested attributes and features are listed in an approximate order of importance below:

- **Track/routes**: length; technical level; signposting; challenges/options along the route; variety of surroundings/experiences along the route; year round usability; and low levels of conflict between incompatible activities.
- **Surroundings**: peace and quiet; remoteness/wilderness feeling; lack of crowding; variety of terrain/surrounding environment.
- **Facilities**: car parking; café; changing facilities; bike wash; toilets; showers; security.
- **Information**: on the surroundings to add interest to the ride; technical descriptions of routes; due to distances travelled some advance warning on interruption to use of the routes due to essential forest operations/maintenance/incompatible activities.
- **Accessibility**: biker friendly bus services; cycle routes linking forests to surroundings.

6.2.4. Horse riders

The horse riding group was largely dominated by a clear demographic: female, married and over 30 years of age.

Section A: How do you use the forest?

Horse riders were attracted to the forests for similar reasons to the mountain bikers: peace and quiet, attractive surroundings, stress busting and so on. While there were a number of disciplines within horse riding that need specialised spaces and equipment (e.g. jumping, dressage), most riders had used the forest trails for 'hacking'. The majority of horse riders sought trails that allow a mix of riding speeds. Most horse riders rode +with another rider or in a small group.

Whilst representing a relative minority of horse riders, endurance (long distance) riders made extensive use of forest trails for training and competition. Their needs were directed towards soft routes to minimise impact on the horse.

There was, within the equestrian users, one group for whom the forests provide what is virtually the only place they can practice their chosen activity: carriage drivers. In many respects their needs were similar to the riders, differing only in that they were confined to the access roads in the forest. Henceforward comments regarding horse riders includes carriage drivers unless otherwise stated.

Section B: Likes and Dislikes

Among the forest recreationists, horse riders were almost unique in two respects: their relationship with "*over half a ton of beast with a mind of its own*" and the use of specialised transportation. The horse rider is vulnerable to the "*flight reaction*" of the horse; riders must consider the horses welfare in all decisions and actions. Riders also have specific requirements of trails, as well as specific parking requirements for their trucks and trailers. Their preferences were largely governed by the issues connected to these factors.

- Incompatibility between activities: this took two forms. First, there was a "*necessary intolerance*" of those activities which may cause a horse to bolt, e.g. shooting. The second incompatibility was a safety issue between different users of the forests: the faster sections of a horse riding trail are often uphill, while the peak speeds for a mountain biker are achieved while travelling in the opposite direction.
- Motor sports, or more accurately the damage they cause to roads, was heavily criticised by horse riders. The logic of permitting rallying, which causes extensive damage but was considered as having little positive impact on either the forests or surrounding businesses was considered "*baffling"*.
- Trail requirements: in common with other users, horse riders appreciate the scenery, environment, interest and peace of the forest trails. Specific needs include: long distance (20 miles plus) trails; signposting (including ones that indicate distances covered); places to canter (gallops) free from obstruction, good visibility and, for safety, free of other users; horse friendly trail surfaces; appropriate furniture (e.g. gate locks).
- Information: it was considered essential that horse riders have access to information on closures or incompatible activities in the forest of choice. Investment in travel, in terms of both effort and finance, was considerable. To arrive at a site which is not usable is costly and has animal welfare implications.

- On site facilities: due to the types of vehicles and care requirements of the horse, riders were largely self-sufficient. The preferred facilities include: hard standing; 'pass-through' car parking; mounting blocks; corrals or other safe places for the horse; 'horse-friendly' design and maintenance (i.e., no loose or flapping materials, eradication of ragwort); space between horses and other users; access/egress suitable for larger vehicles; muck heap/wheelbarrow.

Section C: Improving the experience

Horse riders suggested that the main improvement to their recreation experience would involve greater communication with the Forestry Commission. An example was the carriage driver who had transported horse and carriage to Lake Vyrnwy forest only to find that the site was closed for shooting. The considerable expense, effort and animal welfare concerns of the individual could have been averted had the commission provided up to date information.

While horse riders appreciate the efforts of the Forestry Commission in providing equine access, they suspected that the Forestry Commission had only limited understanding of their requirements. For example, they indicated that the construction of the trail surfaces were often unsuitable to the demands place upon them by horses. Improved consultation between riders and the Forestry Commission was seen as the solution to this and many other issues.

Riders suggested that the provision of on site information would enhance the experience, as well as provide essential safety information. Up-to-date accurate information about the trails, conditions, distances, challenges, points of interest, directions and, essentially, escape routes/short cuts home should there be any emergency should all be provided. Further safety information should include directions to the nearest first aid or accident and emergency department and contact details for a local veterinarian.

Horses can cover considerable distances; signposting on trails was a safety concern which, if provided, also enhances the trail.

The provision of on-site facilities was not considered to be that important to horse riders as, say, for mountain bikers. The transport necessities for a horse ensure that the rider were largely self sufficient. However, car park design which permits easy access to larger vehicle, minimises manoeuvring and which does not impair the safety or convenience of other users was considered important. At Lake Vyrnwy forest the 'car park' consists of circuit of road. The design negates the need to manoeuvre large vehicles and is wide enough to allow parking along its perimeter. The land lying within the loop of road serves as a safe place to cool off horses. At Lake Vyrnwy several small corrals were a welcome addition. It was pointed out that many of the access roads in forests could be used to similar effect providing that they allow one way flow of traffic from and to the public highway.

Like the mountain bikers, horse riders were aware of the differing interests and technical competencies within their sport. Optional challenges, such as jumps, was considered to add interest and excitement to the trails. Again, like the mountain bikers they thought the challenges could be situated on loops off the main trail.

Finally, to obtain the maximum benefit for the effort made and to minimise the stress to the horse, riders indicated that they would often like to stay overnight but were unable to do so due to a lack of accommodation for their horses. Overnight stabling or paddocks were therefore considered

desirable whether they are provided by the Forestry Commission or others. It was thought the Forestry Commission may be the most able organisation to encourage local providers through raising awareness of the demand by consultation and communication.

Section D: Suggested attributes

Suggested attributes and features are listed in an approximate order of importance below:

- **Information sources:** up to date pre-travel information is needed on whether trails are open, what activities are taking place in the forest and which trails are affected. This information could be provided through the web, sms, an answer phone service, newsletter or a published diary of events but it must be current and accessible before travel. Other information, such as route maps, could be made available on site. A willingness to purchase trail guides was expressed.
- **Safety:** information on incompatible activities, escape routes home etc should be available on-site; separation of riders and other users; visibility along tracks; signposting on trails.
- **Track/routes**: longer trails of 20 miles plus wanted; signposting; optional challenges; places to gallop; trail construction/materials/design appropriate to horse use; furniture/signposting appropriate to horse riders; visibility along fast sections; consultation with riders; open up forest access roads to carriage drivers; link forest trails with PRoWs; horse 'tie-up points' at vantage points along the routes.
- **Surroundings**: range of tracks to prevent overcrowding/environmental impact; peace and quiet; remoteness/wilderness feeling; lack of crowding; variety of terrain/surrounding environment.
- **Facilities:** hard standing; car park design as outlined above; corrals/safe cool down area; mounting blocks; muck heaps.

7. Stakeholder interviews

A series of semi-structured stakeholder interviews were also administered (either in person or over the telephone) on Forestry Commission staff. Staff interviewed included site managers at Cwm Carn, Dyfnant, Glentress, Abernethy, New Forest and Thetford forest, as well as Forestry Commission 'Forest recreation experts' from Scotland, England and Wales. The questionnaire *pro forma* used in the stakeholder interviews is reproduced in the appendix.

7.1. Summary of responses to the stakeholder interviews

The following is a summary of some of the key issues that were raised during the stakeholder interviews. We present this summary information in terms of the key requirements for specific forest recreation user groups.

General forest recreation
Forests were considered to be the location for a broad range of recreationists, from the regular, local user visiting several times per day to the specialist user who travels great distance bringing a mass of expensive equipment. The findings would suggest that the forest recreationists, while having an appreciation of the surroundings in common, have preferences and requirements particular to their chosen activity. These may not be fixed; there is variation according to season, skill level and even day of the week. These are summarised by activity type below:

Local regular forest users
Local regular forest users were defined as those who live close to the forest and who make regular use of the forest.

- Local users may visit the forest several times per day for dog walking, or several times per week to jog, cycle or walk.
- It was considered that although dog walking was often the most frequent use of forests, dog walkers have few demands on the forest and also are unlikely to generate any significant economic benefit to the local economy. Thus, dog walking was not considered to be a suitable group for this research.
- Regular local forest users were generally considered to have few requirements for facilities / infrastructure beyond the basics such as car parking, circular routes, open spaces to let their dogs run and a variety of places to walk according to season (higher ground in the wet, for example).
- Their needs are unlikely to change significantly throughout the year.
- Local users were thought to feel some sort of ownership for the forest and are occasionally resentful of seasonal users. This resentment is most often focused on the litter, crowding and inappropriate behaviour of the visitors. Local users suggest the greatest improvement to forest recreation (other than banning visitors) is education aimed at the infrequent user.

Day visitors

Forests were also thought to attract a large number of day visitors. These visitors tended to visit the forests less often than the regular local visitors; perhaps only once a month during the summer. This group also includes the holiday visitors.

- Day forest visitors tended to visit the forests for a 'day out' and undertook activities such as short walks, picnicking, café, visitor centre, children's play, sculpture trails, 'go ape' high wire courses etc.
- Day visitors generally require information on the forest, forest facilities and forest trail.
- It was considered that the forest itself was less of an attraction to day visitors than the facilities provided at the forest.

Ramblers

Ramblers are defined as those forest users that walk more than 2 miles.

- Walkers tend to require only minimal infrastructure / facilities, with secure parking being the main need. However, their requirements are subject to wide variation.
- During the winter months, rambling tends to only occur during the weekends due to the shorter daylight hours. Their requirements are for car parks, toilets at the car parks, longer circular paths taking in a variety of terrain and/or interconnection to the PRoW network.
- Weekday ramblers often take advantage of the longer daylight hours in the summer. They often include families with children of school age who live close to the forest. Their requirements are for car parking and short, circular routes of reasonable surface.
- To maintain the interest of children, ramblers often prefer some point of 'interest' along the route such as nature walks, rope walks or other adventurous features and guided walks.
- Weekend walkers want more strenuous/longer distance walking including links to PRoW network

Mountain Bikers

Mountain bikers were considered to include a range of types of rider from cross country riders to downhill specialists.

- Generally, mountain bikers will own their own bikes (although some might hire a bike at a centre).
- Although largely self-sufficient, many mountain bikers prefer sites which offer a range of facilities including: secure car parking, cafés, toilets and bike wash. Surveys have also been shown to demonstrate that mountain bikers might also like showers, changing facilities (since they often have long drives home after cycling).
- It was thought that many mountain bikers like the Forestry Commission trails since they provide opportunities for mountain biking throughout the year since many of the Forestry Commission trail are designed to be technical, all weather routes.
- It was thought that during the drier summer month, many of the mountain bikers often cycle on longer routes linked to the wider countryside.
- Several of the forest managers thought that the provision of Forestry Commission mountain bike centres was reaching its optimum level and that there may be little benefit from developing new centres.

- However, there was also a feeling that existing centres could be consolidated to provide a wider range of mountain biking opportunities including downhill, 4 cross and jumps.
- It was also thought that as mountain bike technology advances with every increasing lengths of suspension and as biker's skills develop, mountain bikers' will demand more demanding trails and there will be a move to more specialisation within the sport, e.g. downhill, stunt, trails, racing etc.
- Such specialisation in mountain biking could be managed through the creation of new trails that cater for specialist needs, the provision of optional technical sections on existing routes and the development of centres that specialise in a particular type of mountain biking.

Horse Riders

Horse riders include a range of horse riding interests from short rides, to endurance events to carriage riding.

- It was considered that the Forestry Commission generally does not cater for the direct needs of horse riders. The current view is that the horse riders can use the forest to ride if they wish to do so.
- An exception to this is at Dyfnant and Lake Vyrnwy forest. Here, the Forestry Commission in partnership with a local rider club have developed a suite of horse specific facilities including: horse friendly parking, corrals, horse friendly trail surfaces and information.
- In addition, it was noted that the Forestry Commission have recently appointed a horse riding specialist and has signed a concordat on horse riding.
- It was considered that facilities similar to those developed for mountain biking could be developed for horse riding. However, it was also noted that the market for horse riding centres was likely to be smaller than that for the mountain biking.

8. Recommendations for Phase 2

The review of literature, along with the user and stakeholder interviews, highlighted the diverse range of activities that take place in the forests of GB. From this review, it was also clear that the way people use the forest is changing in that there is now a much wider range of recreational activities being undertaken within the forest and that individual forest users are becoming more specialised in their activities. This increased specialisation, in turn, requires more specialised facilities, infrastructure, and management of the forest. For example, where in the past cyclists were generally happy to cycle along the forest road network, specialist sub-groups of cyclists now demand specific resources such a single track or downhill courses. Although the Forestry Commission does now recognise and provide for these specialist groups of forest users, it is evident that the Forestry Commission is in a transitional period where it is aiming to better understand the needs of these specialist groups. Existing research on forest recreation has yet to fully investigate these specialist needs. In particular, there is a desire to identify which types of improvements to the forest recreational resource would generate the greatest welfare gains and greatest economic impacts. This project therefore aims:

1. *To estimate the effect on consumers' surplus of changes to the provision of key forest recreation facilities,*
2. *To examine the heterogeneity of recreational values across different forest users and uses,*
3. *To estimate the economic impact of forest recreation.*

In this final section of the Phase 1 report, we make recommendations for the methodology to be adopted in Phase 2 of this research. First, we discuss our selection of recreation activities to be examined. Next, we provide justification for our selection of the forests to be surveyed. Finally, we discuss details of the economic valuation and economic impact methodologies that we propose to utilise in this research.

8.1. Identification of the types of recreation activities to be studied in Phase 2

In this research, we are interested in identifying which types of improvements to the forest recreation resource may result in the greatest gains in welfare, and how these welfare gains are distributed across different users groups. In both the review of literature and the user / stakeholder interviews, we collected data on:

- the range of recreational activities that currently take place within GB forests,
- the range of specialisations that occur within a specific activity,
- the current rates of participating in individual activities,
- and recent developments within individual activities.

Clearly, there are a wide range of activities that could potentially be examined. The pertinent question for this research is which activities should this research focus on. The following selection criteria were used to help identify key activities for further research:

- those activities which attract a significant number of users,
- those activities where the number of users are expanding most rapidly,
- those activities which have specific facility / infrastructure / management needs,
- those activities which are likely to generate the greatest economic value or impact,
- those activities which are important to Forestry Commission policy.

Based on these selection criteria, we propose to focus this research on the following three activities.

8.1.1. Cycling

Cycling represents an interesting and unique case study for this research. Over the past ten years of so, the Forestry Commission has made significant investments in 'mountain bike centres' such as Glentress, Coed-y-Brenin and Cwm Carn. These centres provide a range of specifically built technical single track trails for mountain biking. These centres attract a high number of users, many of whom are prepared to travel long distances to access these centres (Forestry Commission, 2002a). This, in turn, suggests that mountain bikers attain high levels of utility from riding at these centres. Furthermore, the Wales Mountain Bike survey (Forestry Commission, 2002c) indicates that mountain bikers make significant expenditures into the local economies. Thus, capturing the size of the economic value and impact of these mountain bike centres is likely to be of interest to the Forestry Commission in terms of providing evidence in support of such facilities. However, there was some concern expressed by forest recreation managers that the market for new mountain bike centres may be near saturation point. A valuation study that includes an assessment of the value of additional facilities would help to assess whether this is the case or not. Furthermore, there is also a move within Forestry Commission to start providing more 'hard core' facilities such as downhill, 4 cross and jumps. Currently, little is known about the demand for such facilities and therefore information on this would be useful to aid future investments.

However, restricting the examination of cycling to mountain biking alone would be restrictive since forests also attract large numbers of casual / family riders. These riders are likely to have different needs to the mountain bikers and therefore their needs should also be examined. Furthermore, the inclusion of all types of forest cyclists will enable a better understanding of the heterogeneity of preferences of different groups of cyclists and will also allow detailed examination of the contributions that alternative groups have to local economies.

Recommendation 1: Our first choice of activity to be investigated in this research is 'cycling'. Our definition of cycling would incorporate all types and abilities of cycling that occurs within forests including short family rides, cross country / single track mountain biking, down hill, 4 cross and jumps.

8.1.2. Horse riding

Horse riding presents a second interesting case study for this research. Horse riding currently takes place in 22% of the GB's main forest sites (see Table 2), and accounts for around 2% of forest users. Currently, horse riding takes place on existing forest trails and bridleways and the Forestry Commission generally does not provide specific facilities for horse riders. One prominent exception to this is at the forests of Dyfnant and Lake Vyrnwy. Here, the local riding group, in partnership with the Forestry Commission, have developed a suite of facilities specifically aimed to meet the specific needs of horse riders. Facilities provided include corrals, horse box friendly parking, dung heaps, mounting blocks, horse friendly trail surfaces and optional challenges such as jumps. The facilities are now in much demand and serve to demonstrate the potential of providing horse specific facilities. The facilities at Dyfnant have also won the British Horse Society's prestigious 'Access Award'. It was suggested in the stakeholder interviews that efforts to promote horse riding in forests could follow the success of mountain

biking. Furthermore, the Forestry Commission is showing increased interest in horse riding with the appointment of a 'horse riding liaisons officer' and the recent signing of a concordat on horse riding. This interest is matched by the Welsh Assembly Government's 'Saddling up for Success' strategy for horse tourism

Horse riding was also thought to have the potential to make significant contributions to local economies. The argument here is that horse riding is a resource intense sport and as such there is a significant opportunities of local businesses to benefit from the provision of horse friendly facilities such as accommodation or temporary livery facilities.

Like cycling, horse riding comprises a number of specialist disciplines including short casual rides, jumping, endurance events and carriage driving. Thus again there would be opportunities to examine the heterogeneity of preferences for alternative horse riding facilities.

Recommendation 2: Our second choice of activity to be investigated in this research is 'horse riding'. Our definition of horse riding would include all types for riding that takes place in the forest and would investigate preferences for horse specific facilities similar to those provided at Dyfnant and Lake Vyrnwy forest.

8.1.3. General forest visitors

The choice of our third category of forest user was less obvious. Candidate user groups included walkers, nature watchers and play (such as 'Go Ape' and children's play areas). However, none of these user groups seemed to stand out above the rest in terms of the selection criteria outlined above. For example, it was considered that there was already a plentiful supply of walking trails at forest sites (79% of the main Forestry Commission sites currently have way marked trails – see Table 2) and therefore it was perceived that there was little opportunity to enhance this resource. Only a small proportion of visitors were thought to visit forest specifically to watch nature, whilst many visitors reported that seeing nature enhanced their visit. In terms of 'Go Ape' it was suggested that since this was a franchised venture on Forestry Commission land, it wasn't really in the interest of Forestry Commission to further explore the demand for such facilities. Thus, as an alternative to identifying only one of these groups of users, it was considered that it might be more appropriate to group all of these groups into a single 'general forest user' category. Thus, our definition of this group would be all forest users other than cyclists or horse riders. In the valuation study, this group of user would be asked about their preferences for general improvements to forest facilities including walking trails, opportunities to watch nature, opportunities for play, and other visitor infrastructure. There are several advantages to this approach. First, it enables us to explore a much wider range of user preferences for forest facilities (albeit at a less precise scale) than would be possible if we only focussed on one of the user groups. Second, in practical terms, it allows us to sample all forest users during interviewing. If the sample selection was restricted to only two user groups (i.e. cyclists and horse riders), we would not pick up information on the needs of the other groups of forest users.

Recommendation 3: It is proposed that our third group of forest users be defined as 'general forest users', which would represent a catch all group for non-cyclists and non-horse riders.

We will discuss details of the specific types of improvements that will be examined in each of the three activity groups in Section 8.3.3.

8.2. Site selection

Following the initial steering group meeting with the Forestry Commission, it was proposed that we examine six forests; two in each of England, Scotland and Wales. The main selection criterion for these sites was that they, together, should cover the range of recreational activities to be examined in this research. Site selection was also influence by the recommendations made by Forest Managers. Table 8 below provides an overview of the proposed sites including a brief description of the main reason why these sites were selected and lists recent surveys that have been undertaken at the sites. Further information on the selected study forests can be found on the Forestry Commission website.

Table 8: Overview of the six proposed forest sites for survey work.

Site	Reason for selection	Existing surveys
Glentress, Scotland	Predominantly a mountain bike centre with a range of routes for all abilities. The site also has live coverage of an Osprey nest. Opportunities for walking and horse riding also exist.	Forestry Commission Scotland (2002)
Abernethy, Scotland	A RSPB managed forest with a significant amount of wildlife (including osprey centre) and which also presents users with wilderness opportunities.	Bryden (2002) Sheil *et al.* (2002)
Thetford Forest, England	A family orientated forest, with easy cycling and walking trails and a range of play facilities.	TNT Tourism and Leisure (2004)
New Forest, England	Contains a wide range of opportunities for walking, cycling, and horse riding. The forest has recently become a national park	NFO World group (2003b)
Dyfnant and Lake Vyrnwy, Wales	Excellent facilities for horse riding, plus opportunities for walking and cycling	
Cwm Carn, Wales	A new mountain bike centre which has extended provision into downhill. Also opportunities for walking and play.	Forestry Commission (200c) Forestry Commission (2003)

It is considered that these six forest sites cover the range of recreational activities that take place in GB forests. It should, however, be noted that all of these sites are what the Forestry Commission describe as 'buzzing', i.e. forests that attract a large number of users. This is intentional since it ensures that the time spent surveying in the field is maximised for data collection. Furthermore, it should be recognised that most of these forests also have 'quiet' areas, and it is the intention that some of the sampling will be undertake within these quieter areas of the forest. Finally, at the initial steering group meeting, there was discussion as to whether it would be best to restrict sampling to six forests or sample over a much wider range of forests. We argue that these six sites adequately cover the range of forest activities investigated in this research. Furthermore, by restricting data collection to the six sites, we will be able to provide a lot of specific detail on these sites. Finally, restricting the number of sites will make it easy to manage data collection.

Recommendation 4: It is proposed that survey work is undertaken at the following forests: Glentress, Abernethy, Thetford, New Forest, Dyfnant and Lake Vyrnwy and Cwm Carn.

8.3. Proposed use of valuation methods in this study

Section 4 of this report reviewed the range of available valuation methods to value forest recreation. In this section, we outline our proposed methods for the valuation exercise. Based on our review of the methods and discussions with stakeholders, it is proposed that we aim to estimate:

1. Per visit values for alternative recreation user groups
2. Values for improvements to forest recreation facilities.

We now discuss the proposed methodologies for capturing these values.

8.3.1. Estimation of per visit values for alternative groups of recreational user.

Here, we intend to generate consumers' surplus values per visit for a range of forest recreation user groups. To achieve this, we intend to sample on the basis of a pre-determined set of recreational user groups (e.g. mountain bikers, hikers, wildlife watchers etc – these will be identified in the survey from a question which asks 'what is your main reason for coming to the forest today'). For all user groups on which sufficient observations have been generated, a count model (see section 4.2) will be estimated, based on trips made to the site during the last 12 months to the site. An index of the availability/travel cost of access to alternative sites (e.g. other forests mountain bike tracks) will be included in these models, along with an index of the comparative quality of these alternative sites (survey respondents will be asked to provide this information). These user group specific count models will then be used to produce estimates of consumers' surplus by recreation user. The count model can also be used to predict changes in visitor numbers by user group should any of the right-hand side variables change. Data requirements for this aspect of the valuation work will include:

- 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 and 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 quality attributes of alternative sites.

Recommendation 5: A count model will be used to estimate (i) consumers' surplus values per visit for a range of alternative forest recreation user groups and (ii) to predict changes in the number of visits per user group if forest characteristics were to change.

8.3.2. Estimating the value of recreational improvements at forest sites

It is also proposed that valuation methodologies be utilised to estimate the value of improvements to recreational facilities within forests. It is proposed that two approaches will be utilised here, the second being used as a back-up in case the first does not work.

- **Contingent behaviour models**

The first is to estimate separate contingent behaviour models for the three recreational types outlined in Section 8.1 above (i.e. cycling, horse riding and general forest users). Through these models, we will aim to value specific improvements in recreational facilities. For each recreation type, we will estimate a count model (as in section 8.3.1 above) across all sample sites including as "focus variables" the attributes in which it is proposed to make improvements to the forest recreation facilities. People's rating of the attributes in there current state is included in the first

observation (row in the data base) for each individual. Respondents will then be presented with two improvement choice options, described in terms of attributes (including a travel cost attribute) and asked to indicate which of these two options they prefer. A second observation for each individual is then made by asking respondents 'how often would you visit your preferred choice option site in a typical year if the proposed improvements were made'. These two observations for each person in the sample are pooled, and a panel estimator used to estimate an equation which can be used to predict (i) changes in the number of visits to the site and (ii) the change in consumers' surplus for the improvement in the recreation attributes. This estimation can be done using either a fixed-effects or a random-effects estimator, according to whether we want to eliminate fixed effects or not. An example of this methodological approach can be found in Breffle *et al.* (1999). Data requirements for the contingent behaviour model will include:

- Number of trips to current site for current activity over the past 12 months (as in the count model).
- Number of trips to all sites for current activity over the past 12 months (as in the count model).
- Details of travel costs and quality site attributes of current site.
- An indication of respondents preferred choice option over a series of choice options.
- Predicted number of trips to preferred option for current activity over typical 12 months.

It should be noted that it is proposed that each respondent will be presented with two contingent behaviour choice tasks.

Recommendation 7: A contingent behaviour model will be estimated for each of the three recreation activities (cycling, horse riding and general forest users) to estimate (i) changes in the number of visits to a forest and (ii) changes in consumers' surplus for improvements in forest recreation attributes.

- **Choice experiments / Random Utility Maximisation Travel Cost models**

Relying solely on the contingent behaviour approach is risky, since the focus variables may turn out to be statistically insignificant in the panel model. Therefore, a second approach will be used in tandem whereby the current visit behaviour data are supplemented either by a choice experiment or random utility maximisation (RUM) travel cost model. Note that these two approaches are basically the same in that respondents are asked to choose between a series of choice options describe in terms of attributes; the only different is that the choice experiment would use a price attribute (such as an increased entrance / parking fees) as the payment vehicle, while RUM travel cost model would use additional travel costs as the payment vehicle. The final decision between which of these two techniques to use would be made during developmental focus groups where participants would be asked to express their opinion on the two payment vehicles. The list of attributes and levels would be similar to those used in the contingent behaviour model above, and are discussed in Section 8.3.3 below. The use of these models provides a more direct estimate of the value of the alternative attributes of forest recreation. Data collected during this section would include:

- respondents choices over a series of four choice experiment / RUM travel cost choice sets,
- choice task follow-up question.

Recommendation 8: For each of the three recreation activities (cycling, horse riding and general forest users) either a choice experiment or a random utility maximisation travel costs model will be used to estimate changes in consumers' surplus for improvements in forest recreation attributes.

The above proposal to utilise a series of valuation models represents our ideal situation in that it allows a variety of values to be estimated, while also producing further evidence to help validate survey findings. An issue of concern relates to the likely length of the resultant questionnaire. We discuss possible options to reduce questionnaire length in Section 8.6.

8.3.3. Forest recreation attributes

In section 8.3.2 above, it was proposed that a number of attribute-based valuation approaches be utilised in this research. Table 9 below outlines our initial thoughts regarding our choice of forest recreation attributes and attribute levels. These attributes and levels are based on information collected in the review of literature and the recreational user and stakeholder interviews. It should be noted that the attributes listed below reflect our initial thoughts and that they will be tested and further developed during developmental focus groups undertaken during Phase 2 of this research.

Table 9: Proposed list of forest recreation attributes and levels for the three recreation activities to be investigated.

Attribute	Cycling	Horse riding	General forest users
Trails / routes	1. Short family trails only 2. Single track 3. Downhill / 4 cross	1. Forest roads only 2. Horse friendly trail surfaces 3. Long (+20 mile) routes	1. Short all access circular routes 2. Medium length routes 3. Long distance routes
Optional challenges	1. No jumps / north shore 2. Jumps and north shore	1. No jumps / obstacles 2. Jumps and obstacles	1. Relatively flat terrain 2. Steep terrain
Activity specific facilities	1. None 2. Bike wash 3. Showers / changing room	1. None 2. Horse box friendly parking 3. Corrals / tie up points	1. None 2. Children's play area 3. 'Go ape' highwire
General facilities	1. Only basic facilities such as car parking 2. Café / shop	1. Only basic facilities such as car parking 2. Café / shop	1. Only basic facilities such as car parking 2. Café / shop
Information	1. Basic information provided at site only 2. Information available externally e.g. www	1. Basic information provided at site only 2. Information available externally e.g. www	1. Basic information provided at site only 2. Information available externally e.g. www
Surroundings	1. Enclosed in forest 2. View points and points of interest	1. Enclosed in forest 2. View points and points of interest	1. Enclosed in forest 2. View points and points of interest
Nature	1. Little opportunity to view wildlife 2. Forest enhanced to increase opportunities to view wildlife	1. Little opportunity to view wildlife 2. Forest enhanced to increase opportunities to view wildlife	1. Little opportunity to view wildlife 2. Forest enhanced to increase opportunities to view wildlife
Price / travel cost	5 levels	5 levels	5 levels

There are a number of important issues to highlight regarding these proposed attributes. First, we propose to retain a consistent set of attributes across the three recreation activity groups examined in this research. Thus, the 'general facilities', 'information', 'surroundings', 'nature' and 'price' attributes will be identical over all three recreation groups – this will allow direct comparison of the value for these attributes between recreation groups. The 'trails / routes', 'optional challenges' and 'activity specific facilities' attributes however will be specified according to the individual recreation activities; although the number of levels of each attribute will be consistent between activities.

In terms of the levels for the various attributes, the higher levels will be inclusive of the lower levels. So for example, in the cycling 'trails / routes' attribute, level 2 (Single track) will also include the level 1 (Short family trails) provision. Similarly, level 3 will include Downhill, single track and family provision.

It should also be noted that the 'general forest user' group will capture the preferences of a range of key recreational users groups, namely walkers / hikers and 'play'. Furthermore, the preferences for nature watching / appreciation are included as an attribute in all three recreation activities. The reason for this is that although nature watching was not considered as a main reason for visiting a forest, most forest users indicated that the presence of nature enhanced their recreation experience.

Finally, it should be stressed that the above attributes and levels are based on those identified in the literature review and the recreation user and stakeholder interviews. In phase 2, these attributes and levels will be explored in more detail and then fully specified following further focus group work.

Recommendation 9: It is proposed that the attribute based valuation methods will focus on eight forest recreation attributes: trails / routes, optional challenges, activity specific facilities, general facilities, information, surroundings, nature, and price.

8.4. Exploration of heterogeneity of preferences

The second key aim of this research is to examine the heterogeneity of preferences for recreational activities. It is proposed that heterogeneity will be examined in both the count models (consumers' surplus per trip) and for the attribute based models (consumers' surplus for improvements). A number of approaches will be utilised to define the alternative groups. These will include differentiation in terms of:

- Recreation activity, e.g. between cyclist and hikers, or between family cycling groups and mountain bikers,
- Social economic groups, e.g. for different age groups, gender etc.
- Life cycle groups, e.g. young independents, families and empty nesters
- Motivational groups, e.g. see Table 5
- Latent class groups, e.g. see Section 4.4

Data required for the analysis of heterogeneity will include information of recreational activities undertaken during visit, standard socio economic data, and motivation questions as based on the Forestry Commission's 'Monitoring quality of Experience in Forests' work.

Recommendation 10: Heterogeneity of values for forest recreation will be examined by disaggregating the valuation data according to a range of discrete groups.

8.5. Economic impact analysis

The final aim of this research is to examine the economic impact of forest recreation. Based on the discussion in Section 5, it is proposed that multiplier analysis would be the most suitable approach for this study and that the multiplier coefficients would be best estimated using the LM3 technique. Information required for this analysis will therefore include 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. We discuss each of these data requirements in turn below.

First, there are two possible sources of data on visitor expenditures. The first is the use of secondary data. This option was explored in Section 5.4.1. Here it was concluded that suitable data on the expenditure of forest users generally did not appear to exist. However, other possible sources of expenditure data need further exploration with the Forestry Commission. If it is concluded that no suitable source of secondary data are available, it is proposed that data on visitor spend will be collected during on site interviews.

Recommendation 11: Possible sources of data on forest visitor expenditure will be further explored. If no appropriate data is found, visitors expenditure data will be collected during at the six forest sites.

The next element of the economic impact is the establishment of income and employment multiplier coefficients for each of the forest investigated. In Section 5, it was conclude that LM3 would be the most appropriate approach for this. Thus, a sample of local businesses will be surveyed to establish LM3 coefficients for each of the forests investigated. Finally, all of the above data would be analysed to estimate the size of the local economic impacts for forest recreation in the forests.

Recommendation 12: Information on visitor spend (collected either from primary or secondary data sources) would be multiplied by LM3 multiplier coefficients to estimate local economic impacts at each forest site.

8.6. Survey administration

Above, we have outlined the proposed methodology to be adopted in this research. In this final section, we provide some discussion on how we propose to administer the survey. In particular, we discuss the structure of the proposed survey instrument, the sampling frame and the time scale for Phase 2.

8.6.1. The proposed survey instrument

It is proposed that there will be three versions of the survey instrument, i.e. one for each of the three user groups: cyclists, horse riders and general forest users. Although there will be three versions, all versions will follow the same standard structure. The proposed structure of the questionnaire is outlined in Table 10 below. Also in Table 10 is an indication of the purpose for which the data will be collected.

Table 10: Proposed structure of survey instrument

Proposed questions	Purpose of data
Introductory preamble	
Main recreational activity undertaken during current visit	Count model and Contingent behaviour model
Number of trips to current site for current activity over the past 12 months	Count model and Contingent behaviour model
Details of travel costs and quality attributes of current site.	Count model and Contingent behaviour model
Number of trips to all sites for current activity over the past 12 months	Count model
A list of alternative sites where the respondent undertakes this particular activity, including details on travel costs to alternative sites and quality attributes of alternative sites.	Count model
Description of forest recreation attributes	
An indication of respondents preferred choice option over a series of four contingent behaviour choice options.	Contingent behaviour model
Predicted number of trips to preferred option for current activity over typical 12 months for the four contingent behaviour questions.	Contingent behaviour model
Respondents choices over a series of four choice experiment or RUM travel cost choice sets	Choice experiment / RUM travel cost
Choice task follow-up question	Choice experiment / RUM travel cost
Forest visitor spend in local economy	Economic impact analysis
Identification of where money is spent	Economic impact analysis
Socio-economic and attitudinal data	Heterogeneity analysis

It is envisaged that some of the questions, particularly those relating to recreational use, motivations, socio-economics and visitor spend will be taken from the Forestry Commission's visitor monitoring surveys, since this will allow direct comparison between surveys. Other questions including those related to the valuation questions will be developed during a series of pilot studies and pretests undertaken during the early stages of Phase 2.

One issue of potential concern for survey administration relates to the amount of information that respondents would need to provide during the interviews. Our ideal would be to collect information to feed into the count model, four contingent behaviour choice tasks and four choice experiment / RUM travel cost models choice task. The issue of survey length will be considered further during the pilot studies. However, for the moment, we will make a couple of observations.

First, some of the data to be collected will feed into more than one valuation model e.g. information on the current recreation trip will feed into both the count models and the contingent behaviour models. Thus there are synergies in terms of information needs between models, which will help to reduce the overall length of the survey. Second, it is considered that most forest users, and in particular the cyclists and horse riders, would already have a good understanding of their preferences for their chosen recreational activity. Thus, it is envisaged that effort required to describe the forest recreation attributes to respondents should be relatively straight forward (as compared to say describing complex goods such as biodiversity or ecosystem services). Hence again this will help to limit the length of time required to complete the questionnaire.

However, if the pilot studies identify that questionnaire length is an issue, we propose that the number of valuation tasks that an individual respondent is required to undertake could be reduced. In particular, we highlight the fact that the contingent behaviour and choice experiment / RUM travel cost models are essentially aiming to assess the same issues; we propose that the choice experiment / RUM travel cost models are undertaken (i) as a back up in case the contingent behaviour model fail to pick up significant results and (ii) as it would help validate the results from the contingent behaviour model. If the pilot studies establish that the contingent behaviour works well, then the choice experiment / RUM travel cost model could be dropped from the main questionnaire (we might however still wish to retain it in the valuation workshops). Alternatively, the sample could be split where one sub-sample would only do the contingent behaviour questions, while the second sub-sample would do the choice experiment / RUM travel cost model questions. These issues will be discussed with Forestry Commission following the pilot studies.

A second option to reduce survey length would be to use secondary sources of data on visitor spend (see Section 8.5). If suitable sources of secondary data were found, this would significantly reduce the amount of data required to be collected from respondents. The downside of this may be that the economic impacts may have to be estimated at different forests from those examined in the valuation study.

Recommendation 13: Ideally, the survey instrument would aim to collect data to feed into a count model, contingent behaviour model, a choice experiment / RUM travel cost model and economic impact study. However, dependent on the resultant length of the survey, it may be necessary to reduce the number of valuation questions within the survey instrument or use secondary sources of data on visitor spend. The final decision on the content of the survey will be made following the pilot studies and in consultation with the Forestry Commission.

8.6.2. Sampling frame

It is proposed that data is collected in two ways: in-person interviews and valuation workshops.

On-site, in-person intercept interviews

It is proposed that on-site, in-person interviews be conducted. In-person interviews are the recommended format for stated preference studies (Arrow *et al.*, 1993), and they also ensure that precise details of spending are collected for the economic impact study. Data needed for the count data models, the contingent behaviour and choice experiment / RUM travel cost models will be collected in the same questionnaire (see Section 8.6.1.) Interviewing will take place at the six forest recreation sites throughout Great Britain as identified in section 8.2.

It is proposed that a total of 24 days survey work be undertaken at each site over a period of a six months; i.e. four days of interviews per month per site (April to September). The six month

period includes the four months of the summer season (May to August) and two months of the winter and so goes someway to addressing seasonality while adhering to the timescale for the study.

Assuming that, on average, between 10 and 15 interviews are undertaken each day (depending on the length of the survey instrument), it is envisaged that a total of 240 to 360 interviews will be undertaken at each site during the year. This aggregates to a total of 1440 to 2160 interviews over the six sites. We consider this a suitable size of dataset for robust estimation and for any subsequent classification exercises.

8.6.3. Valuation workshops

In addition to the intercept surveys, it is also proposed that six valuation workshops are used in the research: two for at each of the main reaction activities. The workshops will be structured as follows:

i. Participants will be asked to complete the survey used in the intercept interviews.

ii. Participants will then be given an opportunity to further discuss and reflect on their use of the forest. Not only will this provide qualitative information on recreational use, but also will help to ensure that all participants are fully informed of forest recreation before making a second series of valuation choices (see iv below)

iii. Participants will also be given an opportunity to further discuss and reflect on their decision making strategies that they adopted when completed the valuation choice tasks.

iv. Participants will then be asked to complete a second series of valuation questions. It is envisaged that these will include a randomised repeat of the original valuation questions (this will be used to provide evidence to validate the findings from the original choice tasks), plus undertake some additional valuation questions (which will be used to explore methodological issues).

v. Participants will then be asked to compare and then reflect on the consistency of their valuation choices between the first and second series of valuation choice tasks.

An approach similar to the above was successfully used by Christie *et al.* (2004) in their valuation of biodiversity for DEFRA. The approach not only provides evidence to assess the validity of the main intercept interviews, but also provides an opportunity to further explore user preferences for forest recreation.

8.6.4. Time table for phase 2 work

Table 11 below provides a summary of the research timetable for Phase 2. It is envisaged that Phase 2 will be completed on time.

Table 11: Proposed work plan for the Phase 2 research

	2005									
Tasks	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Developmental focus groups and pilot surveys										
Survey administration										
Workshop administration										
Data analysis										
Draft Phase 2 report										
Final Phase 2 report										

8.7. Key questions for further discussion

In this document, we have outlined our proposal for what we believe to be a very comprehensive assessment of the economic value and impact of forest recreation. However, there are a number of issues which require further discussion / clarification with the project steering group. In this final section, we highlight some of these issues.

- Choice of recreation activities. We believe that our choice of cycling and horse riding presents the two most interesting forest recreation activities in terms of their potential for further development by the Forestry Commission. Furthermore, the catchall group which we term 'general forest users' is included as our third group designed to pick up the remaining activities including walking / hiking, nature watching and play. We would wish to seek agreement that these are the most appropriate activity groups to examine in this research.
- Choice of forest sites. The six forest (Abernethy, Glentress, Thetford, New Forest, Cwm Carn and Lake Vyrnwy) were chosen to reflect a broad range of forest recreation activities and geographic locations. Is this the best choice of forest sites?
- Choice of valuation methods. A range of valuation methods, including count models, contingent behaviour models and choice experiments / RUM travel cost models have been chosen to allow estimates of consumers' surplus and predict changes in the number of visits for (i) alternative recreation user groups and (ii) improvements in forest facilities. Although this does provide a comprehensive valuation assessment, it may result in an overly long survey instrument. Various strategies were proposed in Section 8.6 to reduce the survey length. Has the Forestry Commission any comments on the proposed length of the survey instrument or the proposed approaches to reduce its length?
- Economic impact study. In Section 8.5 we discussed the possible use of secondary data on forest users' expenditure. These secondary data sources need to be further explored with Forestry Commission staff. Also the implications of using secondary data sources needs further discussion.

We would welcome feedback from the Forestry Commission on the above issues.

9. References

Adamowicz W, Swait, J, Boxall, P, Louviere J and Williams M (1997). Perceptions versus objective measures of environmental quality in combined revealed and stated preference models of environmental valuation. *Journal of Environmental Economics and Management* 32(1), 52-64

Anderson, J., Gibson, H., Radford, A. and Riddington, G. (2004). *The Economic Impact of Game and Coarse Fishing in Scotland*, report prepared for Scottish Executive Environment and Rural Affairs Department, January 2004, technical report online at http://www.scotland.gov.uk/library5/ environment/eigcfs01.pdf

Anderson, J., Gibson, H., Radford, A. and Riddington, G. (2004). *An Assessment of the Economic Impact of Water-Related Recreation and Tourism Expenditure in the Spey Catchment Area in 2003*, report prepared for Scottish Natural Heritage, full report available online at http://www.snh.org.uk/pdfs/scottish/ehighland/ECONSTUDYFULL.pdf

Arrow, K., Solow, R., Portney, P.R., Learner, E.E., Radner, R. & Schuman (1993) *Report of the NOAA Panel on Contingent Valuations*, Report to the General Counsel of the US National Oceanic and Atmospheric Administration (Washington, DC, Resources for the Future).

Bateman, I., Carson, R.T., Day, B., Hanemann, M., Hanley, N., Hett, T., Jones-Lee, M., Loomes, G., Mourato, S., Ozdemirogluy, E., Sugden, R. and Swanson, J. (2002). *Economic Valuation with Stated Preference Techniques*. Cheltenham: Edward Elgar.

Bateman, I.J. (1996) *An economic comparison of forest recreation, timber and carbon fixing values with agriculture in Wales: a geographical information systems approach*, Ph.D. Thesis, Department of Economics, University of Nottingham.

Bateman, I.J. and Langford, I.H. (1997) Budget constraint, temporal and ordering effects in contingent valuation studies, *Environment and Planning A*, 29(7): 1215-1228.

Bateman, I.J., Garrod, G.D., Brainard, J.S. and Lovett, A.A. (1996) Measurement, valuation and estimation issues in the travel cost method: A geographical information systems approach, *Journal of Agricultural Economics*, 47(2): 191-205.

Bateman, I.J., Willis, K.G. & Gar rod, G.D. (1994) Consistency between contingent valuation estimates: a comparison of two studies of UK National Parks, *Regional Studies*, 28, pp. 457± 474.

Bennett, R., Tranter, R., Beard, N. & Jones, P. (1995) The value of footpath provision in the countryside: a case-study of public access to urban-fringe woodland, *Journal of Environmental Planning and Management*, 38, pp. 409± 417.

Benson, J.F. and Willis, K.G. (1992) Valuing informal recreation on the Forestry Commission estate, Bulletin 104, Forestry Commission, Edinburgh.

Bishop, K.D. (1992) Assessing the benefits of community forests: an evaluation of the Recreational use benefits of two urban fringe woodlands, *Journal of Environmental Planning and Management*, 35(1):63-76.

Blake, A., Durbarry, R., Eugenio-Martin, J.L., Gooroochurn, N., Hayc, B., Lennon, J., Sugiyarto, G., Sinclair, M.T., Yeoman, I. (2004), *Tourism in Scotland: The Moffat Model for Tourism Forecasting and Policy in Complex Situations*, Discussion Paper 2004/2, http://www.nottingham.ac.uk/ttri

Boxall, P.C. and Adamowicz, W. (2002). Understanding Heterogeneous Preferences in Random Utility Models: A Latent Class Approach. *Environmental and Resource Economics*, 23, 421-446.

Breffle, Morey, Rowe, Waldman and Wytinck (1999) *Recreational Fishing Damages from Fish Consumption advisories in the Waters of Green Bay.* US Fish and Wildlife Service.

Brooke, C. and Rayment M. (1999) *The Environment and the Regional Economy: Opportunities for the Regional Development Agencies.* RSPB.

Bryden D (2002). *Quality of Wildlife Tourism Survey.* HIE: Inverness.

Burt, O. and D. Brewer. 1971. Estimation of net Social Benefits from Outdoor Recreation. *Econometrica*, **39** (September): 813-28.

Chevas,J.P, Stoll,J.R. and Sellar,C. (1989) On the Commodity Value of Travel Time in Recreational Activities. *Applied Economics* 21, 711-722.

Christie, M., Keirle, I. and Scott, A. (1998) *The Economic Impact of Welsh National Nature Reserves*. Countryside Council for Wales.

Christie M (1999). Designing strategic recreation policy using contingent valuation. *Journal of Environmental Planning and Management*. 42(4), 547-564.

Christie. M., Warren, J., Hanley, N., Murphy, K., Wright, R., Hyde, T. and Lyons, N. (2004). *Developing measures to value biodiversity*. DEFRA: London

Christie, M. and Matthews, J. (2003) *The Economic and Social Value of Walking in England*. Ramblers' Association.

Clawson, M. 1959. *Methods of Measuring the Demand for and the Value of Outdoor Recreation*, reprint No. 10. Washington DC: RFF.

Cobbing, P. & Slee, W. (1993) A contingent valuation of the Mar Lodge Estate, Cairngorm Mountains, Scotland, *Journal of Environmental Planning and Management*, 36, pp. 65-72.

Countryside Agency (2000) *The Economic Impact of Recreation and Tourism in the English Countryside 1998*. Countryside Agency.

Crabtree, J.R., Leat, P.M.K., Santarossa, J. and Thomson, K. (1994) 'The economic impact of wildlife sites in Scotland', *Journal of Rural Studies* 10(1): 61-72.

Crabtree, B., Appleton, Z., Thomson, K., Slee, B., Chalmers, N. and Copus, A. (1992) *The Economics of Countryside Access in Scotland*, Economics Report No.37, Scottish Agricultural College, Aberdeen.

Dayton, C.M. (1998). *Latent Class Scaling Analysis*. Sage University Papers Series on Quantitative Applications in the Social Sciences, 07-126. Thousand Oaks, CA: Sage.

Dayton, C.M. and MacReady, G.B. (1988). Concomittant-Variable Latent Class Models. *Journal of the American Statistical Association*, 83(401), 173-178.

Dayton, C.M. and Sheers, N.J. (1997). *Latent class analysis of survey data dealing with academic dishonesty*. In: Röst, J. and Langeheine, R. (Eds.) Applications of latent trait and latent class models in the social sciences. Munich: Waxman Verlag.

Eiser, D. and Roberts, D. (2002) 'The employment and output effects of changing patterns of afforestation in Scotland', *Journal of Agricultural Economics* 53(1): 65-81.

Englin J and Cameron T (1996). Augmenting travel cost models with contingent behaviour data. *Environmental and Resource Economics* 7(2), 133-147.

Everett, R.D. (1979) The monetary value of the recreational benefits of wildlife, *Journal of Environmental Management*, 8:203-213.

Feather, P. and W.D. Shaw. 1999. "Estimating the Cost of Leisure Time in Recreation Demand Models." *Journal of Environment Economics and Management*., Vol. **38**, No. 1: 49-65.

Forestry Commission (1997) *Forest Cycling Survey 1997*. Forestry Commission: Edinburgh

Forestry Commission (1999) *Horse riding Survey 1999*. Forestry Commission: Edinburgh

Forestry Commission (2002a) *Wales Mountain Bike Survey 2002*. Forestry Commission: Edinburgh

Forestry Commission (2002b) *Nant Yr Arian visitor Survey 2002*. Forestry Commission: Edinburgh

Forestry Commission (2002c) *Cwm Carn Visitor Survey 2002*. Forestry Commission: Edinburgh

Forestry Commission (2003) *Cwm Carn Visitor Survey 2003*. Forestry Commission: Edinburgh

Forestry Commission (2004a) *Forest Visitor Survey 2002*. Forestry Commission: Edinburgh

Forestry Commission (2004b) *Forestry Statistics 2004.* Forestry Commission: Edinburgh

Goodman, L.A. (1974). Exploratory Latent Structure Analysis Using Both Identifiable and Unidentifiable Models. *Biometrika*, 61, 215-231.

Griffiths, K. (1996) *The Economic Impact of the Kite Country Project in Mid-Wales*. MSc Dissertation, Oxford Brookes University, Unpublished.

Grijalva T, Berrens R, Bohara A and Shaw WD (2002) "Testing the validity of contingent behaviour trip responses" *American Journal of Agricultural Economics*

Haab T and McConnell K (2002) *Valuing Environmental and Natural Resources*. Cheltenham: Edward Elgar

Hanley N D (1989) Valuing rural recreation benefits: an empirical comparison of two approaches, *Journal of Agricultural Economics*, September, 361-374.

Hanley N, Bell D and Alvarez-Farizo B (2003) Valuing the benefits of coastal water quality improvements using contingent and real behaviour *Environmental and Resource Economics*, 24(3), 273-285.

Hanley, N.D. and Ruffell, R.J. (1991) *Recreational use values of woodland features*. Report to the Forestry Commission, University of Stirling.

Hanley N D and Ruffell R (1993a) The Contingent Valuation of Forest Characteristics: Two Experiments *Journal of Agricultural Economics*, May, 218-229.

Hanley N and Ruffell R (1993b) The Valuation of Forest Characteristics in W. Adamowicz (ed.) *Forestry and the Environment*: Economic Perspectives. Oxford: CAB International.

Hanley N, Wright R and Adamowicz W (1998) "Using choice experiments to value the environment: design issues, current experience and future prospects". *Environmental and Resource Economics*, 11 (3-4), 413-428.

Hanley, N.D. (1989) Valuing rural recreation benefits: an empirical comparison of two approaches, *Journal of Agricultural Economics*, 40(3):361-374.

Hanley, N.D. and Craig, S. (1991) Wilderness development decisions and the Krutilla-Fisher model: the case of Scotland's Flow Country. *Ecological Economics*, 4:145-164.

Hanley, N.D. and Ecotec Ltd (1991) *The Valuation of Environmental Effects: Stage Two Final Report*. The Scottish Office Industry Department and Scottish Enterprise, Edinburgh.

Hanley, N.D. and Munro, A. (1991) *Design bias in contingent valuation studies: the impact of information*, Discussion Paper in Economics 91/13, Department of Economics, University of Stirling.

Hanley N., Shaw WD and Wright R. (2003) *The New Economics of Outdoor Recreation*. Cheltenham: Edward Elgar

Hanneman (1994) Valuing the environment through contingent valuation. *Journal of Economic Perspectives*. 8(4) 19-43.

Hellerstein, D. 1991. Using Count Data Models in Travel Cost Analysis with Aggregate Data. *American Journal of Agricultural Economics*, Vol. **73**: 860-67.

Hill, G., Courtney, P., Burton, R. and Potts, J. (2003). *Forests' role in Tourism: Phase 2 report*. Forestry Commission: Edinburgh.

HM Treasury, (2003). *The Green Book. Appraisal and Evaluation in Central Government*. HM Treasury: London

H.M. Treasury (1972) *Forestry in Great Britain: An Interdepartmental Cost/Benefit Study*, HMSO, London.

Huse, M., Gustavsen, T. and Almedal, S. (1998) 'Tourism impact comparisons among Norwegian towns', *Annals of Tourism Research* 25(3): 721-738.

Hyde T (2004) Investigating heterogeneous preferences in choice experiments using latent class analysis. PhD Dissertation: University of Wales Aberystwyth.

Jones A, Bateman, I and Wright J (2003). *Estimating arrival numbers and values for information recreational use of British woodlands*. Forestry Commission: Edinburgh.

Jones Economics (1996) *The Economic Impacts of Hillwalking, Mountaineering and Associated Activities*. Highlands and Islands Enterprise.

Larson D. and Shaikh S. (2003) "Whalewatching demand and value: estimates from a new double semi-log empirical demand system" in Hanley N., Shaw WD and Wright R. (2003) *The New Economics of Outdoor Recreation*. Cheltenham: Edward Elgar

Lazarsfeld, P.F. and Henry, N.W. (1968). *Latent Structure Analysis*. Boston: Houghton Miffin.

Louviere JJ, Hensher DA and Swait JD (2000). *Stated choice methods: Analysis and Applications*. Cambridge University Press: Cambridge.

McCutcheon, A.L. (1987). *Latent Class Analysis*. Sage University Papers Series on Quantitative Applications in the Social Sciences, 07-64. Thousand Oaks, CA: Sage.

Macmillan, D.C and Hanley, N.D. (2002) *New approaches to data collection in contingent valuation*. University of Aberdeen working paper.

Midmore, P. (2000) *The economic value of walking in rural Wales*, Working Paper No.13, Welsh Institute of Rural Studies, University of Wales, Aberystwyth.

Mitchell, R.C. & Carson, R.T. (1989) *Using Surveys to Value Public Goods : The Contingent Valuation Method* (Washington, DC, Resources for the Future).

Morey, E.R. 1981. The demand for site-specific recreational activities: A characteristic approach. *Journal of Environmental Economics and Management,* Vol. **8** (December): 345-71.

National Centre for Social Research (1995) *UK Day Visits Survey 1994*. National Centre for Social Research: London.

National Centre for Social Research (1997) *UK Day Visits Survey 1996*. National Centre for Social Research: London.

National Centre for Social Research (1999) *UK Day Visits Survey 1998*. National Centre for Social Research: London.

NAO (National Audit Office), (1986) *Review of Forestry Commission Objectives and Achievements*. Report by the Comptroller and Auditor General, National Audit Office, HMSO, London.

New Economics Foundation (2002). *The Money Trail: Measuring the impact on the local economy using LM3*. NEF and The Countryside Agency.

NFO System Three (2002a) *Monitoring quality of experience in Forests and woodlands in Great Britain: Literature Review*. Forestry Commission: Edinburgh

NFO System Three (2002b) *Monitoring quality of experience in Forests and woodlands in Great Britain: Report of qualitative research.* Forestry Commission: Edinburgh

NFO Tourism and Leisure (2003) *Monitoring quality of experience in Forests and woodlands in Great Britain: Summary of qualitative research at Glentress Forest 2002*. Forestry Commission: Edinburgh

NFO Worldgroup (2003a) *Monitoring quality of experience in Forests and woodlands in Great Britain: Review of Pilot methods*. Forestry Commission: Edinburgh

NFO Worldgroup (2003b) *Monitoring quality of experience in Forests and woodlands: Results of the pilot study undertaken in Ringwood, New Forest*. Forestry Commission: Edinburgh

Parsons, G.R.; P.M. Jakus and T. Tomasi. (1999). A Comparison of Welfare Estimates from Four Models for Linking Seasonal Recreational Trips to Multinomial Logit Models of Site Choice. *Journal of Environmental Economics and Management*, Vol. **38**: 143-57.

Parsons G. and Massey DM (2003) A random utility model of beach recreation in Hanley N., Shaw WD and Wright R. (2003) *The New Economics of Outdoor Recreation*. Cheltenham: Edward Elgar

Proctor, C.H. (1970). A probabilistic formulation and statistical analysis of Guttman scaling. *Psychometrika*, 35, 73-78.

Randall A (1994). A difficulty with the travel cost method. *Land Economics*. 70(1), 88-96.

Rayment, M. (1995) *Nature Conservation, Employment and Local Economies*. RSPB.

Rayment, M. (1997) *Working with Nature in Britain: Case Studies of Nature Conservation, Employment and Local Economies*. RSPB.

Roberts D, Eiser D, Crabtree B and Broom G (2000). *Forests' role in Tourism: Phase 1 report.* Forestry Commission: Edinburgh.

Scarpa, R (2003). *The Recreational Value of Woodlands*. Forestry Commission: Edinburgh.

Scarpa, R., Druker, A., Anderson, S., Ferraes-Ehuan, N., Gómez, V., Rispatrón, C.R. and Rubio-Leonel, O. (2003). Valuing the Genetic Resources in Peasant Economies: The Case of the Creole Pigs in Yucatan. *Ecological Economics*. 45(3), 427-443.

Shiel A, Rayment M and Burton G (2002) *RSPB Reserves and local economies*. RSBP: Sandy

Smith, V., Desvousges, W. and McGivney, M., 1983. The opportunity cost of travel time in recreation demand models. *Land Economics,* 59: 259-278.

Smith S and Gilbert J, (2001)*1995-99 National Inventory of Woodland & Trees*. Forestry Commission: Edinburgh

Slee, B., Roberts, D. and Evans, R. (2004) Forestry in the rural economy: A new approach to assessing the impact of forestry on rural development, *Forestry* 77(5): 441-453.

Swait, J. and Adamowicz, V. (1997). *Choice Task Complexity and Decision Strategy Selection*. Staff Paper. Department of Rural Economy, Faculty of Agriculture, Forestry and Home Economy, University of Alberta, Edmonton, Canada.

Swait, J. and Adamowicz, W. (2001). Choice environment, market complexity, and consumer behaviour: A theoretical and empirical approach for incorporating decision complexity into models of consumer choice. *Organizational Behaviour and Human Decision making*. 86(2), 141-167.

TNS Tourism and Leisure (2004) *Monitoring quality of experience in Forests: Thetford, Suffolk Draft report*. Forestry Commission: Edinburgh

TNS Travel and Tourism. (2004a) *All Forests Monitoring Wales 2004*: Unpublished progress report to Forestry Commission.

TNS Travel and Tourism (2004b) *GB Leisure Day Visits 2002-03 for England, Wales and Scotland*. Countryside Agency: Cheltenham.

Whitehouse, D., Dayton, C.M. and Elliot, J. (1980). A left-right identification scale for clinical use. *Developmental and Behavioural Paediatrics*, 1, 118-121.

Whiteman, A. and Sinclair, J. (1994) *The Costs and Benefits of Planting Three Community Forests: Forest of Mercia, Thames Chase and Great North Forest*, Policy Studies Division, Forestry Commission, Edinburgh.

Wood S and Trice A (1958) Measurement of recreation benefits. *Land Economics,* 34: 195-207.

Willis K et al (2003*) The social and environmental benefits of forests*. Report to the Forestry Commission.

Willis, K.G. and Benson, J.F. (1989) *Values of user benefits of forest recreation: some further site surveys*. Report to the Forestry Commission, Department of Town and County Planning. University of Newcastle upon Tyne.

Willis K.G., Benson, J.F and Whitby, M.C. (1988) *Values of user benefits of forest recreation and wildlife*. Report to the Forestry Commission, Department of Town and County Planning, University of Newcastle upon Tyne.

10. Appendices

10.1. Questionnaires used in recreation user and stakeholder interviews

Below are summaries of the questionnaires used during the recreation user and stakeholder interviews.

10.1.1. Recreation user focus groups / interviews - Mountain biking

Note that this survey protocol was tailored to each recreation activity.

Introduction

Good evening. Could I welcome you all to tonight's meeting on forest recreation. My name is ____ and this is _____. We are researchers from Aberystwyth University. During tonight's meeting we wish to discuss ***your*** *views on mountain biking in Britain's forest. This information will be used to help the Forestry Commission better manage its forests for mountain biking in the future. The meeting tonight will last approximately 1½ hours. Your opinions are important to our research. As a thank you for the time that you are spending here with us tonight, we shall be giving you a small gratitude of £15 at the end of tonight's meeting.*

Section A: How you use the forest *(20 minutes)*

1. To begin with, we are interested in the type of mountain biking that you do. Discuss the following:
    - what do they do during a mountain biking trip
    - how experienced they are,
    - how often do they mountain bike,
    - who do you bike with,
    - the types of places do they like to bike in.

2. How do you choose where to mountain bike? *UNPROMPTED then PROMPT:*
    - Severity of terrain / trails
    - Facilities
    - Proximity to home (how far would they travel to mountain bike)
    - Scenery
    - What factors are most important when they are choosing where to go.
    - Do they mountain bike in the same locations, or look for new experiences?
    - What are the pros and cons of the alternative places they go to (name places)

Section B: Likes and dislikes *(20 minutes)*

3. What do you consider to be the most important attributes of a forest for mountain biking, and why? *UNPROMPTED then PROMPT:*
    - Cycle trails
    - Facilities – which ones?
    - Give named examples.
    - Which ones are most important.

4. What attributes of a forest reduce your enjoyment during a mountain biking trip and why? *UNPROMPTED then PROMPT:*
    - Cycle trails / trail condition
    - Facilities
    - Other users (both other types of users or other mountain bikers)
    - Forest operations
    - Value for money – car park, café etc
    - Litter, crime.
    - Give named examples.
    - Which ones are most important.

Section C: How could mountain biking be improved *(20 minutes)*

5. How could forest facilities be improved? *UNPROMPTED then PROMPT:*
    - Cycle trails – how?
    - Facilities – showers, bike washers, shop, information, maps, secure bike parking.
    - Other
    - Name examples to demonstrate improvements
    - Which ones are most important.

6. Would you be willing to travel further or pay a fee to use these improved facilities
    - If so, what facilities
    - How much further would they travel
    - Stress that the reason for asking this question is not for FC to make money, but rather it feeds into our research design

Section D: Exercise *(15 minutes)*

In our study, we are keen to identify alternative ways in which the facilities for mountain biking could be improved for different user groups. We would like you to think about what attributes of mountain biking are important to various types of mountain biker and the alternative levels of provision that these attributes may take. For example, for mountain biking an attribute could be building more trails, while the levels of provision could be easy trails, single track or technical downhill trail.

7. In your handout, could you identify *up to* four important attributes of mountain biking and up to three levels of that attribute.

8. To help us analysis this focus group, could you fill in your socio economic profile in the handout.

9. Finally, is there any other information you are aware of that might help us with our research?

Thank you for your time and contribution.

Don't forget to collect and sign for your gratuity

Thank you for your time and contribution

10.1.2. Stakeholder questionnaire

Good morning. My name is _____ from _____. As you know, we are conducting research on behalf of the Forestry Commission on 'Valuing forest recreation activities'. In particular the research aims to assess the economic value associated with key recreation activities in the forest by different user groups. You have been selected for interview to feed into the design of our study. This interview will last approximately 1 hour and will ask you questions about forest recreation in general, forest recreation in the forests that you are responsible for, forest recreation research and your views on how recreation opportunities could be improved in the future.

Section A: Interviewee's details

10. Name of interviewee: _____

11. Could you outline what areas of responsibility *you* have in terms of:
    - the forest you manage,
    - the forest activities you are responsible for?

Section B: General forest recreation

I would like to ask you some general questions about recreation activities in Britain's forests.

12. What are the main recreation activities that take place in Britain's forests? In particular, you should consider activities in terms of:
    - Those activities with highest levels of participation
    - Those activities with specific user demands for facilities / infrastructure
    - Activities where there may be a latent demand

13. Based on the above, please rank the four recreation activities that you consider to hold the greatest potential for increasing recreational use of forest over the next 5 years or so.

1: _____ 2: _____ 3: _____ 4: _____

Section C: Questions regarding the forests that you have responsibility for.

(ACTIVITIES)

14. Please list, in order of importance, the main recreation activities that take place in the forest you are responsible. For each activity, please indicate why that activity is important.

Ideally, this should include information such as user numbers / spend, however if not readily available % of forest users, or simply tick relevant boxes where relevant.

Activity	***No of users***	***Economically important to site***	***Economically important to local area***	***Important to FC remit***	***Other reason***

15. For each activity listed below, please indicate the level of difficulty of that activity that is undertaken at your forest.

Activity	**Easy**	**Moderate**	**Hard**
MTB			
Walking			
Horse riding			
Nature watch			

16. Are there any activities which currently do not take place in your forest, but have the potential to be introduced?

(FACILITIES)

17. What facilities / infrastructure are available in your forest?
    - General facilities / infrastructure (please tick)

	Easy Access			Cycling			Picnic	
	Information			Educational			Play Area	
	Parking			Fishing			Refreshments	
	Parking Charge			Forest Drive			Skiing	
	Toilets			Forest Shop			View Point	
	Visitor Centre			Heritage			Walking	
	Arboretum			Horse Riding			Watersports	
	Arts			Motorsports			What's On	
	Barbecue			Orienteering			Wildlife Activities	
	Camping			Other Activities			Other Facilities	

- Facilities / infrastructure for specific recreation activities

MTB	WALKING	HORSE RIDING	NATURE WATCH	OTHER

18. Are there any charges for the use of the forest or forest facilities? If so, how much and for what.

Charge	£	For what

(FOREST USERS)

19. How would you categories the different types of users that use your forests?
    [Prompts: activities, socio-economic groups, locals / visitors]

20. What are the different needs of the different user groups in terms of facilities / infrastructure?

User group	Facilities	Infrastructure

Who uses what?

In this exercise, you should list the main groups of forest user, the main recreational activities and the forest facilities. Next, you should try to link the listed activities with the user groups and facilities. If you consider the link to be important you should use a solid line, while if the link is minor, you should use a dashed line. If required, refer to the example at end of questionnaire to show what is required.

USER GROUP	**ACTIVITY**	**FACILITY**
----------	----------	----------
----------	----------	----------
----------	----------	----------
----------	----------	----------
----------	----------	----------
----------	----------	----------
----------	----------	----------
----------	----------	----------

Section D: Forest Recreation Research

The FC has undertaken a number of studies on forest recreation, many of which have attempted to categorise the type of forest and user group. We now wish to examine how these categories related to the forests you manage.

Type of forest

Work for the FC has identified three categories of forests:

'Buzzing'

- *All basic and additional facilities plus a visitor centre, children's play area etc*
- *Variety of information, including exhibitions, leaflets, advice about responsible behaviour*
- *Relatively large numbers of visitors, especially holiday visitors and groups, possibly all year round*

'Regular'

- *Basic facilities such as car park and toilets plus picnic areas, benches and similar*
- *Additional information in form of the interpretation boards, maps etc*
- *Medium numbers of visitors, with a broad mix of locals and peaks of holiday visitors during high season*

'Informal'

- *Basic facilities such as car park etc*
- *Information in terms of signs with name of the site and waymarking signposts*
- *Smaller numbers of visitors, spread out over the year and a large proportion of local residents*

21. Which of these categories best describe your forest and why? You may wish to split different areas of the forest into different forest type categories

Type of forest user

Other FC research has identified different types of forest users. One simply categorisation is based on the user's life cycle.

22. For each of the three categories below, indicate the proportion of user types which use your forests and also which activities each user category undertakes.

User type	%	List activities and level of activity
Young independents *(Under 45, no children on trip)*		
Families *(Any age, children on trip)*		
Empty Nesters *(Aged 45+, no children on trip*		

An alternative categorisation of users is based upon the motivations and reasons for visits rather than visitor demographics or origins. The four segments are:

Convenience users

V*ery regular/routine visitors, live locally, likely to be visiting to walk dog or other spontaneous visit, wide age spectrum, spend short duration in forest, visit at least once a week. Many do not actively choose the forest but use as it is the only alternative.*

Nature users

Enjoy wildlife and natural heritage aspects of forests, actively seek information / interpretation, take days out and visit forests while on holiday, visit one or more forest sites once every two or three months. Nature is the motivation for visit.

Social users

Take days out to forests to relax with friends and family. Enjoy picnics and play areas. Require information and interpretation. Visit at least once every couple of months especially during summer months. Nature is a 'backdrop' to their visit.

Active users

S*uch as cyclists, mountaineers and longer distance walkers. Take days out to forests and visit while on holiday. Visit is an adventure, a test of personal limits. Visit at least once every couple of months. Nature is a 'backdrop' to their visit.*

23. In a similar way to what you did in the previous question, indicate the proportion of your forest users that fall into each category and indicate which activities each category of user undertakes.

User type	%	List activities and level of activity
Convenience users		
Nature users		
Social users		
Active users		

24. The Forest Commission 'Economics and Stats' division have a 'Self Assessment' instrument for forest managers. Are you aware of whether one has been done to your forest? **Y / N**. If yes, would it be possible to have a copy.

25. Are you aware of any other research that has been undertaken on the recreational use of your forest? Please provide details.

Section E: What aspects of forest recreation do you feel need to be improved?

26. How is your forest managed for different activities / user groups?

27. How could / would you like to improve the facilities at your forest for different user groups?

In our study, we are keen to identify alternative ways in which the facilities for alternative forest recreation activities could be improved for different user groups. It is likely that this research will study up to four activities in detail, including mountain biking, walking, nature watching and horse riding; however, we are also open to other suggestions. We would like you to think about what attributes of these activities is important to users and the alternative levels of provision that these attributes may take. For example, for mountain biking an attribute could be building more trails, while the levels of provision could be easy trails, single track or technical downhill trail.

28. For each forest activity, you should identify *up to* four important attributes and up tot three levels of that attribute.

Recreation activity …

Attribute 1:_____ Level 1: _____

Level 2: _____

Level 3: _____

Attribute 2:_____ Level 1: _____

Level 2: _____

Level 3: _____

Attribute 3:_____ Level 1: _____

Level 2: _____

Level 3: _____

Attribute 4:_____ Level 1: _____

Level 2: _____

Level 3: _____

29. For each of the recreation activities listed below, can you identify three forests sites that would be useful to study. For each one, provide a brief description of why you selected that particular site.

Activity	*Site*	*Reason why selected*
• Mountain biking	1 _____	: _____
	2 _____	: _____
• Walking	1 _____	: _____
	2 _____	: _____
• Nature watching	1 _____	: _____
	2 _____	: _____
• Horse riding	1 _____	: _____
	2 _____	: _____
• Other	1 _____	: _____
	2 _____	: _____

30. Finally, is there any other information you are aware of that might help us with our research? E.g. :
    - Information on walking, mtb, horse riding, nature watching at the forest
    - Information on visitor numbers at the site
    - Information on visitor spend at site
    - Information on the economic value of the site.

Thank you for your time and contribution.