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# *Forests' Role in Tourism: Phase 2*

**MAIN REPORT- FINAL**

**for the Forestry Group (Economics & Statistics) of the Forestry Commission**

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***FORESTS' ROLE IN TOURISM***

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# CHAPTER 1 INTRODUCTION

## 1.0 THE STUDY

Forests, woodlands and trees provide what may be termed amenity services. These attract people to visit forests specifically, and to countryside areas more generally, where the presence of trees and woodland contributes to the amenity value of the landscape. These visits necessarily involve expenditure which provides income to local businesses, supports employment and economic output. A proportion of these visits can be classified as 'tourism' visits. Understanding the influence that forests and forestry practices have on tourism visits and associated expenditures is important for those bodies charged with their management. Building on an earlier scoping study (Roberts *et al*., 2000), this study was commissioned by the Forestry Commission in November 2001 to provide greater understanding of "Forests' Role in Tourism". This report presents detailed findings of the literature review, the methodological approaches adopted for the study and the full results of the analysis. An Executive Summary and an outline of the methods and results are presented in an accompanying Summary report.

## 1.1 AIMS OF THE STUDY

### 1.1.1 Aims

The primary aim of this study was to quantify the economic significance of forest-related tourism expenditures in England, Scotland, Wales and at the Great Britain (GB) level. This was based on the premise that a proportion of all tourism expenditure in GB is incurred by tourists undertaking forest-related recreational activities. Here the specific focus was on day visits to forests. However, the presence of trees and woodlands can also attract tourists to the countryside more generally. The second specific aim of the study was to quantify the economic significance of forests in relation to tourism in the countryside. A third aim was to measure the attitudes of tourists towards the environment and forests, and to investigate links between these attitudes[1] and tourist visitor behaviours. Undertaking a visit to a forest or the countryside, and spending money to do so, are specific examples of individual behaviour. Understanding the factors that motivate these behaviours can provide useful information for those organisations engaged in managing forest-related tourism.

### 1.1.2 Objectives of the study

The specific objectives of the study were to:

- Review the existing relevant literature and studies and present key findings to inform the study.
- To develop a method to predict the number of tourism day visits made on an annual basis to public access woodlands in GB.
- To estimate the associated tourism expenditure associated with tourism day visits to forests.

[1] Attitudes are generally considered to be a major motivational factor influencing behaviour.

- To apply these methods to unsurveyed sites in order to estimate annual day visits to forests and associated forest-related tourism expenditures at site, country and GB levels.
- To estimate the economic significance of forest-related tourism at country and GB levels.
- To estimate the economic significance of forests for tourism in the countryside in six case study areas.
- To measure the attitudes of visitors to forests and the countryside towards the environment and forests, and to investigate links between visitor attitudes and behaviour.

## 1.2 CONCEPTS AND DEFINITIONS

The main aim of the study is concerned with an analysis of "**economic significance**". This is an estimation of the economic importance of an activity to a country's economy based on expenditure taking place within the economy. The relevant focus here is the amount of direct expenditure associated with forest-related tourism and the importance or significance of this in terms of supporting existing businesses and employment. In the absence of forest-related tourism, this expenditure might have occurred in another form elsewhere in the economy. Thus, economic significance analysis can be distinguished from "**economic impact**" analysis, which is concerned with the impact of policy intervention or "new money" being injected into an economy.

The first part of the study focussed on day visit tourism only. There is no single agreed definition of a "tourism day visit", and all definitions used are necessarily arbitrary. It is common for definitions to be based on the duration of the trip (in terms of hours spent on the trip), distance travelled on the trip and/or the type of activity undertaken. For the purpose of this study **"tourism day visits"** included (i) day visits from home that lasted 3 hours or more[2], and (ii) all day visits made by holidaymakers regardless of trip duration. The focus of the economic significance analysis was the expenditures incurred on undertaking tourism day visits to forest sites. A visit to a forest site may be only one activity on any day visit. The term "**forest-related**" expenditure refers to that proportion of the expenditure that is directly "related" to the forest site visit. Once again, there is no single agreed definition of a "**forest site**". Further consideration is given to this matter in Chapter 2. However, at a general level, the term "forest site" is used here to refer to a distinct location that is characteristically wooded or partially wooded. As well as the actual woodland, the forest site itself includes man-made site attributes such as paths, visitor centres etc. and natural physical site characteristics such as water features (rivers, lakes etc.) located within the site. In the second part of the study, the focus was on forests at the landscape, rather than site, level. In this context, "**forests**" were defined broadly to include all trees and woodland in the landscape.

The third part of the study is focussed on attitudes towards forests for recreation, and the environment more generally. Attitudes are generally considered to be a major

[2] This is the same trip duration used to distinguish tourism from leisure day trips in the UKDVS 1998.

motivational factor influencing behaviour. The conceptual definition of an "**attitude"** used here is "a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour" (Eagly and Chaiken, 1993). Again, in this part of the study, forests were defined in general terms to include all trees and woodland in the landscape.

A detailed explanation of specific terms can be found in the Glossary, presented as an Annex to this report.

## 1.3 THE STRUCTURE OF THE REPORT

This report is set out in 8 chapters. Following the introduction in Chapter 1, Chapters 2 to 5 present the methods and results relating to the estimation of the economic significance of forest-related tourism day visits. Chapter 2 presents an overview of the method, and details the models developed to estimate visits to forests. It also sets out the necessary primary and secondary data requirements for this part of the study, including a survey of forest visitors. Chapter 3 presents the results from the survey of forest visitors. Chapter 4 presents the full results of the extensive visitor modelling exercise, whilst Chapter 5 presents the results of the application of the models to a sample of sites and the estimates of the economic significance of forest-related tourism in GB, along with the discussion of the results. Chapter 6 presents the methods and results of the part of the study concerned with estimating the economic significance of forest to tourism in the wider countryside. Chapter 7 outlines the methods and key results of the investigation into the linkages between attitudes towards the environment and forests and tourism behaviour. Chapter 8 presents a summary of the overall study along with conclusions and recommendations.

## CHAPTER 2 QUANTIFYING THE ECONOMIC SIGNIFICANCE OF FOREST TOURISM DAY VISITS - METHOD

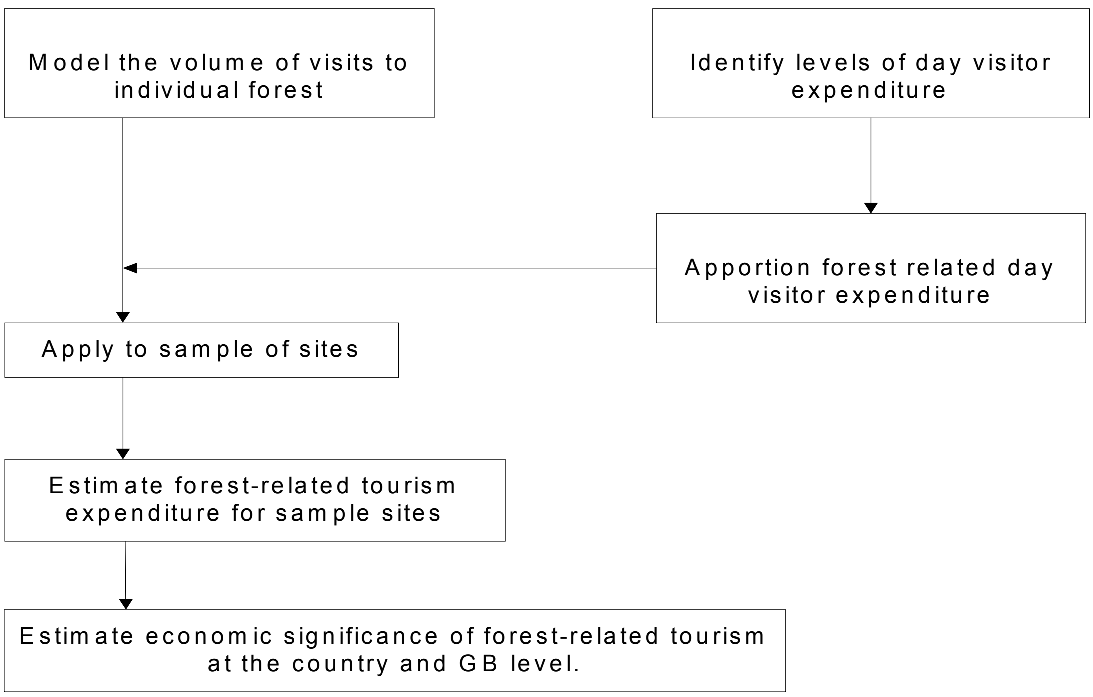
### 2.0 INTRODUCTION

The main aim of this chapter is to present the general method used for estimating the economic significance of forest-related tourism day visits. The chapter begins with an overview of the general method. This is followed by the key findings from a review of the literature relating to the modelling of recreation demand. Drawing on these findings, the third section introduces the specific methods used in the study to model recreation demand, specifically the development of transferable trip generating functions (TGF).

### 2.1 AN OVERVIEW OF THE METHOD

Figure 2.1 presents the key building blocks required for estimating the economic significance of forest-related day visit tourism expenditures.

**Figure 2.1 Stages to estimate the economic significance of forest tourism day visits**



The first stage was to develop a transferable model that could be used to estimate the volume of tourism day visits made annually to individual publicly accessible woodlands in GB. The second stage was to develop an approach to estimate the level of expenditure incurred by tourists on day trips to forests and to establish the forest-related proportion of this expenditure. The next stage was to apply these methods to all publicly accessible woodland sites in GB. The final stage was to estimate the economic significance of forest-related tourism expenditure in England, Scotland, Wales and at the GB level.

### 2.1.1 Modelling day visits to forests

A key objective of the study was to develop a method to predict the numbers of "tourism" day visits to individual publicly accessible forest sites in GB. For the purpose of this study, a transferable Trip Generating Function (TGF) was used. The basic analytical method involved fitting various linear regression models with the natural logarithm of forest visitor counts as the dependent variable[3]. The resulting TGF predicts the mean values of the dependent variable for a linear combination of the independent (predictor) variables, and shows *ceteris paribus* impacts of each predictor on the dependent variable. This approach follows that of Brainard *et al.,* (2001), who demonstrated how forest recreation demand can be modelled quite locally using just site specific characteristics, simple measures of population and availability of competing woodlands as input. Here, we extend and improve upon this robust method by:

- extending the geographical coverage to include all three countries of mainland GB;
- encompassing data from privately and publicly owned woodlands in the development of the models;
- incorporating many more observation sites in the models; and
- transferring developed models to predict visitor numbers at un-surveyed sites.

Two main approaches to the development of a TGF were considered in this study. The first approach, referred to here as the 'forest' model, predicts the number of tourism visits made to a specific forest for a given time period, and has the basic functional form:

$$\text{Visits}_i = f\,(\text{Att}_i, \text{Pop}_i, \text{Sub}_i, \text{Char}_i) \qquad (1)$$

Where $\text{Visits}_i$ is the number of tourism visits made to forest *i*, $\text{Att}_i$ are variable(s) to reflect the attributes of site *i*, $\text{Pop}_i$ is a variable for the population that lives within a given travel time(s) of forest *i*,; $\text{Sub}_i$ is a variable to represent the accessibility of substitute forest sites from outset zones and $\text{Char}_i$ are variables to indicate the socio-economic characteristics of the population within a given travel time(s).

The second approach, referred to as the 'individual' model, aims to predict the number of visits made by an individual to a specific forest for a given time period, and has the basic functional form:

[3] The negative binomial and Poisson distributions have often been applied to represent the distributions of visits and trips, which contain non-zero positive integer data. These were attempted here but the data gave a very poor model fit. It was therefore decided to follow Brainard *et al.*'s (2001) approach and take the natural logarithm of the visit count as the dependent variable. Indeed, many studies incorporating UK travel cost models for forest recreation have concluded that the semi-log form provides the most satisfactory model specification.

$$Visits_{ij} = f(Att_i, Dist_{ij}, Sub_i, Char_j) \quad (2)$$

Where $Visits_{ij}$ is the number of tourism visits made to forest *i* by individual *j*, $Dist_{ij}$ is the distance to forest *i* from individual *j*'s place of residence (or holiday base), $Char_j$ are socio-economic characteristics of individual *j*. $Att_i$ and $Sub_i$ are as before.

The advantages and disadvantages of each approach are detailed in the accompanying Main report, whilst the specific primary and secondary data requirements for the dependent and independent variables used in the modelling exercise, and data collection methods are outlined in section 2.4 below.

### 2.1.2 Estimating forest-related tourism day visit expenditures for forest visitors

The TGF model can provide an estimate of the number of visits made to any given forest. In order to assess the economic significance of these visits it is necessary to quantify expenditures incurred on these visits and the proportion that is forest-related. Expenditure levels and patterns vary considerably between different visitor types, as does the proportion of expenditure that can be considered forest-related.

There are a number of ways of classifying tourism day visitors. One distinction is between day visitors from home and day visitors from holiday bases. A further distinction can be made in relation to the importance of forests in motivating day visits. In Phase 1 of this study, Roberts *et al*., (2000) identified three relevant types of tourist:

- Forest only visitors: Visitors who make a conscious decision to visit a specific forest on their day trip and for whom the forest is of central importance to their decision to make the trip.

- Forest combined visitors: Visitors who combine a visit to a forest with other activities on their day trip, and for whom the forest is of less importance to their decision to make the trip.

- Casual forest visitors: visitors who did not specifically set out to visit a particular forest site on their day trip but, during the course of their outing, decide to spend some time in a forest. The forest plays no role in motivating their day trip, which would be made regardless of whether or not a specific forest existed.

Figure 2.2 presents the classification of visitors for the purpose of this study showing differences in trip motivation and expenditure levels. *A priori*, one would expect the largest forest-related tourism expenditure levels from visitors falling within category $V_{11}$ and $V_{12}$, since visits to forests are their primary activity.

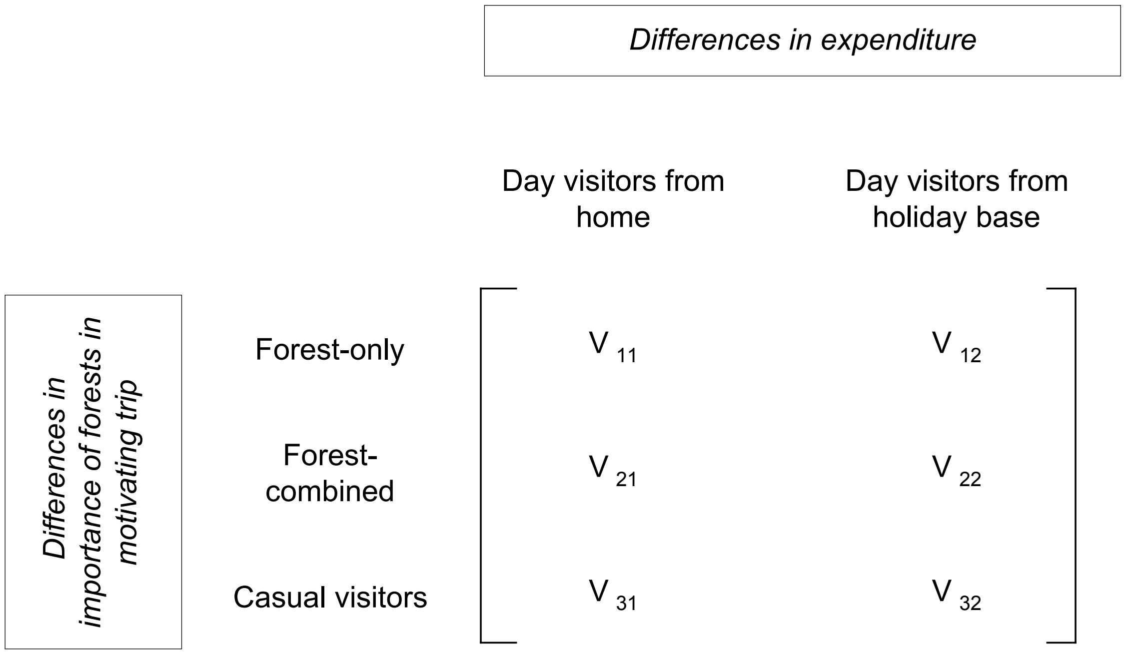



**Figure 2.2 Different visitor types to be distinguished in the forest study**

Information on total expenditure per day visit was collected in a survey of visitors to forests, the detail of which is presented in Chapter 3. In order to estimate the proportion that was forest-related, the "expenditure partition" method, identified in Phase 1 of this study (Roberts *et al*., 2000), was adopted. The general approach is based on a scoring or ranking system, where visitors are asked to rank the importance of various factors relating to a particular behaviour, in this case visiting a forest. Visitor expenditure is then apportioned appropriately to each factor. For this study, following earlier examples of the partition method (e.g. Harley and Hanley, 1989 and Crabtree *et al*., 1994), 100% of the day visit expenditure of "forest only" visits was assumed to relate to forest-tourism. Conversely, for casual forest visits where it is assumed that the trip would have been made regardless of the existence of forests, 0% of day visit expenditure was assumed to be forest-related[4]. For "forest combined" visits, expenditure was apportioned based on the importance of the forest in motivating the trip, relative to other trip motivating influences. In addition to the forest visit, forest-combined visitors were asked to specify up to four other reasons why they had made their day trip and to score each reason (including the forest visit) from 1-10, where 1 was not important and 10 was very important. The forest score was then divided by the sum of the scores for all reasons for making the trip, with the resulting proportion being used as the basis of apportioning the total trip expenditure for that respondent. The method adopted means that the importance of the forest visit in motivating the day trip could range between 2-91%, i.e. where forests are scored 10 and only one other reason is specified and scored 1, then the importance of forests is 10/11 (91%), where four other reasons are specified and scored 10 and forests are scored only 1, the importance of forests is 1/41 (2%).

[4] The decision to visit a forest could have resulted in an increase or a decrease in the overall expenditure incurred on the trip, depending on the type of activity foregone by visiting a forest. However, it is assumed here that this impact is neutral.

Partition methods are arbitrary but provide a transparent and logical method for apportioning expenditures. A summary of the general approach proposed for apportioning total tourism expenditures to forest-related tourism for the three main categories of visitor is set out in Table 2.1.

**Table 2.1 General approach for apportioning total tourism expenditures to forest-related tourism**

| Visitor category | Forest-related tourism |
|---|---|
| Forest specific– forest only | 100% |
| Forest specific– forest combined | Apportioned between 2-91% |
| Casual forest visitors | 0% |

The expenditure figures considered here are only those incurred on the day visit. For day visitors from a holiday base this will represent only a proportion of the overall cost of a holiday, which may include accommodation, travel and insurance costs etc. Where a holiday involves forest-only or forest-combined day visits, as opposed to forest-casual trips[5], it could be argued that some of the expenditure associated with the overall holiday is also forest-related and could, therefore, be included in any analysis of economic significance of forest-related tourism at the country level. However, this study did not attempt to quantify these expenditures.

## 2.2 A REVIEW OF STUDIES MODELLING RECREATION DEMAND

### 2.2.1 Alternative modelling approaches

The travel cost method (TCM) has frequently been used to assess the use value of outdoor recreational sites. However, the methods under-pinning the TCM can be used to construct a model capable of predicting the number of visits made to particular forest sites and, subsequently, forest visitor expenditures. In theory, the main advantage of this approach is that it can distinguish between visitation rates of different visitor types (e.g. day-trippers v. overnight tourists) and can provide information on how changes in the quality of site attributes would affect visitation rates. In its most basic form, the TCM attempts to predict the number of visits made to a particular site using information on travel cost and travel time incurred by individuals to reach that site. The travel time variable may be included in a monetary form or simply as time taken Given the difficulty in calculating the marginal value of time for different people, and the fact that some visitors will have to forego income to visit a forest whereas others will not, there is no consensus on the best way to monetarise the travel time variable. Some studies (e.g. Benson and Willis, 1992) have followed the Treasury approach of calculating the costs of travel time based on the assumption that people value leisure time at 43% of their wage rate. However, recent advances in calculating travel time to particular sites using GIS methods, which can explicitly account for the non-uniformity of road networks, have the potential to substantially improve the results obtained from TCM analyses.

By extending the basic model, the TCM approach can assess the costs of accessing a site with different quality characteristics. For example, the TCM can indicate if people will visit a site containing a mix of broadleaved and coniferous species more

[5] For holidaymakers that make no visits to a forest whilst on holiday, or only make forest-casual visits, none of their day visit or holiday expenditure is considered forest-related. However, forest may be of some local economic where individuals are attracted to an area by the them. The significance of forests in relation to countryside visits is considered in more detail in Chapter 4.

frequently than to one containing just coniferous species. Following on from this, the resulting model can predict how visit rates would change given a change in the quality of the attribute variable. Variables representing visitor type (e.g. day visitor v. holiday tourists) and socio-economic characteristics of visitors can also be included, so that differences in preference for various attributes can be assessed[6].

When a suitable model has been constructed, findings can be extrapolated across the entire geographic extent of the study, thereby predicting the number of visitors of each type likely to be visiting any given forest in the study area (Bateman *et al.*, 1999)[7]. Data on expenditure levels of each different visitor type can then be applied to the forecast visitation rates for each forest area to acquire a figure for the total expenditure due to forests.

An early example of this approach was provided by Willis and Benson (1989). Their model attempted to predict visitor numbers from particular zones to Forest Commission sites using the following variables: travel cost, the average income of residents in each zone, various socio-economic characteristics of residents in each zone, and variables representing various wildlife attributes of each site. This is an example of a *zonal TCM*, i.e. the model attempts to predict the number of visitors from each of a selection of zones around the site to the site itself. The alternative is to adopt an *individual TCM*. The latter attempts to estimate the number of trips any one person may make to the site in question over a given time period. An example of the latter approach is Creel and Loomis (1990), who estimated the change in the number of trips an individual hunter takes in response to several site characteristics including length of hunting season. The individual TCM has a number of theoretical advantages over the zonal TCM, and is now the more widely applied approach (Bateman *et al.*, 1997).

When applying TCM there are several other issues to resolve in addition to the issue as to whether the TCM should take a zonal or individual approach. One of these issues is the type of visitation decision to be modelled. The three studies mentioned above were concerned with measuring those factors which influence the *number* of trips people make to particular sites. However, there are a number of other visitation decisions that may be influenced by site attributes and which may also affect expenditure rates (Loomis 1995). One of these factors is the decision over length of stay at the site. Bell and Leeworthy (1990), for example, use a TCM to assess factors influencing the length of stay (in days) at a beach site. The authors found, among other things, that length of stay is positively related to income and that average lengths of stay are higher among young adults and those in their later years than for people in middle age. This result was replicated in Brainard *et al.* (1999), who point out that the effect of age and income on visitation rates is likely to vary according to the activity type in question. For example, many studies of hunting in the US find that visit frequency is inversely related to income (Loomis 1995), whereas other activities (e.g. mountain biking) may be positively related to income.

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[6] In practice, there are two ways in which this approach could distinguish between day trippers and tourists. One could either include additional (dummy) variables to represent the difference between the two visitor types, or, if the addition of so many variables was restrictive in terms of degrees of freedom, the same travel cost equation could be estimated separately for the different visitor types.

[7] This method is discussed further in section 3.5 below.

More important than the length of stay decision however, is the decision individuals make as to which of available sites to visit. When attempting to predict which of a number of different sites an individual may visit, the most common method is to use a multinomial logit (MNL) model. In an MNL model, the probability of an individual visiting a given site is predicted by comparing the travel cost and site quality variables for that site with those of all other sites (or a representative sample of all other sites). Many early TCM studies focused only on the trip frequency variable and ignore issues of length of stay at the site, and the substitution effect resulting from the fact that people may have a choice of a number of different sites to visit. However Loomis (1995) shows that, when analysis ignores one of these visitation decisions, biased results of the economic impact of site quality improvements are likely to be attained.

### 2.2.2 The significance of forest attributes in influencing visit behaviour

The aim of this part of the review is to consider which forest attributes are likely to have the strongest influence on visit rates to forests. The review has two aims. The first is to inform on the forest attributes to be selected for analysis of forest visitor behaviour, but more importantly, to inform the selection of forest sites for which data must be collected in order to undertake the modelling exercise.

Included in our definition of forest attributes are all factors over which the Forest Manager is able to control or influence in some way, as well as the internal (natural) characteristics of the forest. Thus, forest attributes include the number (length) of walking and cycling trails, the presence of a visitor centre or toilets, the amount of publicity devoted to the site, the presence of open spaces, water features, and picnic areas, and the tree species composition and diversity of tree height, among others. It should be noted that all but one of the studies to be reviewed here focus on individuals' willingness to pay (WTP) for forest recreation, and the role of forest attributes on WTP, rather than visit rates (in terms of visitor numbers) *per se*. However, there is likely to be a reasonable degree of correspondence between the attributes that influence WTP and those that influence visit rates.

Hanley and Ruffel (1993) employed two alternative methods to assess the value of forest characteristics. The results of the first approach indicated that people valued sites with a water feature more highly than those without; that forests with a mix of broadleaved and coniferous species were more highly valued than forest with only coniferous species; and that forests with diverse tree heights were valued more highly than those with more uniform tree heights. However, in the second approach, none of these site characteristic variables significantly effected willingness to pay. The authors suggest that this maybe because of the fact that what visitors perceive of a particular forest may be different from what the data indicates about the forest. For example, a forest may be 95% sitka spruce, but if the area around the car-park was predominantly made up of coniferous trees, and people did not stray far from their cars, their perception of the forest may be quite different from the reality. Rather than site characteristics, the authors find more evidence for the significance of visitor perceptions: their rating of the views and their rating of the visitor facilities. Other significant variables include the weather (WTP higher when it is hot); and visitor type (WTP was higher for weekend as opposed to weekday visits), positively related to income and negatively related to age. Hanley and Ruffel found little evidence that WTP varied according to the activity that visitors participated in at the site.

In their study of vistor preferences and willingness to pay at two sites in Sweden, Bostedt and Mattsson (1995) concluded that a considerable portion of the value to tourists was attributable to forest characteristics, such as the density of planting, the proportion of broadleaves; the number and size of clear-cuts and tree age. The principal limitation with this study was that, by comparing the level of one attribute with another level of the same attribute, it did not indicate to what extent the attribute itself had a significant effect on WTP for forest recreation, or indeed on visit behaviour.

In their attempt to assess the importance of forest attributes in the willingness to pay for forest recreation, Scarpa *et al.*. (2000) surveyed 9,400 visitors were at 27 Irish forest sites (13 sites in the Republic and 14 in Northern Ireland). The forest attributes included in the analysis were: forest size; congestion (total annual visits divided by car-parking spaces); presence of absence of a nature reserve in the forest; presence or absence of a water feature; length of trails (miles); open space (hectares); percent of trees planted before 1940; and the percentage of forest area covered by conifers, broadleaf and larch. The level of congestion had, as expected, a negative and significant effect on WTP. Variables for the length of trails, and the amount of open space, were both significant but had very marginal effects on total WTP. Both of these variables were negative, implying that their levels were above the satiation point. The percent coverage of old trees (pre-1940), and the presence of a nature reserve both had positive and significant effects on WTP. All three tree types (%conifer, %larch, %broadleaf) had positive and significant effects on WTP, but the magnitude of the effect was highest for larch and lowest for conifers. Contrary to expectation, the sign on the dummy variable for water feature was negative. Scarpa et al. put this down to correlation with omitted variables as they could not imagine any other reasons (though they did not suggest what the omitted variables might be). Finally, a "recreational quality index", provided by a panel of experts, had a positive and significant effect on WTP.

Brainard *et al*. (2001) estimated a visit function for Forestry Commission sites in England. The authors attempt to explain the number of party visits to 33 FC sites using variables to reflect the population within two hours of the site, the number of substitute sites, and a number of variables to represent the attributes of each site. An extensive field survey at each site identified the level of particular attributes at each forest. Presence/absence variables analysed included: bicycle hire; viewpoints; lake; river; visitor centre; in a national park; playground; toilets; facilities for disabled persons; and ice cream van. Numeric variables included: the percentage of broadleaf species a visitor is likely to see; car park capacity; the number of marked trails; parking charge; and the total distance of marked trails. In an initial model that excludes population variables, the distance of marked trails is positive and significant, as is the bike hire variable. When variables to represent the population of the area around the forest are included, the distance of marked trails remains both positive and significant in the visits function. A variable for car-park capacity is also positive and significant, but the authors point out that this may simply be correlative rather than causative. Brainard *et al*.'s model explains 83% of the variation in the log of visitor count to FC sites. This high explanatory power is achieved with just four variables: the population living within 2 hours of the site; the distance from the site to the nearest main road; the car-park capacity; and the length of walking trails.

A summary of results from previous studies is presented in Table 2.2. There are a number of reasons for why it is hard to draw any firm conclusions about the significance of forest attributes in either WTP or visit behaviour from a review of previous studies. First, each study analyses the role of a particular set of attributes, and this set is not constant across different studies. Second, each study samples a unique set of forests and a unique set of visitors. These samples have been taken in geographically diverse places, and thus it is not surprising that the set of attributes significant in influencing WTP varies between sites. Third, the exact methods used, phrasing of questions, etc., may explain some more of the variation between studies.
Having said this, some general patterns do emerge. Both Bostedt and Mattsson (1995) and Hanley and Ruffel (1993) stress the importance of relative as opposed to absolute levels of forest characteristics. Bostedt and Mattsson (1995) find that visitors to the southern site would prefer the forests to be more open, while no such indication is found for visitors to the northern site- the authors point out that this is unsurprising given that the southern forests are much denser than the northern forests. Hanley and Ruffel (1993) find some evidence that an individual living in an area dominated by broadleaved woodland may have a lower WTP to visit a broadleaved woodland than someone who lived in an area where broadleaved woodland was relatively scarce as a component of the landscape. Another common conclusion to emerge is that the effect of a particular attribute on the visit decision may be positive or negative depending on the level of the attribute in question. For example, small numbers of open areas may have positive effects on visit rates, but after a “satiation point”, increasing numbers of open areas may begin to have negative effects on visit rates.

In conclusion, there is some evidence from the literature that certain features are more likely to influence visitor behaviour than others. This study, will draw on the findings in previous studies to inform the selection of the forest features/attributes to be considered in the development of TGF models. Whilst it may not be sensible or practical to study each of these individually, they could be combined under one “facilities” variable. One strength of regression analysis is that, once the data has been collected, it will be easy to experiment with different forms of the facilities variable to see which fits best.

**Table 2.2 Summary of results from previous studies**

| Study | Focus | Significant Attributes | Insignificant Attributes | Other Remarks |
|---|---|---|---|---|
| Englin and Mendelsohn (1990) | Overnight trail hikers' WTP for visit | camp ground<br>dirt road<br>excellent view<br>clear-cuts<br>closed spruce forests<br>Douglas fir<br>Silver and Noble firs<br>Hemlock<br>old growth<br>rock and ice | miles of trail<br>presence of lake<br>level of maintenance by USFS | Significance of forest attributes may be due to fact that study focussed on forest enthusiasts. |
| Hanley and Ruffel (1993) | Visitors' WTP for site visit | visitors' rating of views<br>visitors' rating of facilities | mean height of trees<br>height diversity of trees<br>% broadleaf trees<br>conifer species diversity<br>open space as % of total forest area<br>presence of water feature | Visitors' perceptions of forest attributes may be quite different from what is indicated by the statistics on those attributes. |
| Scarpa *et al*. (2000) | Visitors' WTP for forest recreation | level of congestion at site<br>length of trails<br>amount of open space<br>% coverage of old trees<br>presence of nature reserve<br>water feature<br>recreational quality index | | Variables for some attributes may be positive or negative depending on the level of the attribute in question, (i.e. when there are few clear-cuts, these features have a positive effect on WTP, but when the number of clear-cuts increases, the effect may become negative after the "satiation point"). |
| Brainard *et al*. (2001) | Annual no. of visits to FC sites | bike hire<br>car-park capacity<br>distance of walking trails | Extensive list of others. | |

## 2.3 MODELLING DAY VISITS TO FORESTS

Both the so-called ‘zonal’ approach, referred to here as the ‘forest’ model, and the ‘individual’ approach were considered in this study.

### 2.3.1 The ‘forest’ model

The forest approach predicts the number of tourism visits made to a specific forest for a given time period, and has the basic functional form as was set out in equation (1). Apart from its relative simplicity and proven robustness, the main advantage of this approach is that the coefficients can be readily transferable to other sites for which no visitor numbers exist, providing that sufficient secondary data can be obtained for the independent variables that prove to be significant predictors of forest recreation demand. Effective GIS techniques (See Brainard *et al*., 2001; Lovett *et al*., 1997 and Jones *et al*., 2002) allow local level secondary data to collated for individual forest sites as required without having to rely on fairly crude and regional measures.

The main drawback to this approach is that model will only be as reliable as the available visitor number data. Essentially, where the method of collection or timing and timeframe of collection varies, potential imprecision’s are introduced which are likely affect the ability of any TGF to predict demand for recreation accurately. The likelihood of this increases even more where visitor numbers to forests are based on estimates and not actual counts. A second drawback of the approach is that available visitor data is based only on standard count methods (either individual, group or vehicle) and does not discriminate between the proportion of visitors in the count that are day visitors residing in the local area and those which are tourists visiting from outside the area. As ‘tourists’ are the main focus of this study, this visitor data has to be dissagregated using estimates of the proportion of tourism visits at each site based on different survey data. Further, any potential economic benefits at the regional and GB level are also likely to vary between different types of visitor, especially between overseas and GB residents. Consequently, the visitor data has to be dissagregated further, again using alternative survey data.

A further drawback (for both modelling approaches) that should be recognised in this study is that required socio-economic characteristics are only available from the 1991 Census, which obviously reduces the ability of any function to predict visitor numbers accurately, providing that such variables are found to have a significant affect. In reality, such inaccuracies reveal themselves in the form of erroneous estimates in the model and/or a poor level of explanatory power. Thus, given these potential drawbacks it may not be unusual for a fairly robust TGF to predict only a proportion of the variation in the dependent variable with inclusion of significant predictors.

It is important to note that we are not intending to estimate changes in welfare measures (i.e. apply cost-benefit techniques), since this would impose additional restrictions on the modelling not suited to the zonal method employed here. We are also restricting our analysis to current visitors. i.e. we are not attempting to estimate potential visits from households who currently do not visit forests for recreation.

### 2.3.2 The ‘individual’ model

The ‘individual’ model, predicts the number of visits made by an individual to a specific forest for a given time period, and has the basic functional form set as was out in equation (2). This approach does not suffer from some of the limitations of the forest TGF approach, which in turn provide a strong rationale for incorporating it into this study. The first key advantage is the number of potential observations in the analyses. The forest TGF is restricted by the number of forest sites for which visitor data can be obtained. The 'individual' analysis can draw on primary data collected through visitor surveys, thereby increasing the number of observations to be considered in the analysis considerably. The second major advantage is that it allows day visitors to be distinguished from tourists. In theory, this can be achieved either by predicting visits for the two groups separately, or by including this visitor characteristic as a dummy predictor in the model. This becomes important, particularly with respect to distinguishing overseas visitors from all other forest users. A third advantage in this case is that socio-economic data is not only visitor specific, but it is considerably more accurate (not least because it is completely up to date) and allows further individual-specific characteristics to be collected, including income level, labour market situation and education. The fourth advantage is that other individual-specific information is collected by the surveys, including length of stay in the area, distance travelled to the site from place of accommodation or residence and travel costs associated with the trip. As Hanley *et al.* (unpublished) describes, in this way an individual user's demand for a trip to a recreation destination allows a more careful consideration of underlying microeconomic theory.

The final advantage of the individual demand function is the opportunity to incorporate visitor behaviour and attitudes into the model. Rather than simply controlling for the number and type of site attributes, the function can incorporate their actual use, in other words allowing predictors to control for various types of forest visit behaviour. Likewise, given the broad nature of this study we are also able to incorporate attitudinal variations of forest visitors into the model, an area which has hitherto not been explored in this context.

The main limitation of this approach to predicting demand for forest recreation is the relative difficulty of transferring any resulting function to non-surveyed sites, given that accurate local level data on population and demographic characteristics is only available for residents, and not tourists.

## 2.4 DATA REQUIREMENTS

The two TGF methods outlined above were dependent on a combination of primary and secondary data, specifically:

1. TGF dependent variables:
(i) Visitor numbers at specified forest sites ('Forest' model)
(ii) Individual visiting behaviour at specified forest sites ('Individual' model)

2. TGF independent variables:
(i) Forest attributes
(ii) Data within specified travel time zones around each forest for:
    (a) population ('Forest' model only)
    (b) substitute accessibility index for woodlands
    (c) socio-economic characteristics of population

(d) individual specific characteristics including attitudes and socio-economic characteristics and trip specific characteristics including distance travelled ('Individual' model only)

3. Day visit tourism expenditures

This section considers these data requirements in more detail and outlines the methods used for data collection.

**2.4.1 Site visits data for the 'forest' model**

The dependent variable in the 'forest' model (equation 1) is the annual number of tourism visits made to specific forests. Thus, the modelling exercise is dependent on the availability of "reliable" secondary data on visit numbers to forest sites. The quality of the visit data is a key determinant of the ability of regression models to explain the variability in the data and therefore the ability of the TGF to predict future visits, whilst the extent to which the data is representative of all woodlands and forests in GB is a key determinant of the transferability of the TGF model.

After extensive enquiries, only three organisations were able to provide visit number estimates for a recent 12-month period to specific forest sites. Visit numbers were available for a total of 101 sites, of which 68 were Forest Enterprise (FE) owned sites across the GB, the Royal Society for the Protection of Birds (RSPB) provided data for 18 sites located throughout GB, and the Woodland Trust in Scotland (WTS) provided data for 15 sites in Scotland[8]. A summary of the sites by ownership and country is given in Table 2.3, whilst a full list of sites is presented in Table 2.4. The sites are mapped in Figure 2.3.

**Table 2.3 A summary of available woodland/forest sites with reliable visitor number data**

| | Forest Enterprise | RSPB | Woodland Trust Scotland | Total |
|---|---|---|---|---|
| England | 35 | 9 | 0 | 44 |
| Scotland | 21 | 5 | 15 | 41 |
| Wales | 12 | 4 | 0 | 16 |
| Total | 68 | 18 | 15 | 101 |

The visitor data supplied by FE came from the Visitor Monitoring Trends Index Report (FE, 2002). The report provides visitor estimates for 125 sites for the years 1999-2000 and 2000-2001 and was collected using a variety of counting mechanisms. Not all sites had data for the full 12-month period. On some sites, where data was available for a shorter period, FE had estimated visitor numbers for the full 12 months. Only sites that had complete or estimated visitor data for the full 12-month period were selected.

The data for the 15 WTS sites came from the Woodland Trust Visitor Survey (WT 2001) and covered the year April 2000-March 2001. This data was collected using

8 The visitor data used in this study was for 'all' visits made to each forest and did not distinguish between 'tourist' visits and 'non-tourist' visits. Data to split visitors between tourists and non-tourists was obtained through the survey of visitors to a sample of sites, further details of which are given below.

Automatic People Counters (APCs) and a combination of manual counts and estimation. Manual counts were carried out ensuring a representative spread of days throughout the year, week and time of day. Data collected was then used to calculate an average number of visits per day (weekday and weekend) for the season, then grossed up for the whole year. WTS data was adjusted to account for the effects of the Foot and Mouth outbreak that started in early 2001 and led to the closure of all sites for the March of the reporting period. Where possible APC data from March and April 2000 were used to estimate March 2001, which was included in the annual visitor count. At sites where visitors were recorded manually data collected during January and February 2001 was assumed to be representative of the typical visitor numbers for March 2001 allowing an annual estimate to take place.

The RSPB provided visitor data for 18 woodland sites for the years April 1999-March 2000 and April 2000-March 2001 calculated by mechanical methods and estimation. Data provided for the April 2000-March 2001 was not adjusted to account for Foot and Mouth and showed a marked reduction in visitors, therefore data for April 1999-March 2000 was used as this was the only available data that could provide an uninterrupted 12 month count.

## Table 2.4 Full list of forest sites with annual visitor data

| England<br>LOCATION: Site | Forest Owners | Forest District (if applicable) | Counter Category | Months | Visitor numbers | Data Year |
|---|---|---|---|---|---|---|
| Beechenhurst | FE | Forest of Dean | Veh | 12 | 182298 | 2000 |
| Bickley Gate | FE | N.York Moors | Veh | 12 | 229258 | 2000 |
| Birches Valley | FE | W. Midlands | VC | 12 | 89877 | 2000 |
| Blean Woods | RSPB | | * | 12 | 8915 | 4/1999-3/2000 |
| Blidworth Bottoms | FE | Sherwood | Veh | 9 | 233597 | 2000 |
| Bull Crag | FE | Kielder | Veh | 6 | 9626 | 2000 |
| Cannock | FE | Sherwood | Veh | 8 | 143425 | 2000 |
| Chopwell (main car park) | FE | Kielder | Veh | 12 | 99903 | 2000 |
| Clay Bank | FE | N.York Moors | Veh | 12 | 94140 | 2000 |
| Coombes and Churnet Valley | RSPB | | * | 12 | 8636 | 4/1999-3/2000 |
| Cycle Centre (Cannop) | FE | Forest of Dean | P&D | 12 | 26603 | 2000 |
| Dalby Forest | FE | N.York Moors | Veh | 12 | 411338 | 2000 |
| Derbyshire Bridge | FE | Sherwood | Veh | 7 | 148711 | 2000 |
| Sherwood Pines Forest Park | FE | Sherwood | Veh | 6 | 227795 | 2000 |
| Sherwood Forest Drive | FE | Kielder | Veh | 12 | 82953 | 2000 |
| Grizedale | FE | NW England | VC | 12 | 44406 | 2000 |
| Guisborough | FE | N.York Moors | Veh | 12 | 125355 | 2000 |
| Hamsterley | FE | Kielder | Veh | 12 | 172425 | 2000 |
| Hepburn | FE | Kielder | Veh | 12 | 13125 | 2000 |
| High lodge | FE | East Anglia | FDT | 11 | 127068 | 2000 |
| Kielder Castle | FE | Kielder | Veh | 12 | 23464 | 2000 |
| Leighten Moss and Morcambe Bay | RSPB | | | 12 | 85546 | 4/1999-3/2000 |
| Longdale Lane | FE | Sherwood | Veh | 9 | 101126 | 2000 |
| May Beck | FE | N.York Moors | Veh | 12 | 33343 | 2000 |
| Minsmere | RSPB | | * | 12 | 69371 | 4/1999-3/2000 |
| Nagshead | RSPB | | * | 12 | 13860 | 4/1999-3/2000 |
| Newtondale | FE | N.York Moors | Veh | 12 | 63863 | 2000 |
| Nobel Knott | FE | NW England | Veh | 12 | 10723 | 2000 |
| Normans Hill | FE | Sherwood | Veh | 6 | 248044 | 2000 |
| Northward Hill | RSPB | | * | 12 | 983 | 4/1999-3/2000 |
| Pexton | FE | N.York Moors | Veh | 12 | 515705 | 2000 |
| Pinchinthorpe | FE | N.York Moors | VC | 12 | 16111 | 2000 |
| Rigg Lane Tower | FE | Sherwood | Veh | 12 | 166273 | 2000 |
| Simonside | FE | Kielder | Veh | 12 | 23598 | 2000 |
| Symonds Yat Rock | FE | Forest of Dean | Veh | 12 | 176195 | 2000 |
| The Lodge | RSPB | | * | 12 | 39603 | 4/1999-3/2000 |
| The Street | FE | Sherwood | Veh | 10 | 255327 | 2000 |
| Thieves Wood | FE | Sherwood | Veh | 12 | 225710 | 2000 |
| Westonbirt Arboretum | FE | W. Midlands | Ped | 12 | 156773 | 2000 |
| Whinlatter Main | FE | NW England | Veh | 12 | 75140 | 2000 |
| Wolves and Ramsey Woods | RSPB | | * | 12 | 3650 | 4/1999-3/2000 |
| Wyre | FE | W. Midlands | P&D | 12 | 71550 | 2000 |

| Scotland<br>LOCATION: Site | Forest Owners | Forest District (if applicable) | Counter Category | Months | Visitor numbers | Data Year |
|---|---|---|---|---|---|---|
| Abernethy Forest | RSPB | | * | 12 | 31477 | 4/1999-3/2000 |
| Abriachan Wood | WT | Abriachan | Manual | 12 | 1000(!) | 4/2000-3/2001 |
| Alt Na Calliche | FE | Lochaber | Veh (Pn) | 11 | 11065 | 2000 |
| Beeslack | WT | Penicuik | Manual | 12 | 38000(!) | 4/2000-3/2001 |
| Beinn a'Mheadhoin | FE | Fort Augustus | Veh(Pn) | 12 | 8494 | 2000 |
| Bellsquary | WT | Livingston | Manual | 12 | 15000(!) | 4/2000-3/2001 |
| Ben Venue Dukes Pass | FE | Cowal & Trossachs | Ped | 12 | 15872 | 2000 |
| Blaeberry Community Wood | WT | East Whitburn | Manual | 12 | 15000(!) | 4/2000-3/2001 |
| Brighty Wood | WT | Angus | Manual | 12 | 1000(!) | 4/2000-3/2001 |
| Cardrona (Kirkburn Car park) | FE | Scottish Borders | Veh | 12 | 22353 | 2000 |
| Ciste Dubh | FE | Lochaber | Veh(Pn) | 8 | 12485 | 2000 |
| Countesswells | FE | Kincardine | Veh | 12 | 100404 | 2000 |
| Crinan | WT | Argyll | Ped | 12 | 4000(!) | 4/2000-3/2001 |
| Den Wood | WT | Old Meldrum | Manual | 12 | 2000(!) | 4/2000-3/2001 |
| Dog Falls | FE | Fort Augustus | Veh(Pn) | 12 | 21460 | 2000 |
| Formonthills | WT | Glenrothes | Manual | 12 | 11000(!) | 4/2000-3/2001 |
| Glen Doll | FE | Tay | P&D | 12 | 56603 | 2000 |
| Glen Fingus | WT | Callander | Ped | 12 | 13000(!) | 4/2000-3/2001 |
| Glenmore | FE | Inverness | C, ME | 12 | 68380 | 2000 |
| Glentress | FE | Scottish Borders | Veh | 12 | 55372 | 2000 |
| Inchree | FE | Lochaber | Ped | 11 | 26695 | 2000 |
| Inch Marshes | RSPB | | * | 12 | 8900 | 4/1999-3/2000 |
| Ken-Dee Marshes | RSPB | | * | 12 | 3815 | 4/1999-3/2000 |
| Kirkhill Main | FE | Kincardine | Veh | 12 | 39780 | 2000 |
| Ledmore and Migdale | WT | Spinningdale | Manual | 12 | 1000(!) | 4/2000-3/2001 |
| Moncreiff Hill | WT | Bridge of Earn | Ped | 12 | 16000(!) | 4/2000-3/2001 |
| Otter Hide | FE | Fort Augustus | Ped | 7 | 29936 | 2000 |
| Portmoak Moss | WT | Scotland Well | Ped | 12 | 11000(!) | 4/2000-3/2001 |
| Pressmennan Wood | WT | Stenton | Ped | 12 | 9000(!) | 4/2000-3/2001 |
| QEFP Visitor Centre | FE | Cowal & Trossachs | Veh | 12 | 50383 | 2000 |
| R.Affric | FE | Fort Augustus | Veh(Pn) | 11 | 31717 | 2000 |
| Rogie Falls | FE | Inverness | Ped | 12 | 56052 | 2000 |
| Scolty | FE | Kincardine | Veh | 10 | 57641 | 2000 |
| Shooting Greens | FE | Kincardine | Veh | 12 | 18353 | 2000 |
| St. Ronans | WT | Innerleithen | Manual | 12 | 8000(!) | 4/2000-3/2001 |
| Strathyre Car Park | FE | Cowal & Trossachs | Veh | 12 | 4356 | 2000 |
| Sutherlands Grove | FE | Lorne | Veh (Pn) | 12 | 25018 | 2000 |
| Tyrebagger West | FE | Kincardine | Veh | 12 | 23492 | 2000 |
| Vane Farm | RSPB | | * | 12 | 39729 | 4/1999-3/2000 |
| Warout Wood | WT | Glenrothes | Manual | 12 | 100000 (!) | 4/2000-3/2001 |
| Wood of Cree | RSPB | | * | 12 | 5816 | 4/1999-3/2000 |

| Wales<br>LOCATION: Site | Forest Owners | Forest District (if applicable) | Counter Category | Months | Visitor numbers | Data Year |
|---|---|---|---|---|---|---|
| Llyn Crafnant | FE | Coed y mynydd | P&D | 12 | 8988 | 2000 |
| Black Covert | FE | Coed y mynydd | Veh(Pn) | 6 | 20430 | 2000 |
| Caen y Coed | FE | Coed y mynydd | P&D | 11 | 5635 | 2000 |
| Coed Aber | FE | Coed y mynydd | P&D | 11 | 19856 | 2000 |
| Coed Y Brenin | FE | Coed y mynydd | VC | 12 | 34129 | 2000 |
| Cwn Clydach | RSPB | | * | 12 | 7190 | 4/1999-3/2000 |
| Lake Vyrnwy | RSPB | | * | 12 | 32253 | 4/1999-3/2000 |
| Llyn Parc Mawr | FE | Coed y gororau | P&D | 10 | 8690 | 2000 |
| Lyn Geirionydd | FE | Coed y mynydd | P&D | 12 | 13318 | 2000 |
| Mountain Bike Trail | FE | Coed y mynydd | Cyc | 12 | 18758 | 2000 |
| Mawddach Valley | RSPB | | * | 12 | 4559 | 4/1999-3/2000 |
| Moel Famau | FE | Coed y mynydd | P&D | 12 | 32695 | 2000 |
| Nant yr Arian | FE | Coed y mynydd | Veh(Pn) | 9 | 87833 | 2000 |
| Newborough Beach | FE | Coed y mynydd | Veh(Pn) | 12 | 147279 | 2000 |
| The Arch | FE | Coed y mynydd | Veh(Pn) | 9 | 23651 | 2000 |
| Tynybedw | FE | Coed y mynydd | Veh(Pn) | 7 | 4995 | 2000 |
| Ynys-hir | RSPB | | * | 12 | 11362 | 4/1999-3/2000 |

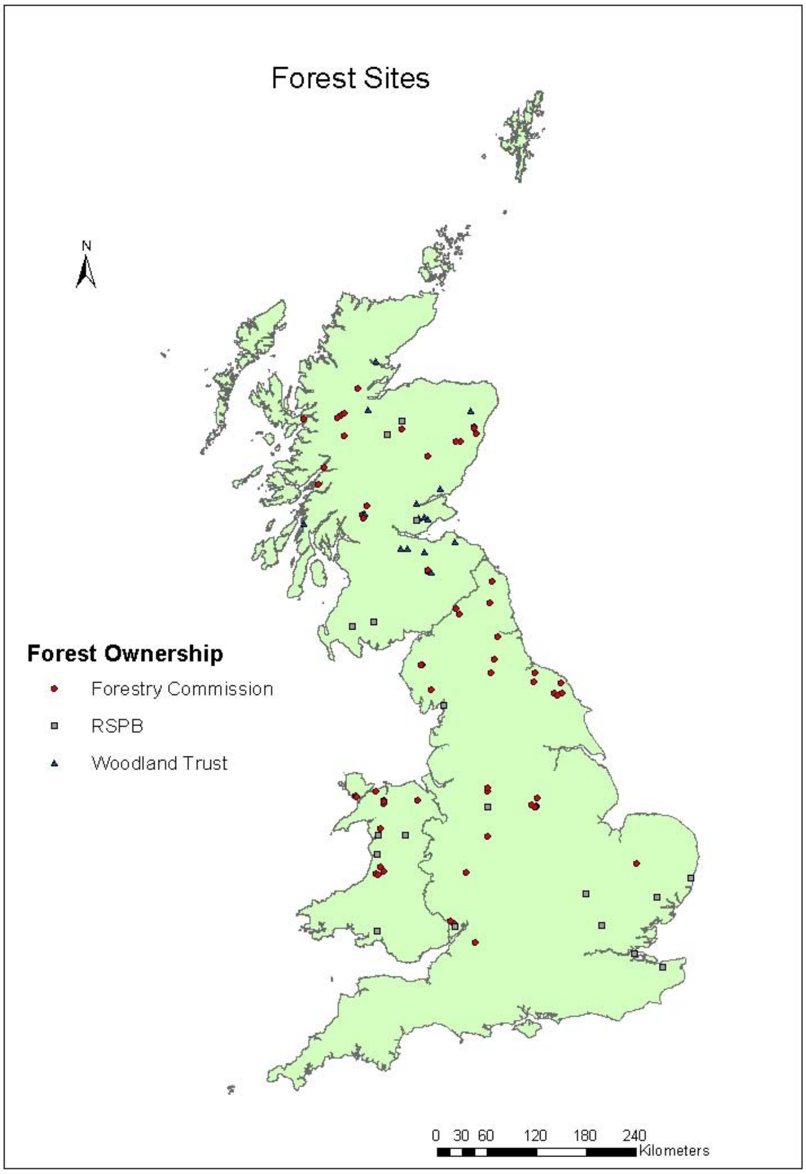
Notes : Counter Category Key
Veh(Pn)-Vehicle counter (pneumatic), P&D-Pay and Display ticket, Cyc-Cycle, VC-Visitor Centre, Manual-Aggregated Manual counts, Veh-Vehicle Counter, Ped-Pedestrian Counter, C-Counter, ME-Magic Eye, FDT-Forest Drive Tickets.
Where counter category is marked with a * we were unable to identify the exact method of count, but the counts were carried out from VC, Vehicle Counter, Ped Counter, Vehicle Pneumatic, Estimation or a combination.
Visitor Numbers
The presence of (!) indicates that the figures have been effected by the widespread Foot and Mouth outbreak and adjusted.

No clear or rigorous definitions of a “site” were provided by the FE, RSPB or WTS organisations. However, the following definitions were derived from a consideration of the information provided by, and in discussion with, the respective organisations.

The RSPB sites are entire individual nature reserves characterised by a significant presence of woodland. The visit numbers to the “site” represent the visits to the nature reserve not just the woodland part of the nature reserve. The Woodland Trust for Scotland sites are individual areas of the Woodland Trust Estate. Visits were counted at all access points to each WTS site. Thus, the visit numbers represent the visits to the whole area included in the WTS Estate, not just to the wooded part of the Estate. In contrast, the FE sites were single access points to a forest area (not specifically a block or compartment). Thus, relative to the RSPB and WTS sites, where visits may be counted at more than one access point, the visit numbers for FE woodland/forest may be understated. The inconsistency in the definitions of a site used by the different organisations introduces some ambiguity in terms of what is being modelled.

However, in the absence of alternative sources of data, site data based on all three definitions were included in the modelling exercise.

**Figure 2.3 Location of sites with 12 month visitor data**




Outline based on Bartholomew's Digital Database

There are some important points regarding the representativeness and reliability of the data that need to be noted. 'Reliable' data on visitor numbers to forest sites, however defined, is relatively scarce. For the data that is available, there is considerable scope for introducing error into the visit counts during its collection. The data may be collected by one of a variety of different counting mechanisms, some of which are more reliable than others. These include electronic vehicle counters, pay and display counters, pedestrian counters, pneumatic counters, "magic eyes", forest drive tickets, cycle counters and manual "hand" counts. Depending on the mechanism, it may be necessary to translate the actual counts produced into individual visits using a range of assumptions, for example, the average number of individuals per car parked at a pay and display car park. Further problems arise where the data is collected for only part of the year. Here again assumptions have to be made about the pattern of visits to individual sites during the period not monitored. These assumptions are more transparent for some data than others. The data set used for this study was collected using a combination of count mechanisms. The individual organisations that collected the data made their own assumptions in order to estimate the final visit counts. Whilst it would have been possible to take some of these potential sources of uncertainty and error into account in the modelling exercise if they were quantified, no such data was available for the survey based estimates of visit numbers available for use in this study.

### 2.4.2 Forest attribute data for the 'forest' and 'individual' models

Both the 'forest' and 'individual' modelling approaches require forest attribute data as a key input. There are a number of site attributes relating to the size, type and nature of the forests as well as a wide diversity of natural and man-made features present at woodland locations that may influence the type and number of visitors. Data on a range of woodland facilities and quality attributes were collected (or confirmed where already available on organisation web sites) for the 101 sites through a survey of forest managers. Around 50 forest managers were contacted and requested to complete an attribute checklist, to which the majority responded. Table 2.5 presents the full list of attributes for which data was collected in the Forest Managers survey.

**Table 2.5 Forest Managers survey checklist**

| | | |
|---|---|---|
| Forest type: (Conifer, broad-leaved, or mixed) | | |
| Principle species: (Sitka spruce, Scots pine etc) | | |
| Forest Age: (main planting year) | | |
| Forest size i.e. area of forest site | | |
| Forest type in immediate proximity of site entrance if significantly different to above | | |
| Car park: (yes/no) | | |
| Pay/Free | | |
| Capacity (No. of spaces/area) | | |
| Picnic site: (yes/no) | | |
| Marked (signposted) forest walks: (yes/no) | | |
| Number of walks | | |
| Length of trails | | |
| Trail difficulty | | |
| Marked (signposted) cycle trails: (yes/no) | | |
| Number of trails | | |
| Length of trails | | |
| Trail difficulty | | |
| Marked (signposted) bridleways : (yes/no) | | |
| Orienteering course: (yes/no) | | |
| Play equipment: (yes/no) | | |
| Forest drive: (yes/no) | | |
| Viewpoint/s: (yes/no) | | |
| Water feature (river or lake) : (yes/no) | | |

| | | |
|---|---|---|
| Fishing allowed: (yes/no) | | |
| Wildlife Hide/s: (yes/no) | | |
| Camping/caravan site: (yes/no) | | |
| Youth camping/ backpacking sites: (yes/no) | | |
| Bothies: (yes/no) | | |
| Visitor Centre: (yes/no) | | |
| Café: (yes/no) | | |
| Shop: (yes/no) | | |
| Bike hire: (yes/no) | | |
| Forest interpretation centre: (yes/no) | | |
| Forest classroom: (yes/no) | | |
| Information: (yes/no) | | |
| Toilets: (yes/no) | | |
| Disabled facilities | | |
| Toilets: (yes/no) | | |
| Walks/ trails with disabled access: (yes/no) | | |
| Trail Grading: | | |
| Access to shop: (yes/no) | | |

### 2.3.3 Primary visitor data and expenditure data

The 'forest' and 'individual' models require primary data on the number, type and frequency of forest visits, whilst primary data was also required on day visit expenditures and visitor attitudes. This data was collected in a visitor survey, the specific aims of which were:

- To provide visitor data to inform the development of the "forest" and "individual" recreation demand models;
- To collect data on the tourism expenditures of visitors to forests;
- To collect data on the importance of forests in trip decisions for apportioning forest-related tourism expenditures;
- To collect data on the attitudes of forest visitor towards the environment and forests for recreation (see chapter 5).

The structured questionnaire[9] comprised of seven main sections:

1. Introduction to questionnaire
2. Identification of the type of tourist
3. Visit and visitor characteristics
4. Forest importance in visit decisions
5. Visitor expenditure
6. Attitudes towards the environment and forests
7. Socio-economic characteristics

A copy of the questionnaire can be found in the Appendix to this chapter. The survey was carried out at a sample of 44 sites from the 101 sites identified above. The sample was stratified geographically, by ownership and in terms of visitor numbers. In order to ensure that differences in expenditure patterns between the three study countries were captured, an equal number of sites were selected in each country. Within each country, sites were selected to represent a broad geographical distribution. Of the 44 sites selected, 30 were owned by Forest Enterprise, whilst seven sites were Woodland Trust owned and eight owned by the RSPB. All sites in the sample frame were classified into one of three groups[10] based on annual visitor counts: small (up to 15,000 visitors per annum) medium (between 15,000 and 70,000 visitors per annum) and large (over 70,000 visitors per annum). The number of sample sites selected from each size group was approximately proportional to the distribution of sites within the sample frame. A full list of the sites selected is presented in Table 2.6, a summary of the stratification of the sample is presented in Table 2.7 and the geographical distribution is presented in Figure 2.4.

9 A copy can be found in the appendix to the extended report.

10 The size brackets are arbitrary, dividing the sample frame into three groups of approximately equal size.

**Table 2.6 Sample sites for visitor survey**

| Site ID | Site | Location | Forest district (if applicable) | Owner |
|---|---|---|---|---|
| 1 | Beechenhurst | England | Forest of Dean | FE |
| 2 | Bickley (gate) | England | N.York Moors | FE |
| 57 | Blean woods | England | | RSPB |
| 5 | Bull Crag | England | Kielder | FE |
| 6 | Chopwell (main car park) | England | Kielder | FE |
| 7 | Clay Bank CP | England | N.York Moors | FE |
| 8 | Cycle Centre (Cannop) | England | Forest of Dean | FE |
| 10 | Forest Centre  (Sherwood Pines VC) | England | Sherwood | FE |
| 15 | High lodge | England | East Anglia | FE |
| 60 | MINSMERE | England | | RSPB |
| 24 | Symonds Yat (Rock) | England | Forest of Dean | FE |
| 64 | The Lodge | England | | RSPB |
| 25 | Thieves Wood (CP) | England | Sherwood | FE |
| 26 | Westonbirt (Arboretum) | England | W. Midlands | FE |
| 27 | Whinlatter Main | England | NW England | FE |
| 65 | Wolves & Ramsey woods | England | | RSPB |
| 86 | Beeslack | Scotland | | WT |
| 30 | Beinn a'Mheadhoin | Scotland | Fort Augustus | FE |
| 31 | Ben Venue (Dukes Pass) | Scotland | Cowal & Trossachs | FE |
| 33 | Ciste Dubh | Scotland | Lochaber | FE |
| 34 | Countesswells (CP) | Scotland | Kincardine | FE |
| 81 | Formonthills | Scotland | | WT |
| 36 | Glen Doll | Scotland | Tay | FE |
| 37 | Glenmore VC | Scotland | Inverness | FE |
| 38 | Glentress (Red Squirrel Car Park) | Scotland | Scottish Borders | FE |
| 87 | Portmoak Moss | Scotland | | WT |
| 89 | Pressmennan Wood | Scotland | | WT |
| 48 | Sutherlands Grove | Scotland | Lorne | FE |
| 82 | Warout Wood | Scotland | | WT |
| 97 | Coed Aber | Wales | Coed y mynydd | FE |
| 53 | Coed Y Brenin VC (Maesgwm VC) | Wales | Coed y mynydd | FE |
| 71 | Cwm Clydach | Wales | | RSPB |
| 72 | Lake Vyrnwy | Wales | | RSPB |
| 50 | Llyn Crafnant | Wales | Coed y mynydd | FE |
| 54 | Lyn Geirionydd | Wales | Coed y gororau | FE |
| 73 | Mawddach Valley | Wales | | RSPB |
| 99 | Moel Famau | Wales | Coed y mynydd | FE |
| 55 | Nant yr Arian | Wales | Coed y mynydd | FE |
| 101 | Newborough Beach | Wales | Coed y mynydd | FE |
| 56 | The Arch | Wales | Coed y mynydd | FE |
| 102 | Tynybedw | Wales | Coed y mynydd | FE |
| 74 | Ynys-hir | Wales | | RSPB |

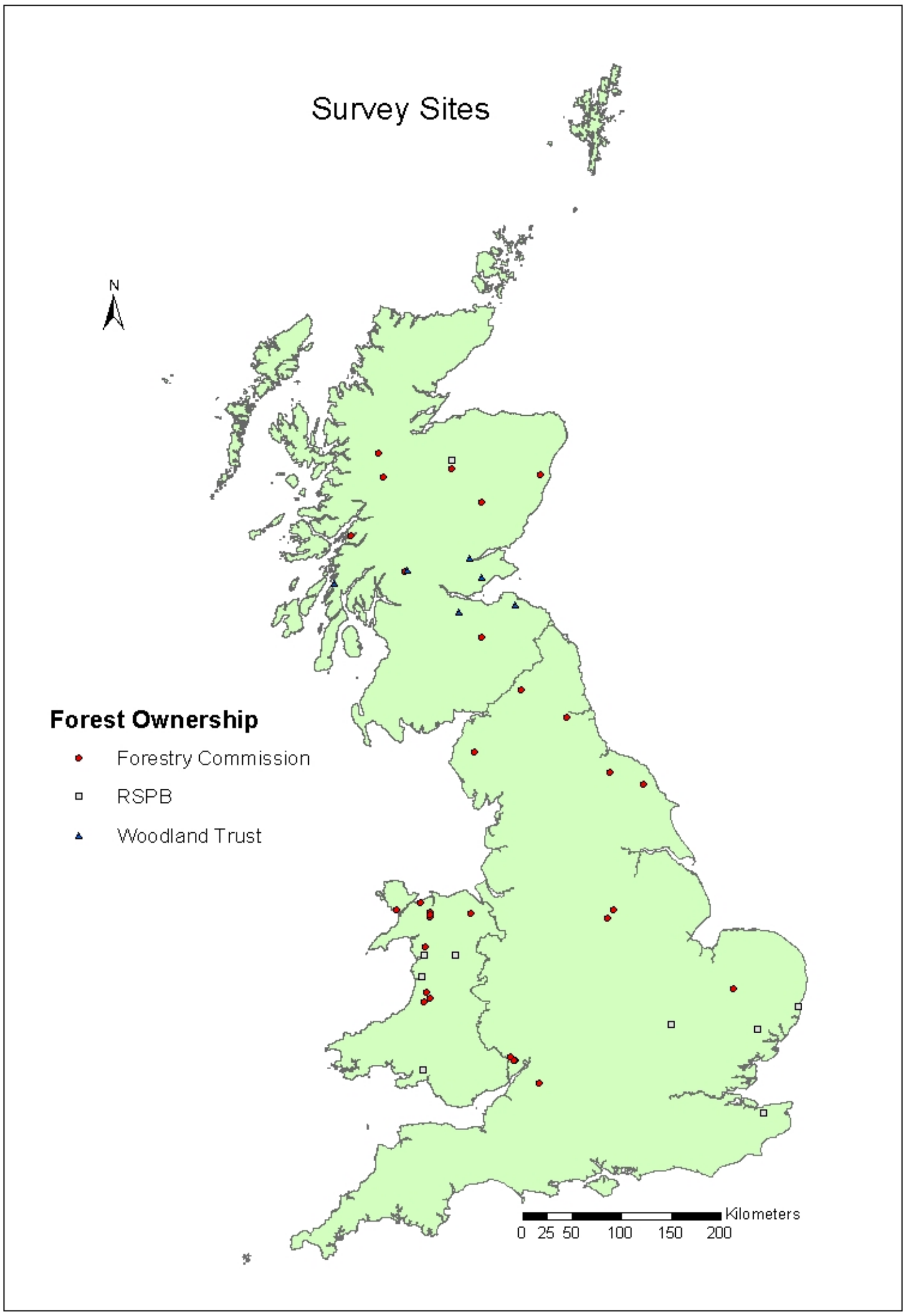
**Table 2.7 Summary of sample sites for the forest visitor survey**

| | | Ownership | | |
|---|---|---|---|---|
| | Number of visitors | Public | Private* | Total |
| England | Small (<15K) | 1 | 2 | 3 |
| | Medium (15K-70K) | 1 | 2 | 3 |
| | Large (>70K) | 9 | 0 | 9 |
| | Total | 11 | 4 | 15 |
| Scotland | Small (<15K) | 2 | 3 | 5 |
| | Medium (15K-70K) | 5 | 2 | 7 |
| | Large (>70K) | 1 | 1 | 2 |
| | Total | 8 | 6 | 14 |
| Wales | Small (<15K) | 4 | 3 | 7 |
| | Medium (15K-70K) | 5 | 1 | 6 |
| | Large (>70K) | 2 | 0 | 2 |
| | Total | 11 | 4 | 15 |
| GB | Small (<15K) | 7 | 8 | 15 |
| | Medium (15K-70K) | 11 | 5 | 16 |
| | Large (>70K) | 12 | 1 | 13 |
| | Total | 30 | 14 | 44 |

*RSPB or Woodland Trust

The sites were also selected to ensure specific site attributes were represented in sufficiently large numbers in order to be able to test for significance in terms of influencing visit numbers and to avoid problems of co-linearity. The site attributes most likely to be statistically significant in influencing forest visit numbers were identified from the literature review.

**Figure 2.4 Location of 44 forest survey sites**




Outline based on Bartholomew's Digital Database

Table 2.8 presents a list of attributes present at the sites in the visitor survey. There are some noticeable differences between sites under different ownership and across the three countries. Some non-FE sites do not have car parks and, on average, less have picnic facilities, less play equipment, and no cycle trails whilst they have more information provision, more disabled facilities and more facilities such as hides and horse riding. Across the three countries, on average English sites generally appear to have the most facilities and Scottish sites the least. The low number of facilities at Scottish sites on average, is likely to be a reflection of the WTS sites in the Scottish sample.

**Table 2.8 Attributes present across 44 survey sites (%)**

| | FE | Non-FE | E | S | W | GB |
|---|---|---|---|---|---|---|
| CAR PARK | 100 | 86 | 100 | 86 | 100 | 95 |
| FOREST WALK | 93 | 93 | 94 | 86 | 100 | 93 |
| PICNIC SITE | 87 | 43 | 88 | 36 | 93 | 73 |
| INFORMATION | 60 | 86 | 88 | 64 | 50 | 68 |
| TOILETS | 63 | 43 | 56 | 29 | 86 | 57 |
| DISABLED FACILITIES | 50 | 64 | 69 | 36 | 57 | 55 |
| WATER FEATURE | 50 | 43 | 19 | 50 | 79 | 48 |
| VIEWPOINT | 47 | 36 | 44 | 43 | 43 | 43 |
| DISABLED TOILETS | 43 | 29 | 44 | 21 | 50 | 39 |
| DISABLED WALKS | 30 | 57 | 50 | 36 | 29 | 39 |
| VISITOR CENTRE | 30 | 43 | 44 | 21 | 36 | 34 |
| CAFE | 37 | 14 | 56 | 7 | 21 | 30 |
| SHOP | 27 | 29 | 44 | 14 | 21 | 27 |
| CYCLE TRAIL | 37 | 0 | 44 | 14 | 14 | 25 |
| DISABLED ACCESS TO SHOP | 23 | 29 | 38 | 14 | 21 | 25 |
| ORIENTEERING | 30 | 7 | 31 | 14 | 21 | 23 |
| FISHING | 27 | 7 | 6 | 21 | 36 | 20 |
| HORSE RIDING | 10 | 36 | 31 | 14 | 7 | 18 |
| PLAY EQUIPMENT | 20 | 7 | 25 | 0 | 21 | 16 |
| HIDES | 7 | 36 | 25 | 7 | 14 | 16 |
| FOREST CLASSROOM | 17 | 14 | 31 | 7 | 7 | 16 |
| BIKE HIRE | 13 | 7 | 19 | 7 | 7 | 11 |
| FOREST INTERPRETATION CENTRE | 10 | 7 | 6 | 14 | 7 | 9 |
| FOREST DRIVE | 10 | 0 | 13 | 7 | 0 | 7 |
| BOTHIES | 3 | 7 | 0 | 14 | 0 | 5 |
| CAMPING/CARAVAN SITE | 3 | 0 | 0 | 7 | 0 | 2 |
| YOUTH CAMPING/ BACKPACKING SITES | 3 | 0 | 0 | 7 | 0 | 2 |

### 2.3.4 Secondary data on size and socio-economic characteristics of population and substitute woodlands

Based on previous studies, independent variables relating to the size and characteristics of the local population and the availability of substitute tourism destinations can influence the number of visitors to a given woodland site. Extensive use was made of Geographical Information Systems (GIS) to collect data. The methodology included developing travel time bands from forest sites, derivation of substitute availability measures, and collation of demographic data for the time bands. All spatial analysis and calculation was carried out using ESRI's ArcView 3.2 GIS package and the extension Spatial Analyst. Special routines were developed using Avenue, ArcView's customization and development language.

**Travel zones**

Following Lovett *et al.* (1997) and Brainard *et al.* (2001) six travel time zones around each forest site were defined using cost-distance modelling. The travel time bands were:

(i) 0-15 minutes
(ii) 15-30 minutes
(iii) 30-45 minutes
(iv) 45-60 minutes
(v) 60-90 minutes
(vi) 90-120 minutes

The analysis used Bartholomew's digital version of the UK road network obtained from the MIMAS information system at the University of Manchester. An example of this road network is shown in Figure 2. This follows Jones *et al*. (2002) method whereby each road section is coded according to the estimated amount of time a vehicle travelling at a typical speed takes to traverse it. A simulation is developed in Arc-Info that predicts visitor routes and estimates the associated travel distances and times. Each section of road was assigned an average rural and urban speed according to its type. The methodology and values used for assigning the speeds are given in Jones *et al*. (2002). The average speeds are shown are shown in Table 2.9.

**Table 2.9 Average speed road classification for travel zone development**

| Road Type | Average Speed (mph) | |
|---|---|---|
| | Rural | Urban |
| Minor Road | 14 | 11 |
| B-Road Single Carriageway | 24 | 12 |
| B-Road Dual Carriageway | 36 | 18 |
| A-Road Single Carriageway | 32 | 18 |
| A-Road Single Carriageway-Trunk Road | 45 | 25 |
| A-Raod Dual Carriageway | 50 | 25 |
| A-Road Dual Carriageway-Trunk Road | 54 | 28 |
| Motorway | 63 | 35 |

In order to do cost-distance modelling to calculate travel times away from forest sites it was necessary to convert the vector (lines) road network to raster format. The raster format is a geographic data model in which geographic space is broken into an array of equally sized cells. The road network was converted to a raster surface of 500 * 500 meter cells. This resolution was chosen based on a compromise between desired resolution and the data storage and processing demands. In order to classify the roads as passing through urban or rural areas, the urban vector coverage from Bartholomew's was converted to a grid and then combined with the raster roads network. A time value in minutes was then assigned to each cell representing the time-per-meter it would take to travel in that cell. The value is in time-per-meter because the spatial units of the data was meters. This value was assigned according to the average speed assigned to each road type using the formula:

Time Cost (in minutes) $= 6.21 * 10^{-4} / (\text{average speed}/60)$
The value $6.21 * 10^{-4}$ is the number of miles in one meter. At this point all cells that were part of the road network had a time cost value while areas outside the network had no values. The empty cells within 1500 m of the road network were assigned the value of the nearest road cell as was done in Jones *et al*. (2002). The remaining cells were assigned a value that was based on the lowest average speed from Table 2.8 (11

mph). The time cost value assigned to each cell in the raster surface was used to do cost-distance modeling away from each forest site. A routine was developed in ArcView 3.2 with Spatial Analyst based around the CostDistance request. The result from this routine was a separate grid for each forest site in which each cell contained a value representing time necessary to travel away from the forest site. An example of the raster surface for a single forest site is shown in Figure 2.5. A concentric pattern based around the road network is evident.

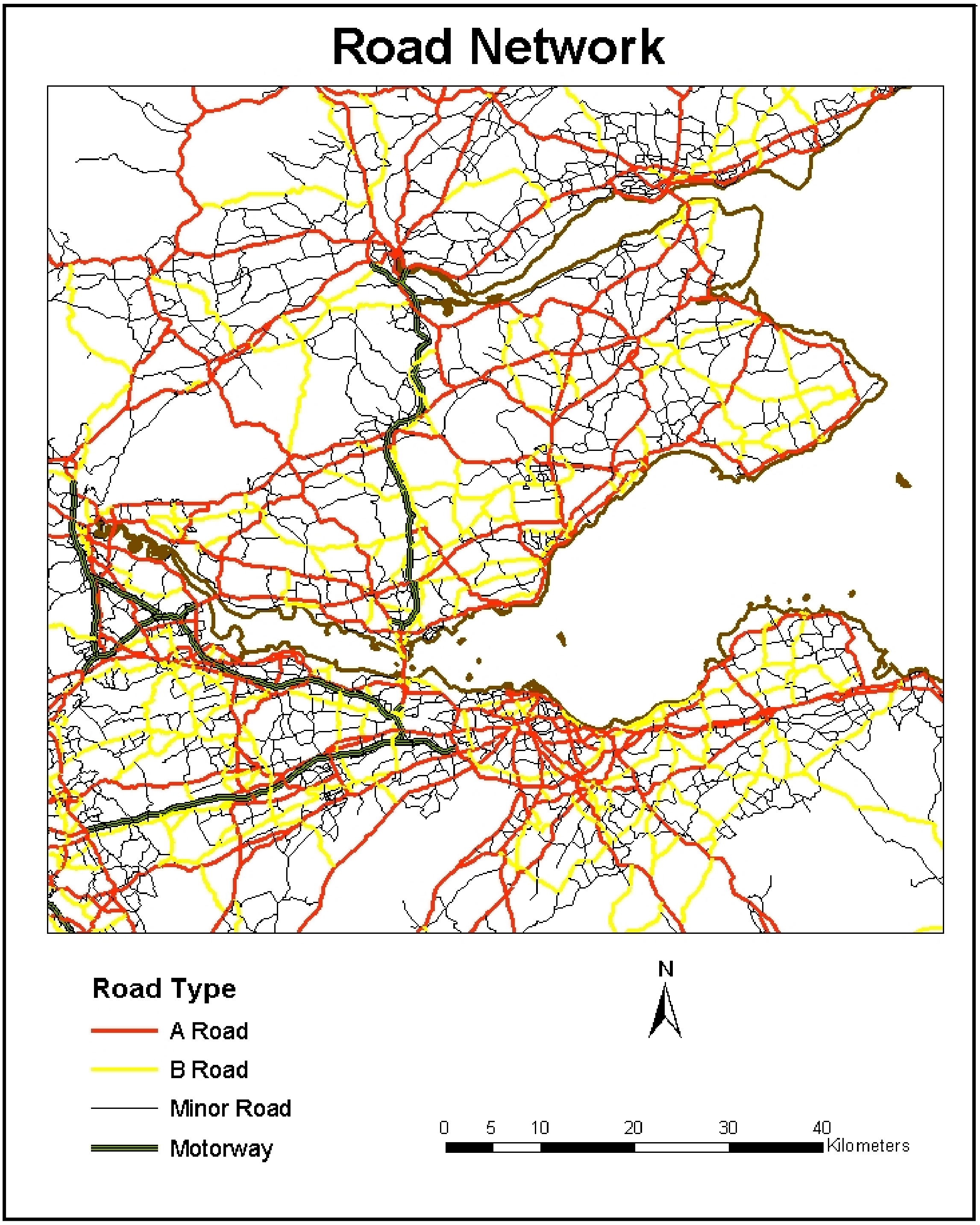



**Figure 2.5 An example of the Bartholomew's road network showing area around Edinburgh and the Firth of Forth**

**Assigning travel time value to enumeration district and census output area centroids**

For this analysis demographic data was extracted from the 1991 census data based on enumeration district polygons in England and Wales and census output area polygons in Scotland. These spatial units represent the possible outset zones for visitors. There are approximately 110,000 enumeration districts in England and Wales and approximately 38,000 census output areas in Scotland. Enumeration districts and census output areas are the lowest level geographical representation available with approximately 200 and 50 households per feature respectively (http://census.ac.uk/cdu/). These spatial units provided a detailed level of resolution for attaining the demographic data while not causing unreasonable computing requirements.

Centroid points for all of the enumeration districts and census output areas were derived using the 'Convert Shapes to Centroids' request in the XTools extension developed for ArcView 3.2 by Mike DeLaune of the Oregon Department of Forestry. These centroids were then converted to a raster grid with a 10 m cell resolution. This fine resolution was used because the centroid points were often close together and a larger cell size would cause some of the points to be lost in the conversion. Each cell had the unique identifier for the enumeration district or census output area as an attribute value. This unique identifier could be linked to the census data to retrieve demographic data.

Each 10 m enumeration district and census output area cell fell within one cell of the cost distance grid. Using the request ZonalStatsTable in Avenue it was possible to retrieve the value from the underlying cost distance grid and assign it as an attribute to the enumeration district or census output area centroid grid attribute table. Figure 2.6. shows the census output points overlaying the census output area polygons and the cost distance surface. The census output area centroid vector points are shown here because the 10 m cells do not show up well.

The time values in minutes were reclassified into the following six time bands: 1-15 (1), 15-30 (2), 30-45(3), 45-60(4), 60-90(5), and 90-120(6) in the enumeration district and census output area grid attribute tables (Figure 2.7). For each time band a list of census output area unique identifiers was created and used to extract the relevant demographic data from the Small Area Statistics (SAS) data tables. The digital data making up the SAS tables are the principal output of the 1991 census and provide the most detailed resource of socio-economic data in the UK (http://census.ac.uk/cdu/). Individual demographic variables were summed for each time band to get the total population for that variable.

The choice of socio-economic variables to be included in the modelling has been rationalised by considering the findings from previous studies. Ten socio-economic variables (derived from ONS 1991 data) were assembled in the GIS for each of the six travel bands, covering the main types of demographic indicator (Table 4.2).

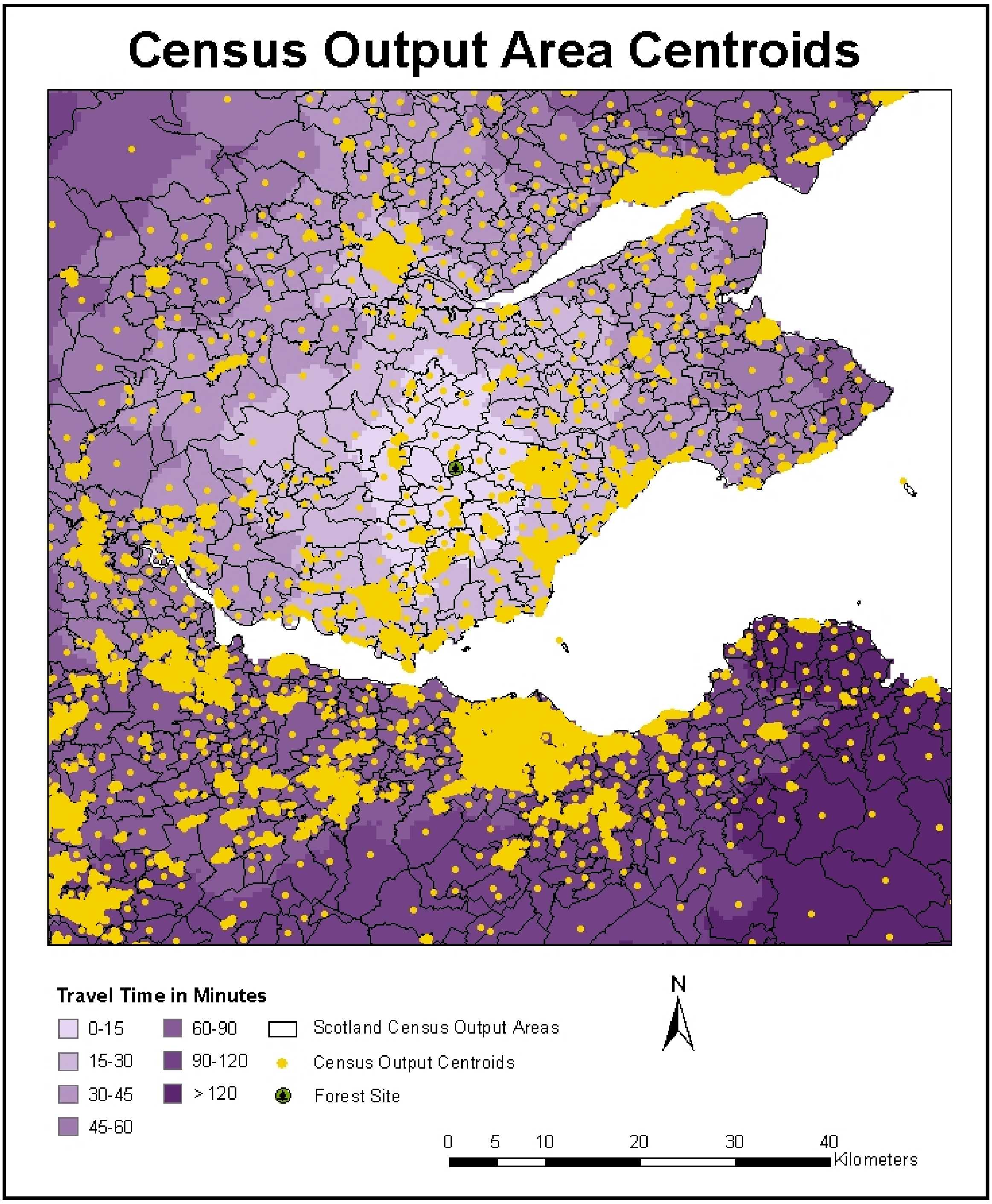
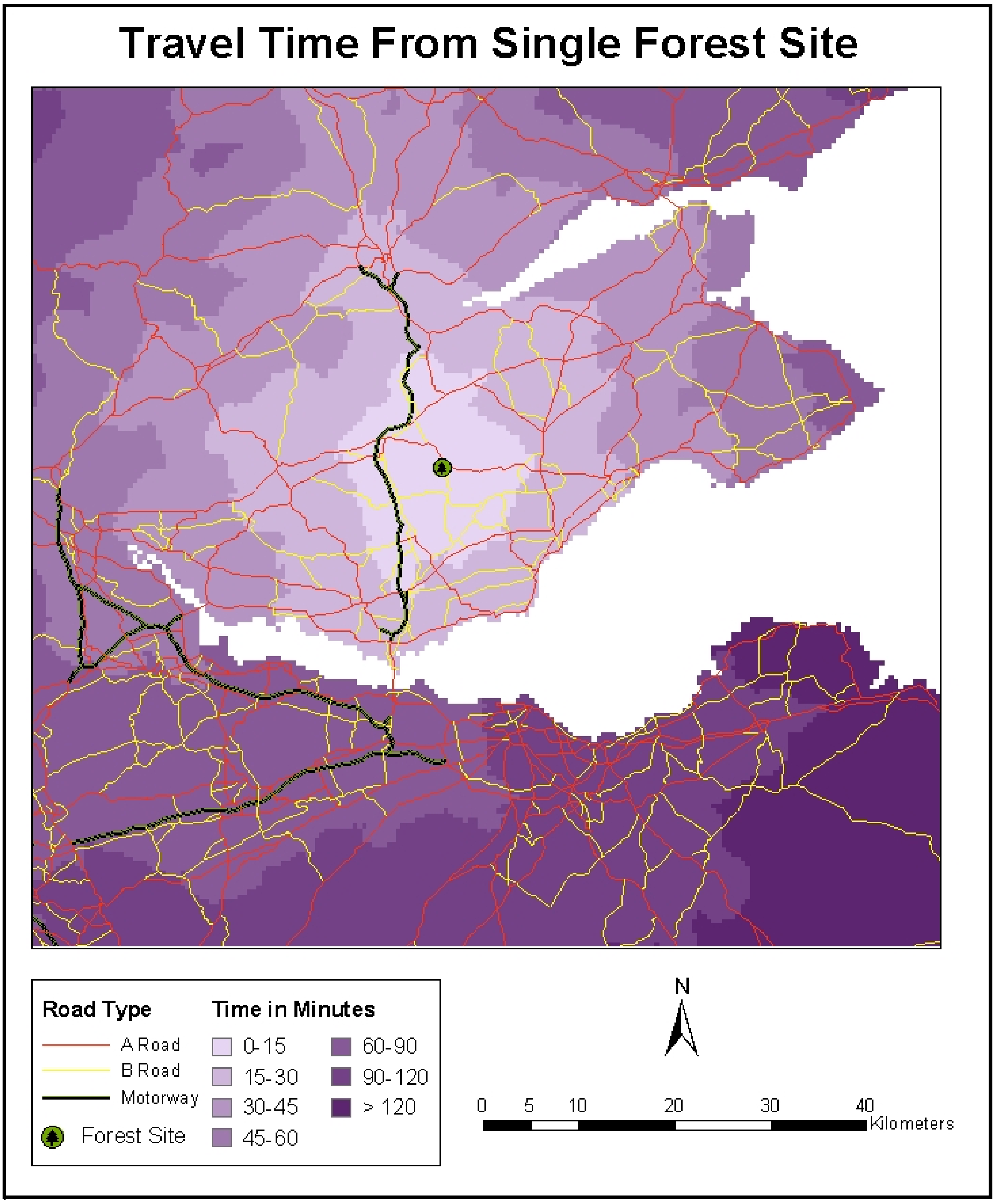





**Figure 2.6 Census output area points overlaid on cost distance surface from a single forest site**




"This work is based on data provided with the support of the ESRC and JISC and uses boundary material which is copyright of the Crown, the Post Office and the ED-LINE Consortium."

**Figure 2.7 Travel times away from a single forest site**

**Substitute availability to other woodland**

The availability of other forests in proximity to a visitor's outset could influence whether they visit a given site. An effort was made to quantify the availability of other woodlands in the proximity of the visitor outset locations (enumeration district or census output area centroids) in relation to a given forest site. Index's of relative accessibility to substitute forests will be devised for each of the six travel time bands, following the method employed by Jones *et al.* (2002). All GIS analysis for each forest site was restricted to a bounding rectangle defined as being 150 km in each direction from the given forest site (the analysis extent). Only woodlands falling in this area were considered in the substitute availability calculation. The woodland spatial data (polygons) from Bartholomew's digital database was used.

This data was broken into three classes (small, medium and large woodlands) based on area. Small woodlands were those less than 50 ha, medium woodlands were between 50-100 ha, and large woodlands were over 100 ha. This breakdown was achieved after investigating the distribution of woodland areas. A roughly equal number of woodland polygons fell in each of the three classes. The three types of woodland data were converted from vector to raster in order to do cost distance modelling. Figure 2.8 shows the three different classes of woodland.

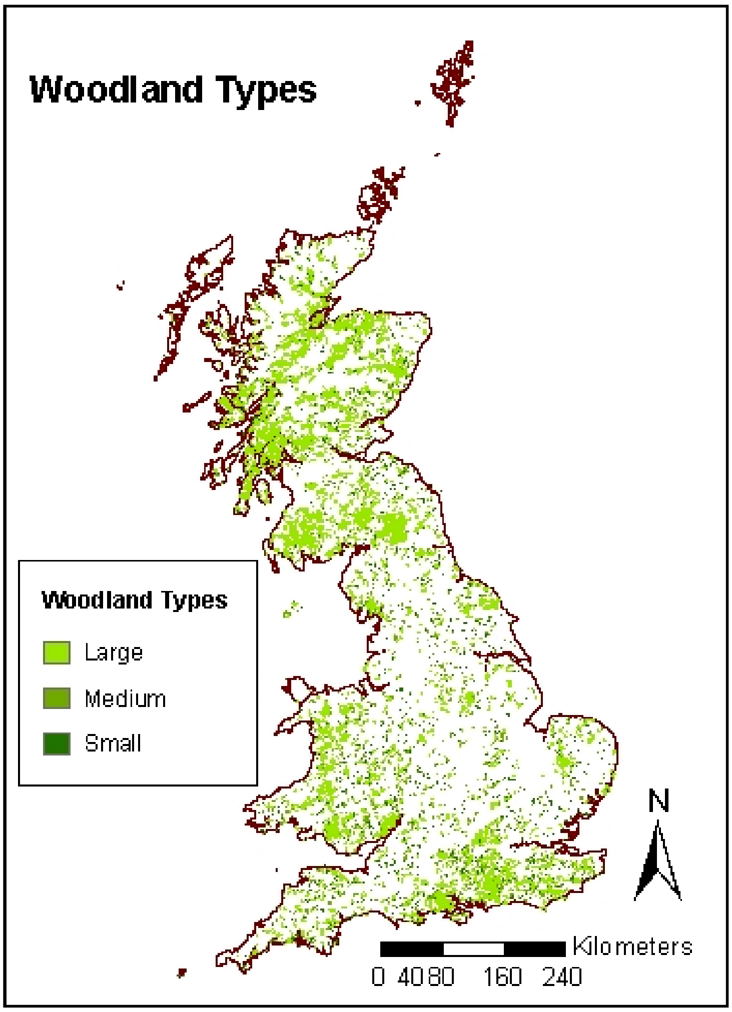



**Figure 2.8 Different size woodlands from Bartholomew's digital database**

Another routine was developed with Avenue to calculate a travel time surface for each type of woodland. The travel time surface for the large woodland area is shown in Figure 2.9. This routine used the road network grid that was used in the travel time calculation described above. A gravity model was used to weight the travel times to the various woodlands. First the total area of each type of woodland falling in the given forest site's analysis extent was calculated. The total area of all woodland was calculated for the analysis extent. The ratio for each type of forest was calculated as:

Woodland Type Ratio = Woodland Type Area / Total Woodland Area

The calculated ratios were used as a weighting mechanism by multiplying the ratio for each woodland type by the corresponding travel time surface. This methodology is similar to that used by Jones *et al*. (2002). The resulting accessibility surfaces are an index of substitute accessibility. This weighting procedure was used because it is assumed that larger forests are more likely to draw visitors than smaller forests.

The three substitute accessibility scores were assigned to each enumeration district or census output area centroid cell in the same manner as described above. The average substitute for the six time bands defined above was calculated using the ZonalStatsTable request in Avenue for each of the three substitute accessibility scores. These values were included in the final table to be used for the regression analysis organized by time band and woodland type.

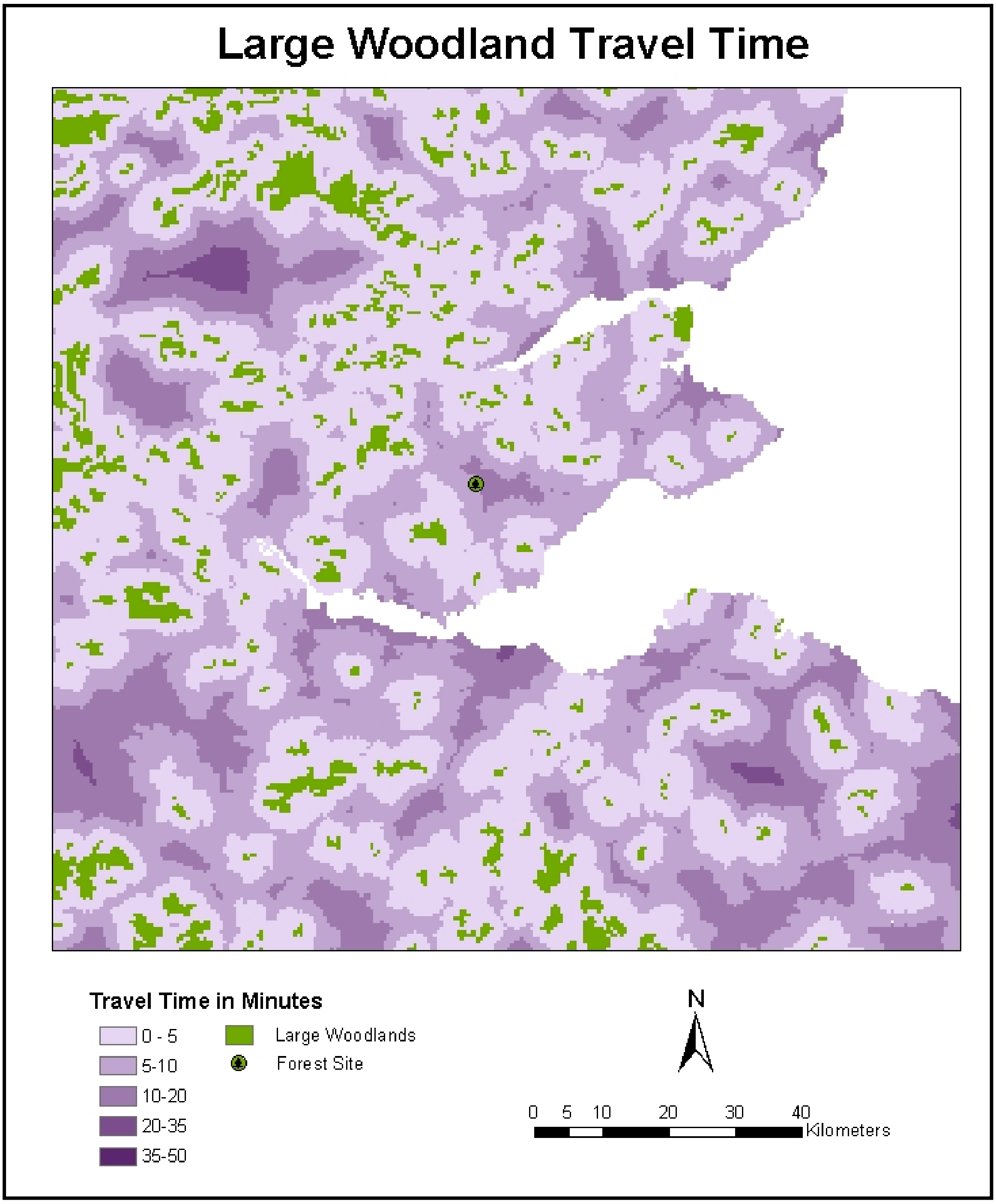



**Figure 2.9 An example travel time surface from large woodlands**

# CHAPTER 3 FOREST VISITOR SURVEY

## 3.0 INTRODUCTION

This chapter presents the results from the forest visitor survey. A total of 1,907 face to face interviews with adults (aged 16 or over) were undertaken at a stratified sample of 44 sites located throughout England, Scotland and Wales. They were carried out during the months of July, August and September 2002 and spread across weekdays and weekends. Interviews were generally conducted at entrance/exit points of each forest/woodland. Each site had one interviewer and respondents were selected for interview on a continuous survey basis, where-by the next person to pass the interviewer after completion of the previous interview was approached. Where a group of people were approached, one person was selected for interview. A quota of 45 interviews was set at each site, although not completed at some sites where visitors were particularly sparse. No other quotas were set.

## 3.1 THE SAMPLE

To inform the analysis, respondents were asked to provide some details about themselves. Table 3.1 presents the gender profile of respondents.

**Table 3.1 Gender profile (%)**

| | FE | Non-FE | E | S | W | GB |
|---|---|---|---|---|---|---|
| *n* | *1303* | *602* | *723* | *588* | *594* | *1905* |
| Male | 56 | 50 | 54 | 56 | 53 | 54 |
| Female | 44 | 50 | 46 | 44 | 47 | 46 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 |

Across the total sample, males accounted for a slightly higher proportion of respondents than females. These proportions varied only slightly across the regions. There was a slightly larger variation between ownership, with the proportion of respondents to non-FE sites being split evenly between males and females. The age profile is presented in Table 3.2 (the minimum age of respondents was 16 years).

**Table 3.2 Age profile (%)**

| | FE | Non-FE | E | S | W | GB |
|---|---|---|---|---|---|---|
| *n* | *1297* | *601* | *719* | *587* | *592* | *1898* |
| 16-24 | 5 | 8 | 5 | 6 | 8 | 6 |
| 25-34 | 16 | 13 | 15 | 18 | 11 | 15 |
| 35-44 | 27 | 21 | 28 | 22 | 25 | 25 |
| 45-54 | 19 | 21 | 20 | 23 | 17 | 20 |
| 55-64 | 18 | 20 | 17 | 20 | 19 | 19 |
| 65+ | 15 | 17 | 15 | 11 | 20 | 15 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 |

Those aged between 35-44 years were the largest age group represented across the overall sample, and 79% of all respondents were aged between 25 and 64 years. There was relatively little variation in the age profile across the countries and between FE and non-FE forests/woodlands. The employment profile of respondents is presented in Table 3.3.

**Table 3.3 Employment status (%)**

| | FE | Non-FE | E | S | W | GB |
|---|---|---|---|---|---|---|
| *n* | *1296* | *601* | *715* | *589* | *593* | *1897* |
| Working full-time | 52 | 44 | 45 | 55 | 48 | 49 |
| Working part-time | 11 | 10 | 14 | 8 | 10 | 11 |
| House husband/wife | 6 | 9 | 8 | 6 | 6 | 7 |
| Retired | 24 | 30 | 26 | 24 | 28 | 26 |
| Unemployed | 1 | 2 | 1 | 2 | 1 | 1 |
| Not working: disability/sickness | 1 | 0 | 1 | 1 | 1 | 1 |
| At school | 1 | 0 | 1 | 0 | 0 | * |
| In full-time higher education | 3 | 4 | 2 | 3 | 6 | 3 |
| In further education or training | 1 | 1 | 1 | 1 | 0 | 1 |
| Other | 0 | 0 | 1 | 0 | 0 | * |
| Total | 100 | 100 | 100 | 100 | 100 | 100 |

* - less than 0.5%

Those in full-time employment were the largest group of respondents, representing just under half (49%) of the total sample. Just over a quarter (26%) of visitors were retired, reflecting the age profile of respondents. The overall employment distribution is consistent with the employment profile found for respondents in the recent survey of visitors to Woodland Trust sites in Scotland. (WT, 2002). Table 3.4 presents respondents by trip type analysed between GB residents and visitors from overseas. Overall, 96% of respondents were resident in the GB. This is also consistent with findings from the Woodland Trust survey.

**Table 3.4 Trip type by origin of respondents (%)**

| | *n* | GB | Overseas |
|---|---|---|---|
| On a short trip (of less than 3 hours) from home | *922* | 100 | 0 |
| On a day out (of more than 3 hours) from home | *211* | 100 | 0 |
| On a holiday away from home staying in area | *618* | 92 | 8 |
| On holiday visiting friends and relatives in area | *83* | 83 | 17 |
| Passing through area to/from holiday destination | *57* | 79 | 21 |
| Other | *5* | 100 | 0 |
| Total | *1896* | 96 | 4 |

Over half (51%) of all GB resident respondents were on a short day trip from home of less than 3 hours and were not, therefore, counted as a ‘tourist’ for the purpose of this study. Not surprisingly, all respondents on a day trip from home were GB residents. Only 8% of those on holiday staying in the area were overseas visitors, although this represents about two thirds (64%) of all overseas respondents. Table 3.5 presents the same breakdown but for the 'tourist' trip categories only, analysed by country.

**Table 3.5 Type of trip for all respondents by country (%)**

| | E | S | W | GB# |
|---|---|---|---|---|
| *n* | *340* | *264* | *370* | *974* |
| On a day out (of more than 3 hours) from home | 35 | 29 | 5 | 22 |
| On a holiday away from home staying in the area* | 47 | 56 | 84 | 63 |
| On holiday visiting friends and relatives in the area* | 12 | 7 | 6 | 9 |
| Passing through the area* to/from your holiday destination | 6 | 8 | 4 | 6 |
| Other | 0 | 0 | 1 | 0 |
| Total | 100 | 100 | 100 | 100 |

E = England, S= Scotland and W = Wales. * The area was undefined, with the respondent deciding whether they were staying in the "area" or not. # This is a simple mean of the data and is unweighted, i.e. it does not take into account country stratification.

Just over a fifth of all tourists were on a day trip from home, whilst just under two thirds were holidaymakers staying in the area. The differences in the pattern of trip types between countries was statistically significant (chi-square 130.8, $p < 0.001$), with tourism visitors in Wales much more likely to be holidaymakers than in England and Scotland. The reason for such a low resident to holidaymaker ratio in Wales is not immediately obvious raising questions over the representativeness the sites selected. In the total (unweighted) GB sample, only around a fifth of all tourism visits were made by GB residents on a day trip from home, with 78% being made by holidaymakers. This is higher than that found in an analysis of Forestry Commission data, where only 62% of tourism visits to forests were made by holidaymakers[11].

## 3.2 THE IMPORTANCE OF FORESTS IN TRIP LOCATION DECISIONS

As set out in Chapter 2, the general method for apportioning forest-related tourism expenditure requires a distinction be made between forest visits on the basis of trip purpose. Respondents were asked whether:

- they had specifically set out to visit the forest and not do anything else,
- they had set out to visit the forest as part of a trip combining a range of activities, or
- they had not initially intended to visit the forest but had decided to visit while passing.

Table 3.6 presents 'tourism' visits analysed by current trip purpose.

**Table 3.6 Trip purpose for tourism forest visits (%)**

| | E | S | W | All |
|---|---|---|---|---|
| *n* | *340* | *264* | *370* | *972* |
| Forest only | 76 | 62 | 65 | 68 |
| Forest combined | 17 | 23 | 17 | 19 |
| Casual | 7 | 15 | 18 | 13 |
| Total | 100 | 100 | 100 | 100 |

[11] From an analysis of 32,000 interviews at GB forests sites undertaken by the Forestry Commission.

For 68% of all tourism day trips the forest visit was the main reason for the trip, whilst 19% combined their forest visit with other activities on their day trip. Only 13% had not initially intended to visit a forest on their day trip. There was a significant difference between countries in terms of the percentage of visits made by each trip purpose (Chi-square 30.65, $p < 0.001$). That is, tourists in Wales and Scotland on a day trip are more likely to combine their visit to a forest with a visit to another destination, than tourists in England on a day trip. Once again, it is not immediately clear why this should be the case, but it may be related to the higher proportion of holidaymakers surveyed in Scotland and Wales.

## 3.3 TOURISM EXPENDITURE

Individuals were asked to specify for their current trip, the amount they or their group[12] had spent or expected to spend on their trip. Table 3.7 presents the mean day visit expenditures for 'tourism' visits, split between day visits from home and day visits from holiday bases[13].

**Table 3.7 Mean total expenditure by type, country & purpose (£ person$^{-1}$ visit$^{-1}$)**

| Country | Type | Forest only | Forest-combined |
|---|---|---|---|
| England | Day trip from home | 6.39 | 9.60 |
| | Day trip from holiday base | 8.44 | 23.16 |
| Scotland | Day trip from home | 5.93 | 5.24 |
| | Day trip from holiday base | 12.57 | 14.97 |
| Wales | Day trip from home | 10.97 | 10.33 |
| | Day trip from holiday base | 7.15 | 8.15 |

For England and Scotland, mean total expenditure is higher for holidaymakers than for day visitors from home. However, this is reversed in Wales, where day visitors had the highest and the holidaymakers the lowest mean total expenditure levels for the three countries[14]. The figures compare favourably with those reported by the UKDVS for tourism[15] day trips to the countryside of £15.20 and to woodlands of £8.90 in GB respectively (Countryside Agency, 1999). Form the visitor survey, the proportions of mean total expenditure for the different expenditure categories are for 'Forest Only' trips presented in Table 3.8.

[12] Where expenditure figures were given for a group they were divided by the party size to get the mean expenditure per person per trip.
13 Due to the relatively small numbers of visitors in each category, a single holiday maker category was used.
[14] The reason for this is not immediately apparent.
[15] Here the definition of a tourist visit is trips with a duration of 3 hours or more and non-regular in nature.

**Table 3.8 Expenditure per category expressed as proportion of mean expenditure figures for Forest Only tourism visits (%)**

| | England | | Scotland | | Wales | |
|---|---|---|---|---|---|---|
| | Trip from home | Trip on holiday | Trip from home | Trip on holiday | Trip from home | Trip on holiday |
| *n* | *96* | *157* | *54* | *99* | *12* | *220* |
| Travel | 45 | 34 | 58 | 26 | 58 | 42 |
| Food/drink | 33 | 49 | 39 | 39 | 24 | 34 |
| Entertainment | 16 | 8 | 0 | 13 | 0 | 5 |
| Clothing etc. | 0 | 0 | 0 | 1 | 0 | 1 |
| Gifts/souvenirs | 5 | 5 | 0 | 6 | 11 | 17 |
| Other | 1 | 4 | 3 | 15 | 7 | 1 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 |

The proportion of mean total expenditure for each expenditure category (i.e. travel, food, etc.) for Forest Combined trips is presented in Table 3.9.

**Table 3.9 Expenditure per category expressed as percentage of mean expenditure figures for Forest Combined tourism visits (%)**

| | England | | Scotland | | Wales | |
|---|---|---|---|---|---|---|
| | Trip from home | Trip on holiday | Trip from home | Trip on holiday | Trip from home | Trip on holiday |
| *n* | *14* | *41* | *11* | *49* | *3* | *59* |
| Travel | 41 | 16 | 57 | 24 | 60 | 41 |
| Food/drink | 52 | 70 | 36 | 36 | 40 | 35 |
| Entertainment | 6 | 4 | 0 | 13 | 0 | 6 |
| Clothing etc. | 0 | 0 | 0 | 1 | 0 | 4 |
| Gifts/souvenirs | 1 | 6 | 6 | 7 | 0 | 13 |
| Other | 0 | 4 | 1 | 19 | 0 | 1 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 |

Overall, these figures are broadly consistent with those reported by the UKDVS for the pattern of expenditure of tourism day visit trips from home to woodland (Countryside Agency, 1999). However, the small sample sizes for some categories of visitor suggest caution is required when using the results at a country level.

## 3.4 APPORTIONING TOURISM EXPENDITURES FOR COMBINED TRIPS

The general method for apportioning forest-related tourism expenditure was set out in Chapter 2. In order to inform the 'expenditure partition' approach, it was necessary to gauge the relative importance of forests in motivating combined trips compared to other reasons. Respondents were asked to specify up to four[16] other reasons why they had made the trip and score each reason from 1-10, where 1 was not important and 10 was very important. Respondents were then asked to score the importance of forests

[16] From the pilot survey most respondents generally specified four or less reasons for undertaking a day trip.

relative to their other reasons. Table 3.10 presents the mean forest score as a proportion of the mean sum of the scores for all trip motivating reasons analysed by country.

**Table 3.10 Mean forest score as proportion of sum of scores for factors motivating day trips (%)**

| | E | S | W | Total |
|---|---|---|---|---|
| *n* | *55* | *59* | *58* | *172* |
| | 46.7 | 44.7 | 42.8 | 44.7 |

The results show that the relative importance of the visit to a forest in motivating a combined trip is similar across the three countries, with the forest visit being only slightly more important in England, than in Scotland or Wales. Overall, the differences between the countries were not statistically significant. Thus, it was assumed that 44.7% of all expenditure for combined visitors was attributable to forest-related tourism. This is approximately midway between the possible range of 2-91% based on the method used.

# CHAPTER 4 DEVELOPING A TRANSFERABLE TRIP GENERATING FUNCTION (TGF) FOR PREDICTING DEMAND FOR FOREST RECREATION IN THE GB

## 4.0 INTRODUCTION

The main purpose of this chapter is to present the results from the extensive regression modelling exercise aimed at developing a transferable Trip Generating Function (TGF) to model demand for recreation in all GB woodlands, including un-surveyed sites. Both the 'forest' and 'individual' models were considered. The first section of the chapter presents the results of the 'forest' model, the second section presents the results for the 'individual' model.

## 4.1 FOREST MODELS TO PREDCIT NUMBERS OF ALL VISITS TO GB WOODLANDS

### 4.1.1 Model specification

The developed Trip Generating Functions (TGF's) described and presented in this section involve those which aim to predict visitor numbers to a forest, based on the initial form:

$$Visits_i = f\,(Att_i, Pop_i, Sub_i\; Char_i)$$

Where $Visits_i$ is the number of visits made to forest i, $Att_i$ are variable(s) to reflect the attributes of site i, $Pop_i$ is a variable for the population that lives within a given travel time(s) of forest i,; $Sub_i$ is a variable to represent the accessibility of substitute forest sites from outset zones and $Char_i$ are variables to indicate the socio-economic characteristics of the population within a given travel time(s).

The basic analytical method follows that used by Brainard *et al.* (2002) who were successful in developing simple but robust stand-alone functions to describe visits across many sites in England. The approach involves fitting various linear regression models with the natural logarithm of forest visitor counts as the dependent variable (VIS_COUNT)[17]. Here the dependent variable was the total number of 'all' visits to a site in 1999, as measured by the managing organisation (see Table 2.4). Based on findings in previous studies, independent variables are derived and selected from each of the following four groups:

a) Forest attributes.
b) Population within six travel time zones around each forest.
c) Substitute accessibility indexes for small, medium and large woodlands in six travel time zones around each forest.
d) Socio-economic characteristics of population within six travel time zones.

In the first instance a series of correlations are fitted, taking each specified predictor variable in turn and examining its independent influence over the variation in the

[17] The negative binomial and Poisson distributions have often been applied to represent the distributions of visits and trips, which contain non-zero positive integer data. These were attempted here but the data gave a very poor model fit. It was therefore decided to follow Brainard et al's (2002) approach and take the natural logarithm of the visit count as the dependent variable. Indeed, many studies incorporating UK travel cost models for forest recreation have concluded that the semi-log form provides the most satisfactory model specification.

dependent variable. Results from the correlations are then used to inform specification of the multiple regression models, which take relative influences into account and aim to identify the most parsimonious models that explain visitor numbers to sampled woodlands using backward stepwise techniques. The remainder of this section details the procedures for specifying the independent (predictor) variables.

**a) Attribute variables**

Given that forest attribute data had been gathered on a total of 19 forest attributes (and a further 8 'sub-attributes') a consideration was: 1) their potential influence over degrees of freedom given that only 100 observations would be entered into the analysis; and 2) the strong likelihood of multi-collinearity given that a number of these attributes often act as surrogates for others, a factor which is unavoidable.

This pointed towards the need for an 'attribute index' variable to indicate the number of attributes at each site. This is similar to the approach employed by Brainard *et al.* (2001) who used a number of facilities' variable to circumvent problems of multi-collinearity in trying to incorporate many site traits. The problem with Brainard's approach was that it allowed for no explicit weighting for less or more attractive facilities, a factor which may explain why the facilities variable was not found to be significant.

***Attribute index creation***

To improve on Brainard *et al's* (2001) method we thus created a 'weighted attribute index', derived from rankings provided by a random sample of 635 respondents to the forest specific visitor surveys[18]. From a list of 19 forest attributes in the survey respondents were asked to a) identify which attributes had a positive influence on their decision to visit the site; and b) to rank these selected attributes in terms of their influence on their decision to visit[19]. Thus, if 5 attributes were selected, rankings were from 1 to 5, where 1 was the most important. These rankings were subsequently used to derive the weighted index.

For each of the 19 attributes the sum of all rankings and the mean of all rankings were calculated. This provided an indication of a) how frequently the relevant attribute was cited as being important in the decision to visit, with higher sums indicating higher importance irrespective of rank; and b) the relative importance of the attribute in the decision to visit, with lower means indicating higher importance.

The total sum of all 19-attribute sums was calculated which enabled a proportional measure of ranked frequency to be calculated for each attribute. To take into account both frequency and ranking, a weighted index was then created by dividing the proportional indicator of ranked frequency by the mean rank for the attribute. For convenience the index was subsequently taken in the interval [0,1].

Two un-weighted attribute indexes were also computed so that any differences could be compared. (This comparison also acted as a useful external validation for the relevant question in the survey). In both indices, all attributes were assigned a value of 0.1. Thus, if a site contained any 5 attributes from the list it would have an index of

[18] Again, the forest specific survey provided the opportunity to refine the analyses of secondary data. The 635 observations, which accounts for approximately one third of the entire sample, were deemed a sufficient number from which to derive an index.

[19] See Question 19 of the forest specific survey, which is situated in the Appendix to Chapter 3.

0.5. One index related to the case of 19 attributes to provide a direct comparison to the weighted index derived from the primary surveys. Thus, the index was in the interval [0,1.9].

The second un-weighted index was based on inclusion of a further 8 'sub-attributes' for which information was available from secondary data. These sub-attributes were excluded from the primary survey as they could not be easily recognised as distinct attributes in their own right. This un-weighted index was thus in the interval [0,2.7]. Respective values for the three attribute indexes are contained in Table 4.1, which also indicates the aggregate rank for the 19 attributes on the basis of their perceived influence on decision to visit sampled forests.

**Table 4.1 Weighted and un-weighted index values for forest attributes**

| FOREST ATTRIBUTES | Un-weighted index value | Weighted index value | Rank (1-19) |
|---|---|---|---|
| **CAR PARK** | 0.1 | **0.1701** | **2** |
| **PICNIC SITE** | 0.1 | **0.1236** | **3** |
| **FOREST WALK** | 0.1 | **0.2161** | **1** |
| CYCLE TRAIL | 0.1 | 0.0460 | 7 |
| HORSE RIDING ROUTE | 0.1 | 0.0035 | 15 |
| ORIENTEERING COURSE | 0.1 | 0.0030 | 16 |
| PLAY EQUIPMENT | 0.1 | 0.0287 | 10 |
| FOREST DRIVE | 0.1 | 0.0391 | 8 |
| **VIEWPOINT** | 0.1 | **0.1024** | **5** |
| HIDES | 0.1 | 0.0080 | 13 |
| Wildlife activities | 0.1 | - | - |
| CAMPING/CARAVAN SITE | 0.1 | 0.0064 | 14 |
| YOUTH CAMPING/ BACKPACKING | 0.1 | 0.0015 | 18 |
| BOTHIES | 0.1 | 0.0015 | 18 |
| VISITOR CENTRE | 0.1 | 0.0786 | 6 |
| Cafe | 0.1 | - | - |
| Shop | 0.1 | - | - |
| Bike hire | 0.1 | - | - |
| FOREST INTERPRETATION CENTRE | 0.1 | 0.0114 | 11 |
| FOREST CLASSROOM | 0.1 | 0.0020 | 17 |
| **TOILETS** | 0.1 | **0.1152** | **4** |
| DISABLED FACILITIES | 0.1 | 0.0090 | 12 |
| Toilets | 0.1 | - | - |
| Disabled walks | 0.1 | - | - |
| Access to shop | 0.1 | - | - |
| WATER FEATURE / FISHING | 0.1 | 0.0351 | 9 |
| Fishing | 0.1 | - | - |

A total of nine forest attributes were selected for inclusion as presence/absence dummy variables in the analysis to examine for any exclusive influences over visitor numbers. It seemed appropriate to select the top 5 attributes from the weighted index as all had an index value of more than 0.1. Thus, taken together these 5 attributes effectively counted for more 50% of all perceived influence over the decision to visit sampled forest sites. These were, in order of importance, forest walks, car parks, picnic sites, toilets and viewpoints.

A further four attributes were selected on the basis of findings from previous studies. These were visitor centres, water features, cycle trails and camping/caravan sites. Other attributes previously found to be useful predictors of visitor numbers or willingness to pay for forest recreation in previous studies were car park capacity, length of walking trails and number of walking trails; all of which were put forward for inclusion as continuous predictors in the analysis.

The forest managers' survey also allowed collection of forest size and age (based on average age of the forest stand) data, also deemed to be useful predictors of recreation demand. Although the forest manager surveys provided data on forest species this was not as comprehensive as was hoped, allowing only a simple differentiation between broadleaved, coniferous and mixed stands.

Apart from forest ownership (FE, WT and RSPB), a regional variable was also created to examine any potential differences between England, Scotland and Wales in terms of demand for forest recreation.

Despite efforts to collect attribute information for all 101 forest sites, there was some missing data on individual attributes and continuous data on car park capacity and length of walking trails. To maximise total degrees of freedom, and to capitalise on the compete data set for other variables made possible by use of the GIS, all missing attribute data was replaced by the series mean for the relevant variable.

**b) Population variables**

The total demographic population within the six time zones was calculated and subsequently re-specified to represent the total population within staged travel time zones *from* the forest site, following previous approaches used to model forest recreation demand (Brainard *et al*., 2001; Lovett *et al*., 1997). Five predictor variables were thus created based on population within 30, 45, 60, 90 and 120 minutes of the forest site. The natural logarithm of each variable was taken to improve distribution for model fitting. As population data was collated in the GIS, missing data was not an issue.

**c) Substitute woodland variables**

Variables relating to indices of accessibility to the nearest substitute forest or woodland were also assembled for each of the six travel time zones in the GIS. This produced a total of 18 variables, with indices differentiated in terms of whether the nearest substitute woodland was small, medium or large. Predictor variables were derived in the same as the population variables, producing 15 zonal substitute accessibility predictors for inclusion in the modelling. A further 5 zonal predictor variables were specified to represent accessibility to all woodlands irrespective of size. Again, the natural logarithm was take of each variable to improve model fit, more specifically the distribution of error terms.

**d) Socio-economic variables**

A number of socio-economic variables were assembled in the GIS for consideration later. Based on findings from previous studies, ten socio-economic variables (Table 4.2) were selected on *a priori* assumptions of being significant factors influencing visitation rates. These were derived from ONS 1991 data and were assembled in the GIS for each of the six travel time bands.

**Table 4.2 Socio-economic variables included in models**

| |
|---|
| Affluence |
| Number of households classified as social class 1 or 2 |
| Number of owner occupied households |
| Deprivation |
| Number of economically active male population unemployed |
| Number of adult population in local authority/housing association accommodation |
| Age |
| Number of population aged under 9 years |
| Number of households with dependent children |
| Number of households with retired head |
| Ethnicity |
| Number of population classified as ethnic (Black, Indian, Pakistan, Bangladesh, Chinese) |
| Transport availability |
| Number of households with no car |
| Higher education |
| Number of population over 18 with higher degrees |

All ten were re-specified to represent proportional indicators of the population or household as appropriate (i.e. proportion of the population aged under 9 years, proportion of households with a retired head etc.) and put forward for inclusion in the first round of analysis. Descriptions and labels for all independent variables are presented in Table 4.3.

**Table 4.3 Names and descriptions of all independent (predictor) variables**

| Variable name | Variable description |
|---|---|
| **Attribute variables**[1] | |
| (log)ATTINDEX | Weighted attribute index |
| (log)UNWT19 | Un-weighted attribute index |
| (log)CARCAP | Car park capacity (no. of spaces) |
| (log)TRAILEN | Average length of forest trails |
| (log)TRAILNUM | Number of forest trails |
| (log)FORSIZE | Forest size in ha |
| (log))FORAGE | Average age of forest stand |
| CARPK | Car park (1 Present 0 Absent) |
| PICNIC | Picnic area (1 Present 0 Absent) |
| FORWALK | Forest walk (1 Present 0 Absent) |
| CYCLE | Cycle trail (1 Present 0 Absent) |
| VIEWPNT | Viewpoint (1 Present 0 Absent) |
| CAMPING | Camping/caravan site (1 Present 0 Absent) |
| VISITCEN | Visitor centre (1 Present 0 Absent) |
| TOILET | Toilet facility (1 Present 0 Absent) |
| WATERFEA | Water feature (1 Present 0 Absent) |
| OWNDUM | Forest Ownership (1 FE, 0 WT and RSPB) |
| BROAD | Species (1 Broadleaved 0 Coniferous/mixed) |
| REGION | Region (1 England, 0 Scot and Wales) |

| **Population variables** | |
|---|---|
| (log)POP30 | Population within 30 min travel time |
| (log)POP45 | Population within 45 min travel time |
| (log)POP60 | Population within 60 min travel time |
| (log)POP90 | Population within 90 min travel time |
| (log)POP120 | Population within 120 min travel time |
| **Substitute woodland variables** | |
| **All woodlands:** | |
| (log)SALL30 | Substitute accessibility index for all woodlands within 30 min travel time |
| (log)SALL45 | Substitute accessibility index for all woodlands within 45 min travel time |
| (log)SALL60 | Substitute accessibility index for all woodlands within 60 min travel time |
| (log)SALL90 | Substitute accessibility index for all woodlands within 90 min travel time |
| (log)SALL120 | Substitute accessibility index for all woodlands within 120 min travel time |
| **Substitute woodland variables** | |
| **Large woodlands (over 100 ha):** | |
| (log)SLRG30 | Substitute accessibility index for large woodlands within 30 min travel time |
| (log)SLRG45 | Substitute accessibility index for large woodlands within 45 min travel time |
| (log)SLRG60 | Substitute accessibility index for large woodlands within 60 min travel time |
| (log)SLRG90 | Substitute accessibility index for large woodlands within 90 min travel time |
| **(log)SLRG120** | Substitute accessibility index for large woodlands within 120 min travel time |
| **Medium woodlands (50-100 ha):** | |
| (log)SMED30 | Substitute accessibility index for medium woodlands within 30 min travel time |
| (log)SMED45 | Substitute accessibility index for medium woodlands within 45 min travel time |
| (log)SMED60 | Substitute accessibility index for medium woodlands within 60 min travel time |
| (log)SMED90 | Substitute accessibility index for medium woodlands within 90 min travel time |
| (log)SMED120 | Substitute accessibility index for medium woodlands within 120 min travel time |
| **Small woodlands (under 50 ha):** | |
| (log)SSML30 | Substitute accessibility index for small woodlands within 30 min travel time |
| (log)SSML45 | Substitute accessibility index for small woodlands within 45 min travel time |
| (log)SSML60 | Substitute accessibility index for small woodlands within 60 min travel time |
| (log)SSML90 | Substitute accessibility index for small woodlands within 90 min travel time |
| (log)SSML120 | Substitute accessibility index for small woodlands within 120 min travel time |
| **Socio-economic variables** | |
| PERLA120 | Proportion of the population in local authority housing |
| PERHI120 | Proportion of the population with a higher degree |
| PERETH120 | Proportion of the population classified as ethnic |
| PERUN9120 | Proportion of the population under 9 years of age |
| UNPER120 | Proportion of the economically active males unemployed |
| RETIR120 | Proportion of households with a retired head |

| | |
|---|---|
| DEP120 | Proportion of households with dependents |
| OWN120 | Proportion of owner-occupied households |
| CAR120 | Proportion of households with no car |
| SOC120 | Proportion of households in social groups I and II |

[1] Log denotes transformation by the natural logarithm

### 4.1.2 Correlation analysis

The first stage of the forest modelling involved fitting a series correlations to estimate visitor numbers at GB woodlands from the preceding data sets. This involved taking each predictor variable in turn to identify their independent correlation with visitor arrivals. Two sets of correlations were generated, one for all GB sites (including FE, RSPB and WT owned) and one for FE sites only. This was done for 3 main reasons. First, it helped clarify the influence of ownership on the ability of the TGF to predict visitor numbers. Second, it helped to explore any potential variations in the reliability of the visitor data between public and privately owned woodlands, which is particularly important given that some visitor counts of the latter were based on estimates. Third, we needed to bear in mind any potential variations in the availability of forest attribute data for application of the model to non-sampled sites.

Table 4.4 presents the significant t values, coefficients and $R^2$ values for predictor variables of interest, and for 'all-sites' and 'FE-only' sites respectively. Models to predict visitor numbers as a function of forest attributes indicate that the un-weighted attribute index (UNWHT19) has more explanatory power than the weighted one (ATTINDEX) derived from the visitor surveys, with $R^2$ values .138 and .079 respectively for all sites. When the model is fitted for FE only sites, the weighted index falls out and the explanatory power of the un-weighted index falls to .07.

This may indicate that the reason why Brainard *et al.* (2002) did not find the 'number of facilities' variable to be a useful predictor of forest arrivals may be related to the relatively small sample size employed in their study, rather than the fact that index was not weighted to account for the relative attractiveness of individual attributes as they suggest. However, we also need to question the potential validity of the weighted index itself, which may in turn question the reliability of the visitor survey results on reasons to visit the forest. I.e. were the attributes an important consideration before making the trip, or were they just considered during the visit? The time of interview, whether at the start or end of the visit, may help account for this.

Simple but effective models to predict visitor numbers to all sites and FE only sites are obtained from the car park capacity variable (CARCAP), which yields $R^{2}$'s of .216 and .209 respectively. Whilst the influence is clear it may, however, be more correlative rather than causative. One cannot assume that large car parks will attract more visitors than small ones, one the other hand ease of parking may be an issue in the decision to visit, particularly if small car parks are known to reach their capacity quite quickly. The presence or absence of a car park is also included as a dummy variable (CARPK), although its minimal explanatory power can be attributed to the fact that the vast majority of forest visitors arrive by car, and only very few sites have no car park at all. The variable falls out of the FE only model because all sites in the sample have a car park.

The four other continuous attribute variables, which consider the length of forest trails (TRAILEN), the number of trails (TRAILNUM), the size of the forest in ha (FORSIZE) and the average age of the forest stand in years (FORAGE) predict visitor arrivals to varying degrees. The latter is the most useful predictor of forest recreation demand ($R^2$ .157) although the fact that this variable shows no significance in the FE sample implies that forest size is highly correlated with ownership. Further analysis confirms this, with publicly owned sites found to be larger on average than the privately owned sites in sample. The number of trails also proves to be a marginally useful predictor of forest arrivals, independently accounting for around 5% of the variation in the data, with little difference between the two samples. However, the length of the trails, along with the average age of the forest stand, did not prove significant in either case.

Focusing on the presence/absence attribute variables, some interesting findings are evident which are worth some discussion. Of the eight attributes modelled, the presence of a picnic site (PICNIC) is shown to have the greatest influence over visitor numbers ($R^2$ .181), although further investigation reveals that the vast majority of sites in the sample that have a picnic site are publicly owned. In turn this explains why the variable loses its significance when privately owned sites are removed from the sample. More importantly, it also indicates that the variable acts as a pseudo surrogate for ownership, which itself (OWNDUM) is shown to be the most useful predictor of visitor arrivals to all sampled sites ($R^2$ .277).

The same issue is relevant to the presence of cycle trails (CYCLE), whereby the explanatory power of the variable falls from .111 to .032 when privately owned woodlands are removed from the sample. Likewise, the species dummy (BROAD), whilst proving an important predictor of visitor numbers ($R^2$ .258), may also be acting as a surrogate for ownership as, in this sample, no wholly broadleaved sites are publicly owned. Thus, the reliability of this attribute for predicting demand for forest recreation is brought into question.

The presence or absence of a visitor centre (VISITCEN) proves a robust predictor of demand for forest recreation, irrespective of ownership. This variable explains 11% of the variation in visitor numbers, a figure which increases to 17% for FE owned sites. Likewise, a positive correlation is shown between forests where there is a toilet on site (TOILET) and visitor arrivals. However, the explanatory power of this variable is greatly reduced when privately owned sites are removed from the sample, which may indicate that most publicly owned sites with a visitor centre also have a toilet facility.

The final attribute dummy, which distinguishes between sites with or without a water feature (WATERFEA) is the only one (apart from BROAD) to have a negative sign on the coefficient, indicating that those FE sites without water features receive more visitors than those with. This is difficult to explain. It may be that the finding is reflecting some other, unobserved, characteristic of forest sites with water features that may also affect visitor numbers.

The explanatory power of the final attribute variable differentiating between Forest sites in England and those located in Wales and Scotland (REGION) is shown to be relatively high, particularly in the FE only sample, where it accounts for a third of all variation in the dependent variable. This would indicate that visitor numbers to forests are higher in England than they are in the other two regions, which some further analysis confirms. However, one cannot necessarily assume that this can be translated into demand for forest recreation in the GB because the population density is higher, and relative accessibility easier, in England compared to Scotland and Wales. Thus, whilst aggregate demand for forest recreation may be higher, relative demand may in fact be fairly constant across the regions.

**Table 4.4 Correlations between visit numbers and all variables considered for the forest model** (Coefficients given for significant variables only) [1]

| | ALL SITES | | | FE ONLY SITES | | |
|---|---|---|---|---|---|---|
| **Attribute variables[2]** | **B** | **t** | **R-square (adj)** | **B** | **t** | **R-square (adj)** |
| (log)ATTINDEX | 1.035 | *3.079 | 0.079 | | | |
| (log)UNWT19 | 0.854 | *4.099 | 0.138 | 0.583 | **2.449 | 0.07 |
| **(log)CARCAP** | **0.67** | ***5.321** | **0.216** | **0.499** | ***4.289** | **0.209** |
| (log)TRAILEN | | | | | | |
| (log)TRAILNUM | 0.588 | **2.563 | 0.053 | 0.437 | ***1.998 | 0.043 |
| (log)FORSIZE | 0.314 | *4.413 | 0.157 | | | |
| (log))FORAGE | | | | | | |
| CARPK | 1.53 | *3.059 | 0.079 | n/a | n/a | n/a |
| PICNIC | 1.319 | *4.757 | 0.181 | | | |
| FORWALK | | | | | | |
| CYCLE | 1.081 | *3.626 | 0.111 | 0.501 | ***1.792 | 0.032 |
| VIEWPNT | | | | | | |
| CAMPING | | | | | | |
| VISITCEN | 1.049 | *3.652 | 0.115 | 1.059 | *3.818 | 0.17 |
| TOILET | 1.09 | *4.164 | 0.147 | 0.516 | ***1.870 | 0.036 |
| WATERFEA | | | | -0.6 | **-2.194 | 0.055 |
| **OWNDUM** | **1.589** | ***6.239** | **0.277** | n/a | n/a | n/a |
| BROAD | -1.876 | *-5.490 | 0.258 | n/a | n/a | n/a |
| **REGION** | 1.344 | *5.320 | 0.216 | **1.322** | **5.793** | **0.33** |

| **Population variables** | **B** | **t** | **R-square (adj)** | **B** | **t** | **R-square (adj)** |
|---|---|---|---|---|---|---|
| (log)POP30 | 0.171 | *2.650 | 0.057 | 0.236 | *4.411 | 0.219 |
| (log)POP45 | 0.203 | *3.010 | 0.075 | 0.251 | *4.487 | 0.225 |
| (log)POP60 | 0.279 | *3.632 | 0.11 | 0.326 | *5.049 | 0.271 |
| **(log)POP90** | 0.337 | *4.075 | 0.136 | **0.387** | ***5.456** | **0.304** |
| **(log)POP120** | **0.373** | ***4.208** | **0.144** | 0.391 | *5.163 | 0.28 |

| **Substitute woodland variables** | **B** | **t** | **R-square (adj)** | **B** | **t** | **R-square (adj)** |
|---|---|---|---|---|---|---|
| **All woodlands:** | | | | | | |
| (log)SALL30 | | | | | | |
| (log)SALL45 | 0.921 | **2.333 | 0.043 | 0.795 | ***1.864 | 0.036 |
| (log)SALL60 | 1.309 | *3.089 | 0.079 | 1.275 | **2.741 | 0.09 |
| (log)SALL90 | 1.621 | *3.548 | 0.105 | 1.664 | *3.269 | 0.128 |
| **(log)SALL120** | **1.774** | ***3.655** | **0.111** | 1.875 | *3.599 | 0.153 |

| | 1.0 ALL SITES | | | FE ONLY SITES | | |
|---|---|---|---|---|---|---|
| **Substitute woodland variables** | **B** | **t** | **R-square (adj)** | **B** | **t** | **R-square (adj)** |
| **Large woodlands (over 100 ha):** | | | | | | |
| (log)SLRG30 | | | | | | |
| (log)SLRG45 | 0.585 | ***1.755 | 0.021 | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| (log)SLRG60 | 1.037 | **2.674 | 0.058 | 1.078 | *2.723 | 0.089 |
| (log)SLRG90 | 1.484 | *3.289 | 0.09 | 1.6 | *3.351 | 0.134 |
| **(log)SLRG120** | 1.755 | *3.482 | 0.101 | **1.954** | ***3.780** | **0.168** |
| **Medium woodlands (50-100 ha):** | | | | | | |
| (log)SMED30 | 0.46 | **1.997 | 0.029 | | | |
| (log)SMED45 | 0.52 | **2.163 | 0.036 | | | |
| (log)SMED60 | 0.564 | **2.279 | 0.041 | 0.492 | ***1.745 | 0.03 |
| (log)SMED90 | 0.611 | **2.374 | 0.045 | 0.553 | ***1.865 | 0.036 |
| (log)SMED120 | 0.665 | **2.504 | 0.051 | 0.62 | **2.037 | 0.046 |
| **Small woodlands (under 50 ha):** | | | | | | |
| (log)SSML30 | 0.59 | **2.508 | 0.051 | | | |
| (log)SSML45 | 0.634 | **2.530 | 0.052 | | | |
| (log)SSML60 | 0.657 | **2.492 | 0.05 | | | |
| (log)SSML90 | 0.708 | **2.548 | 0.053 | | | |
| (log)SSML120 | 0.76 | **2.617 | 0.056 | | | |
| **Socio-economic variables** | **B** | **t** | **R-square (adj)** | **B** | **t** | **R-square (adj)** |
| PERLA120 | -0.0732 | ***-1.873 | 0.025 | | | |
| PERHI120 | | | | | | |
| PERETH120 | 0.159 | **2.157 | 0.036 | 0.464 | *6.252 | 0.366 |
| PERUN9120 | 1.371 | *3.427 | 0.098 | 1.576 | *4.595 | 0.234 |
| UNPER120 | | | | 0.565 | ***1.980 | 0.042 |
| RETIR120 | 2.587 | *2.839 | 0.067 | | | |
| DEP120 | | | | | | |
| OWN120 | 0.0475 | *2.672 | 0.058 | | | |
| CAR120 | | | | | | |
| SOC120 | | | | | | |

[1]Sig of t *99% (p<0.01)**95% (p<0.05) ***90% (p<0.1)
[2] (log) denotes transformation by the natural logarithm.

Moving on to the five population variables, we find that of the variables derived to indicate population levels within a set driving distance, the 120 minute zone (POP120) is the best predictor of visitor numbers for all forest sites ($R^2$ .144). This is consistent the previous findings of Brainard *et al.* (2002). However, when privately owned forests are removed from the sample two important differences occur. First, the 90 minute drive time (POP90) is a marginally better predictor than the 120 minute zone. Second, the explanatory power of the population is doubled for FE only sites compared to the all sites model ($R^2$ .304). Given the consistent ability of population within set travel time zones to predict visitor arrivals to forests in previous studies, one might therefore assume that the visitor data for FE sites is more reliable than that for the RSPB and WT sites in the sample. Indeed, the fact that some of the latter data was based only on estimates would support this.

As described earlier, the substitute woodland variables are based on an average accessibility index to the nearest woodland for each of the travel time zones. Thus, a lower index equates to a greater ease of accessibility to a substitute woodland that the population within the respective zones might visit as opposed to visiting the woodland in question. Following Jones *et al* (2002), woodlands are differentiated in terms of their size, thus we consider a total of 20 separate equations for this variable, 5 for each of small, medium and large woodlands, and the average of all woodland sizes across the respective travel zones.

The first observation is that the explanatory power of the accessibility indices broadly increases with the size of the substitute woodland, with some deviation in the FE only sample. The second observation is that, as with the population variables, the best predictor of forest visitor numbers is the 120-minute travel time zone. Considering all sites in the sample, the most useful predictor of recreation demand is the accessibility index for all substitute woodlands within the 2-hour travel time (SAL120, $R^2$ .111). The positive sign on the coefficient indicates that the lesser degree of accessibility to the nearest substitute woodland, the higher the demand for visitors to the forest site. However, in the FE-only sample it is the accessibility index for large substitute woodlands within the 2-hour drive time (SLRG120), which proves more useful, with an $R^2$ of .168 comparing to .153 for the equivalent index for all woodlands.

The reason for this is likely to be due to the fact that FE sites are themselves larger, on average, than the privately owned sites in the sample. Thus, visitors may be more likely to visit a substitute site of a similar size (perhaps because it has similar attributes), and possibly even to visit another FE site). The fact that no substitute accessibility indices for small woodlands are significant in the FE only model further supports this argument.

The final set of independent variables relate to socio-economic characteristics of the population within the 2-hour drive time. Surprisingly, car ownership (CAR120) and social class (SOC120) show no significant correlation with visitor arrivals, although this may be due to the fact that the data relates to the 1991 census, and visitor data to 1999/2000.

In the all-sites model, the proportion of the population which are under 9 years (PERUN9120), the proportion of households where the head is retired (RETIR120), the proportion of owner-occupied households (OWN120) and the proportion of the population in local authority housing (PERLA120) are all shown to correlate with forest visitor counts, and in the direction that one would expect. For example, one would expect families with young children and retired households to participate in countryside recreation mode than other groups, and home ownership status is a pseudo surrogate for household income. For the FE-only sample, the population under 9 years variable is consistent, which further supports its reliability as an indicator of forest recreation demand.

However, the remaining correlations evident in this variable group warrant some further investigation to examine their potential reliability. The first is the proportion of the population classified as ethnic (PERETH120), which one might expect to show a negative correlation with visitor arrivals to forests. In fact the correlation is positive, and in the case of the FE only sample, has an extremely high explanatory power relative to all other variables in the analyses. Further investigation reveals that this variable is highly correlated with regional variations (REGION) as there is a much higher proportion of ethnic minorities in England than in Scotland or Wales. Thus it is likely that the variable can only be a realistic predictor of forest recreation demand when modelled within an English, rather than GB data set.

The second is the proportion of the economically male population that is unemployed, which is largely unexplainable apart from the temporal variations between the visitor data and the socio-economic data. Whilst one would expect the unemployed to visit forests less than other social groups, the models seem to suggest otherwise. They do however, have more time available for recreation, and if many sites are close to population centres then costs of visiting forests fall, even for this low-income group. In fact, count models often show a negative relationship between forest visits and income, which may be what is being picked up here.

Further investigation of the home ownership variable also reveals that it is highly correlated with the population within the defined travel zones (and also the population density). Thus, in more densely populated areas, there are more owner-occupied households, which questions the reliability of the variable in its own right. However, there is no such correlation between proportion of owner-occupied households and number of households, which would appear to indicate a relationship between the relative size of owner-occupied and tenant households.

### 4.1.3 Multi-variate forest models

The ultimate aim of the multiple forest modelling is to generate an appropriate TGF that can be aggregated to all non-sampled forest sites in the GB. In the first instance we draw upon the results of the simple forest models to help select appropriate independent variables for consideration in the multiple models. A key reason for pre-selecting variables in such is a way is due to restrictions on degrees of freedom imposed by sample size, which in this case is limited to 101 observations. The rationale for variable selection in the four predictor groups are described below.

***Attribute variables***

The un-weighted attribute index (UNWHT19) proves a useful predictor of forest recreation demand and overcomes the problem of accounting for a large number of attributes within a relatively small sample size, as well as the problem of multi-collinearity caused by inevitable correlation's in presence / absence attribute set. For example, many sites with a cycle trail will also have a forest walk, and those with a visitor centre will often have toilet facilities as well etc. There are also inherent problems in this analysis in that some forest attributes, such as cycle trails and picnic sites, are found to act as surrogates for forest ownership. The species dummy (BROAD) is also dropped at this stage for the same reason.

As well as the un-weighted attribute index, car park capacity (CARCAP) is a clear contender for inclusion in the model, and coefficients from the continuous variables relating to forest size (FORSIZE) and number of trails (TRAILNUM) also warrant initial inspection alongside other predictors of visitor demand, although the former should probably be dropped if ownership is not a direct consideration in the model.

Initial inclusion of the regional (REGION) and ownership (OWNDUM) variations are warranted by the aims of the study, although we recognise that significance of the former is in part related to population density and not necessarily variations in demand for forest recreation *per se*.

***Population variables***
Selection of zonal travel time variables for population is informed by those which exhibit the most explanatory power. Obviously, only one can be selected for inclusion to avoid serious problems of multi-collinearity. Explanatory power varies between the all-sites and FE-only models, thus for the former case the population within 120 minutes travel time is selected (POP120) whilst for the latter the population within 90 minutes (POP90) is likely to prove more useful.

***Substitute woodland variables***
The same principle is followed for selection of the substitute accessibility variables, although again the explanatory power varies between the all-sites and FE-only samples. The accessibility index for all woodlands within the 2-hour drive time (SALL120) is selected for the all sites model, whilst the equivalent index for large woodlands is selected for the FE-only model. As discussed in the previous section, the reason is likely to be due to the relative size of public and privately owned woodlands.

***Socio-economic variables***
All socio-economic variables of interest are specified as the proportion of the population in a 2-hour drive time. The most useful, and reliable, predictor of visitor numbers to forests in this group is the proportion of the population under 9 years of age (PERUN9120), which is put forward for inclusion into both models. The proportion of households with a retired head (RETIR120) is also selected for the all-sites model. All other socio-economic variables are dropped at this stage for the reasons discussed in the previous section.

A summary of all selected predictor variables initially considered for the two sets of modelling is provided in Table 4. 5.

**Table 4.5 Predictor variables selected and initially considered for multiple forest models**

| Variable name | Variable description | All sites | FE sites |
|---|---|---|---|
| OWNDUM | Forest Ownership (1 FE, 0 WT and RSPB) | √ | |
| REGION | Region (1 England, 0 Scot and Wales) | √ | √ |
| (log)CARCAP | Car park capacity (no. of spaces) | √ | √ |
| (log)UNWHT19 | Un-weighted attribute index | √ | √ |
| (log)FORSIZE | Forest size in ha | √ | |
| (log)TRAILNUM | Number of trails | √ | √ |
| (log)POP120 | Population within 120 min travel time | √ | |
| (log)POP90 | Population within 90 min travel time | | √ |
| SALL120 | Substitute index for all woodlands within 120 min travel time | √ | |
| SLRG120 | Substitute index for large woodlands within 120 min travel time | | √ |
| RETIR120 | Proportion of households with retired head | √ | |
| PERUN9120 | Proportion of population under 9 years | √ | √ |

The analytical method employed is multiple linear regression, with predictor variables entered into the model using a backward stepwise procedure[20]. This allows the variation in the dependent variable to be explained by the most parsimonious model, which is logical given that the ultimate aim is to develop a transferable TGF. We present and discuss a total of seven models. Models I to V predict demand for recreation at all forest sites in the sample and models VI and VII forecast visitor arrivals at FE sites only.

Model I includes all 10 variables selected for the all-sites model from Table 2.9, from which the stepwise procedure selects four variables that help explain over half of the variation in the visitor count ($R^2$ .552): forest ownership, the population within a 2-hour drive time, the number of forest attributes and car park capacity. Interestingly the significance of car park capacity falls slightly when the variable is modelled alongside other predictors of visitor demand.

[20] Backward stepwise variable elimination enters all of the variables in the block in a single step and then removes them one at a time based on removal criteria (probability of F 0.1). Studentised residuals were examined to identify outliers, the removal of which accounts for variations in total degrees of freedom between the models. Tolerance statistics were examined in all models to check for possible multi-collinearity among predictor variables, of which no instances were found.

| **Model I (all sites, all selected variables)** | | (t-statistics) |
|---|---|---|
| **(log)VIS_COUNT** | 3.980 | 4.108* |
| OWNDUM | | |
| (log)POP120 | +.340 | 4.883* |
| (log)UNWHT19 | +.537 | 3.315* |
| (log)CARCAP | +.191 | 1.751*** |
| Total d.f. 97 | | |
| **$R^2$ .552** | | |

[1]Sig of t *99% (p<0.01)**95% (p<0.05) ***90% (p<0.1)

Whilst Model I is an effective model to predict visitor numbers to GB forests it takes into account forest ownership, which may not be ideal as we cannot assume that WT and RSPB sites are necessarily representative of all private forests in the GB. Removing the ownership dummy in Model II reduces the explanatory power of the best-fit model by around 15%. Unsurprisingly, we also see that forest size remains in the equation, possibly acting as a surrogate for ownership as discussed in the previous section.

| **Model II (all sites, excluding ownership)** | | (t-statistics) |
|---|---|---|
| **(log)VIS_COUNT** | .246 | .128 |
| RETIR120 | +1.577 | 2.265** |
| (log)POP120 | +.225 | 2.891* |
| (log)FORSIZE | +.185 | 3.088* |
| (log)CARCAP | +.436 | 3.736* |
| Total d.f. 95 | | |
| **$R^2$ .402** | | |

[1]Sig of t *99% (p<0.01)**95% (p<0.05) ***90% (p<0.1)

We therefore generate a new model, this time excluding forest size as well as ownership. The strongest resulting function is given by the coefficients in Model III, which provides a more reliable predictor of visitor numbers irrespective of ownership. It also provides more explanatory power than the previous function ($R^2$ .427), although interestingly the population variable drops out of the equation in favour of the proportion of the population under nine years of age. The number of forest facilities remains, as does car park capacity. However, as discussed in section 2.4.3, the usefulness of car park capacity as a predictor of recreation demand is worth considering, as it is clearly desirable to predict visitor numbers using variables that are more likely to be causative rather than correlative.

| **Model III (all sites, excluding ownership & size)** | | (t-statistics) |
|---|---|---|
| **(log)VIS_COUNT** | -8.814 | -1.825*** |
| RETIR120 | +1.558 | 2.215** |
| PERUN9120 | +1.079 | 3.370* |
| (log)UNWHT19 | +.554 | 3.000* |
| (log)CARCAP | +.407 | 3.794* |
| Total d.f. 92 | | |
| **$R^2$ .427** | | |

[1]Sig of t *99% (p<0.01)**95% (p<0.05) ***90% (p<0.1)

We therefore generate the same model, this time excluding car park capacity as well. The explanatory power of the resulting function falls only slightly ($R^2$ .408). The model predicts visitor numbers to forests on the basis of the number of facilities present at the site, the population within a 2-hour drive time of the site and two socio-economic characteristics of the local population, both of which are plausible indicators of forest recreation demand. I.e. one would expect retired households and those with young families to visit the countryside for recreation more than other socio-economic groups. Thus on balance, Model IV presents a fairly robust function to consider for application to all GB sites, or at least all FE, WT and RSPB sites.

| **Model IV (all sites, excluding ownership, size & car park capacity)** | | (t-statistics) |
|---|---|---|
| **(log)VIS_COUNT** | -14.061 | -2.604** |
| RETIR120 | +1.653 | 2.120** |
| PERUN9120 | +1.415 | 3.665* |
| (log)UNWHT19 | +.733 | 4.241* |
| (log)POP120 | +.160 | 1.815* |
| Total d.f. 93 | | |
| **$R^2$ .408** | | |

[1]Sig of t *99% (p<0.01)**95% (p<0.05) ***90% (p<0.1)

Out of interest, we exclude the un-weighted attribute index from the equation in Model V to examine the relative influence of other predictor variables on visitor numbers to forests. The resulting function includes the two socio-economic variables, and this time the backward stepwise procedure also selects the substitute accessibility index for all woodlands of all sizes and the number of forest trails on site. However, the explanatory power of the model falls quite considerably ($R^2$ .270) and although it is interesting combination of variables, there are no solid reasons for excluding the number of attributes as a potential predictor of visitor arrivals to forests.

| **Model V (all sites, excluding ownership, size, car park capacity & attribute index)** | | (t-statistics) |
|---|---|---|
| **(log)VIS_COUNT** | -14.597 | -2.298** |
| RETIR120 | +2.680 | 2.930* |
| PERUN9120 | +1.299 | 3.123* |
| (log)SALL120 | +.893 | 1.711*** |
| (log)TRAILNUM | +.549 | 2.674* |
| Total d.f. 99 | | |
| **$R^2$ .270** | | |

[1]Sig of t *99% (p<0.01)**95% (p<0.05) ***90% (p<0.1)

In the final two models we exclude privately owned woodlands from the sample and aim to predict demand for forest recreation at FE sites only. In this case the regional dummy remains in the equation, which may indicate that reliable regional variations in visitor numbers to forests are only possible for FE count data. However, as discussed in section 2.4.3, we cannot reliably translate the influence of the regional dummy into relative demand for forest recreation because it is correlated with population density. Thus, we would expect more visitors to sites in England simply because more people reside in a given area.

The function itself predicts over half of total variation in the visitor count ($R^2$ .544) on the basis of the number of forest attributes, relative accessibility to substitute large woodlands, the population with a 90 minute drive time of the site and the GB region, with forests in England showing higher visitors counts than those in Scotland and Wales. Interestingly, car park capacity falls out of the multi-variate equation when we remove private owned woodlands from the sample.

| **Model VI (FE sites, all variables)** | | (t-statistics) |
|---|---|---|
| **(log)VIS_COUNT** | 6.227 | 5.780* |
| (log)SLRG120 | +1.278 | 2.942* |
| (log)UNWHT19 | +.524 | 3.140* |
| (log)POP90 | +.164 | 2.134** |
| REGION | +.659 | 2.532* |
| Total d.f. 63 | | |
| **$R^2$ .544** | | |

[1]Sig of t *99% (p<0.01)**95% (p<0.05) ***90% (p<0.1)

In Model VII we exclude the regional dummy variable and generate a more robust function to explain 50% of the variation in demand for forest recreation at FE sites. Only three variables are selected for the final equation: the population within 90 minutes, accessibility to substitute woodlands and number of forest attributes. The fact that such a simple function can be generated to predict a greater variation in visitor demand may indicate that FE visitor count data is more reliable for FE sites than equivalent data for WT and RSPB sites, which is plausible give that some data for the latter were based only on estimates provided by forest managers.

| **Model VII (FE sites, excluding region)** | | (t-statistics) |
|---|---|---|
| **(log)VIS_COUNT** | 5.044 | 5.637* |
| (log)SLRG120 | +1.539 | 3.546* |
| (log)UNWHT19 | +.735 | 4.083* |
| (log)POP90 | +.247 | 3.813* |
| Total d.f. 63 | | |
| **$R^2$ .508** | | |

[1]Sig of t *99% (p<0.01)**95% (p<0.05) ***90% (p<0.1)

Of the models presented, Models IV and VII, appear to provide the most robust and plausible functions to predict forest visit counts.

## 4.2 FOREST MODELS TO PREDCIT NUMBERS OF TOURISM VISITS TO GB WOODLANDS

The models outlined above predict ‘all’ visits to forests, including leisure day visits. The primary aim of this study is to develop a model to predict ‘tourism’[21] visits. Based on the available data, there were two alternative methods when using the “forest” model to estimate the number of ‘tourism’ visits to forests. The first method is to predict ‘all’ visits using one of the models presented above, and then distinguish between “tourism” and “non-tourism visits” using a second, complementary, model

[21] As previously defined, for the purpose of this project a tourist trip is one that has a total trip length of 3 hours or more.

based on the data collected from the 44 forest surveys to predict the proportion of "all" visits that are "tourism" visits. The second method is to model "tourism" only using the primary and secondary data collected for the 44 forest sites surveyed only. Both approaches were explored and the results are presented below.

**4.2.1 'All' visits and 'tourism' visits forest models combined**

As the 'all' model does not distinguish between "tourism" and "non-tourism visits" a second model is needed to predict the proportion of "total visits" (VIS_COUNT) to forest *i* in one year that are likely to be "tourism" visits (V):

$$V_i = VIS\_COUNT_i * P_i \qquad \textbf{(2)}$$

where $\mathbf{P}_i$ is the probability of a trip being a tourism trip for forest *i*. The basic function for **P** is derived from a logit regression model. The independent (predictor) variables most likely to influence the probability of a visit being a tourism visit were expected to be related to the resident and tourist populations in the area around the forest and the characteristics of the forest. The general form of the probability function is:

$$P_i = f(TOUR_i, POP_i, ORG_i, CHAR_i) \qquad \textbf{(3)}$$

where $TOUR_i$ is the tourist population in the area around the forest *i*, $POP_i$ is the resident population in the area around the forest, $ORG_i$ are characteristics of the owner/management organisation and $CHAR_i$ are the characteristics of the forest site. The same basic approach as outlined in section 4.1 was followed. A range of independent predictor variables was considered in the development of the model. The parameters of the model with the greatest explanatory power are set out below.

| | **LOGIT Model 1 (all sites) (log (P/1-P))** | | **Co-efficients** |
|---|---|---|---|
| | Constant | | -5.51824 |
| POP | Log of population within 120 min travel time | (log)pop120 | -0.1913 |
| | Log of UK tourist population within "area" | (log)Tour | +0.55089 |
| ATT | Log of the unweighted index of all attributes at site | (log)UNWHT19 | +2.1552 |
| | Picnic area at the site | PICNIC | +0.88986 |
| ORG | Dummy variable | (ORG1) | +2.06905 |
| | Dummy variable | (ORG2) | -1.12931 |
| CHAR | Large (> 70K ) number of annual visitor | LARGE | -1.38942 |
| | **Chi Square** = 216.7 Psuedo $R^2$ = .22 | Deviance =564.6 | d.f. 35 |

Generally, the model results were disappointing for a number of reasons. Firstly, the resulting model had a pseudo $R^2$ of only 0.22, suggesting a low level of explanatory power. Other key points include the negative sign on size of the resident population within a 2 hour time band. As around a fifth of tourism visits were made by local residents, the sign should be positive. Site ownership was also found to be a key explanatory variable. Here the variability in the data due to site ownership is captured by two dummy variables. What these actually represent is not immediately clear. They could represent similarities and differences in a number of site and organisational characteristics that influence the use of the site by tourists and non-tourists, including marketing, sign posting etc.. Furthermore, the inclusion of the ownership variables pose a considerable problem when applying the model to a wider selection of sites

#### 4.2.2. Tourism visits model only

Using the primary and secondary data collected for the 44 forest sites only, a model was developed to predict "tourism" visits" at unsurveyed sites. Here the number of tourism visits (the dependent variable) was calculated by multiplying the total number of visits to a site in 1999 (Table 2.4) by the proportion of 'tourism' visits from the forest survey, i.e. the ratio of tourism to non-tourism visits (Table 4.6). Due to the small size of the samples and the large confidence intervals around the resulting ratios, the ratios used were Bayesian estimates of probability.

**Table 4.6 Proportion of tourists to non-tourists at the 44 surveyed forest sites**

| Survey ID | n | ntourist | Prop of tourists | Bayesian estimate |
|---|---|---|---|---|
| 1 | 45 | 22 | 0.489 | 0.490 |
| 2 | 45 | 33 | 0.733 | 0.723 |
| 5 | 46 | 36 | 0.783 | 0.771 |
| 6 | 45 | 10 | 0.222 | 0.234 |
| 7 | 45 | 29 | 0.644 | 0.639 |
| 8 | 45 | 15 | 0.333 | 0.341 |
| 15 | 45 | 37 | 0.822 | 0.809 |
| 24 | 45 | 31 | 0.689 | 0.681 |
| 25 | 45 | 8 | 0.178 | 0.192 |
| 26 | 45 | 8 | 0.178 | 0.192 |
| 27 | 45 | 31 | 0.689 | 0.681 |
| 30 | 45 | 40 | 0.889 | 0.872 |
| 31 | 45 | 34 | 0.756 | 0.745 |
| 33 | 38 | 24 | 0.632 | 0.625 |
| 34 | 45 | 4 | 0.089 | 0.106 |
| 36 | 45 | 32 | 0.711 | 0.702 |
| 37 | 38 | 31 | 0.816 | 0.800 |
| 38 | 45 | 27 | 0.600 | 0.596 |
| 48 | 45 | 30 | 0.667 | 0.660 |
| 50 | 45 | 19 | 0.422 | 0.426 |
| 52 | 45 | 39 | 0.867 | 0.851 |
| 53 | 45 | 41 | 0.911 | 0.894 |
| 54 | 45 | 11 | 0.244 | 0.255 |
| 55 | 45 | 36 | 0.800 | 0.787 |
| 56 | 45 | 30 | 0.667 | 0.660 |
| 57 | 45 | 6 | 0.133 | 0.149 |
| 60 | 45 | 27 | 0.600 | 0.596 |
| 64 | 44 | 21 | 0.477 | 0.478 |
| 65 | 45 | 5 | 0.111 | 0.128 |
| 66 | 45 | 40 | 0.889 | 0.872 |
| 71 | 45 | 0 | 0.000 | 0.021 |
| 72 | 45 | 25 | 0.556 | 0.553 |
| 73 | 45 | 33 | 0.733 | 0.724 |
| 74 | 45 | 29 | 0.644 | 0.638 |
| 81 | 45 | 0 | 0.000 | 0.021 |
| 82 | 45 | 0 | 0.000 | 0.021 |
| 86 | 28 | 0 | 0.000 | 0.033 |
| 87 | 35 | 2 | 0.057 | 0.081 |
| 89 | 45 | 0 | 0.000 | 0.021 |
| 97 | 12 | 11 | 0.917 | 0.857 |
| 99 | 45 | 29 | 0.644 | 0.639 |
| 101 | 45 | 33 | 0.733 | 0.724 |
| 102 | 45 | 35 | 0.778 | 0.766 |

In the first instance a series of simple correlations were fitted, taking each specified predictor variable in turn and examining its independent influence over the variation in the dependent variable. Results from the correlations were then used to inform specification of multiple regression models, which take relative influences into account and aim to identify the most parsimonious models that explain visitor numbers to sampled woodlands using backward stepwise techniques. Full details of the predictor variables considered and the correlations and multiple regression results are presented in the appendix. From the results of the correlations, the variables considered for inclusion in the multivariate model are listed in Table 4.7. Only those variables for which 'reliable' data could feasibly be collected for the aggregation exercise were included. Certain variables that had a statistically significant influence, but for which the interpretation was ambiguous, were also excluded.

**Table 4.7 Predictor variables included in the multivariate 'tourist' forest model**

| **Attribute variables** | |
|---|---|
| ln(UNWT19) | Natural logarithm of un-weighted attribute index |
| TOILET | Toilet (1,0) |
| PICNIC | Picnic site (1,0) |
| CYCLE | Cycle track (1,0) |
| VIEWPNT | Viewpoint (1,0) |
| VISITCEN | Visitor centre (1,0) |
| ENGLAND | Site located in England (1), Scotland and Wales (0) |
| SCOTLAND | Site located in Scotland (1), England and Wales (0) |
| **Population variables** | |
| ln(UKTOUR) | Natural logarithm of annual tourist nights for UK residents in the tourist region* |

* From the UKTS (2002).

The attribute variables included a number of individual site facilities and an un-weighted attribute index[22]. Also included were variables identifying site location. The interpretation of the significance of these variables is not immediately clear. They could feasibly be picking up a number of different factors influencing recreation demand. Nevertheless, they were included in the modelling exercise. The only population variable included in the multivariate modelling was the number of annual holiday staying nights by UK residents in the area around the site, a general indicator of the tourist population around the site. The best fitting model[23] was:

$$\ln(\text{VISIT99}_i) = \alpha + \beta_1 \text{PICNIC}_i + \beta_2 \text{TOILET}_i + \beta_3 \ln(\text{UKTOUR})_i + \beta_4 \text{ENGLAND}_i + \beta_5 \text{SCOTLAND}_i - \ln(p_i) + \varepsilon_i$$

where $\ln(\text{VISIT99}_i)$ was the natural logarithm of the estimated number of tourism visits at forest site *i*, $\alpha$ is the intercept, $\beta_{1,2,3,4,5}$ are slope coefficients and $\varepsilon$ is the error term or residual. The results for the model are presented in Table 3.8.

[22] This is similar to the approach employed by Brainard *et al.* (2001) who used a number of facilities' variable to circumvent problems of multi-collinearity in trying to incorporate many site traits.

[23] The model was fitted using the Markov Chain Monte Carlo method. By fitting the model in this way it was possible to allow for the uncertainty in the proportion of tourists at each site (pi) which arises from the small sample size. For example, if no tourists were observed in a sample of 45 visitors to a particular site, this does not mean that the total number of tourists visiting the site is zero, since the 95% confidence interval for the proportion of tourists is between 0% and 8%. Estimates of the proportion of tourists at each site were obtained using the available data and a uniform (0,1) prior.

**Table 4.8 Multivariate model of tourism visits for a sample of 44 forest sites in GB –Model I**

| Variable | Coefficient | s.d. | 95% Confidence Interval | 90% Confidence Interval |
|---|---|---|---|---|
| Intercept | 0.685 | 2.955 | (-5.214, 5.489) | (-4.188, 6.436) |
| PICNIC | 2.222 | 0.555 | (1.138, 3.322) | (1.315, 3.138) |
| TOILET | 1.546 | 0.468 | (0.632, 2.477) | (0.783, 2.318) |
| ln(UKTOUR) | 0.601 | 0.333 | (-0.048, 1.262) | (0.059, 1.148) |
| ENGLAND | 1.405 | 0.492 | (0.434, 2.377) | (0.601, 2.216) |
| SCOTLAND | 1.56 | 0.579 | (0.421, 2.707) | (0.617, 2.512) |

The square of the correlation between the fitted values from this model and the estimated 'observed' number of tourists to the site (number of visits in 1999 × estimated proportion of tourists from the model) is 0.61[24]. All coefficients of the predictor variables are positive. At the 95% confidence interval the coefficients for both the intercept and the ln(UKTOUR) variable include zero. However, the coefficients are positive for the ln(UKTOUR) variable at the 90% level. The same model was fitted omitting the two country dummy variables as there is can be some debate over their interpretation . The results are presented in Table 4.9.

**Table 4.9 Multivariate model of tourism visits to a sample of 44 forest sites in GB excluding country variables – Model II**

| Variable | Parameter Estimate | s.d. | 95% Confidence Interval | 90% Confidence Interval |
|---|---|---|---|---|
| Intercept | 0.356 | 3.19 | (-5.995, 6.621) | (-4.902, 5.573) |
| PICNIC | 1.915 | 0.546 | (0.849, 3.006) | (1.026, 2.815) |
| TOILET | 1.161 | 0.501 | (0.186, 2.155) | (0.344, 1.986) |
| ln(UKTOUR) | 0.806 | 0.358 | (0.101, 1.518) | (0.220, 1.395) |

The ability of the model to explain the variability in the data is reduced, with the square of the correlation between the fitted values and the estimated actual number of tourists to the site being 0.50. Nevertheless, as in other similar studies the results show that a relatively high degree of variability in visitor data can be explained using simple models of population and site characteristics (e.g. Brainard *et al*., 2001). Of the two 'forest' model options, the 'tourism' visits only models appear to present the 'best' option for transferring to unsurveyed sites.

### 4.2.2 Model transfer and validation

The models presented above draw on information from all sites for which survey data is available. Although the extent to which these sites are representative of the population of forest sites in GB is unclear, in principle, the models specified above can be used to predict visitor numbers to other forest sites. The efficacy of transferring the models can be tested. Following Jones *et al*. (2002), the model was cross-validated by re-fitting a series of 'omit' models to predict visitor numbers for forest sites

[24] This is an $R^2$ equivalent measure of the goodness of fit.

systematically excluded from the sample[25]. Resulting coefficients were used in conjunction with information on predictor variables for the omitted site to predict visitor numbers to that site. An observed-to-predicted ratio was then calculated to assess validity of the model, and in turn its suitability for aggregation. This provides a form of cross-validation[26] in that the same data set is not being used to assess the quality of predictions as is used to develop the model. Thus, prediction errors will not have an over-optimistic bias. The exercise also provides a 'transferred estimate' of visitor arrivals in that we do not have information on any other sites with which to test the efficacy of the model for aggregation purposes. Resulting transferred estimates and validation ratios are presented in Table 4.10**.**

[25] The validation exercises for Model I was carried out using Ordinary Least Squares (OLS) regression analysis with the log of the Bayesian tourist visitor estimate as the dependent variable. Performing the cross-validation using the Markov Chain Monte Carlo method would have proved too time consuming, although equivalent OLS estimates and ratios are sufficient for validation purposes.

[26] As there were only 43 case study sites in the analysis the option of fitting the model on 60% of the observations and testing the model on the remaining 40% was not a feasible option.

**Table 4.10 Results of cross-validation of Model I using OLS 'omit' models**

| Site ID | SITE NAME | Observed | Predicted | Ratio Obs:pred |
|---|---|---|---|---|
| 1 | | 93391 | 57904 | 1.61 |
| 2 | | 161184 | 16974 | 9.50 |
| 5 | | 8115 | 9725 | 0.83 |
| 6 | | 22788 | 12282 | 1.86 |
| 7 | | 62237 | 19957 | 3.12 |
| 8 | | 9210 | 5408 | 1.70 |
| 15 | | 89842 | 70612 | 1.27 |
| 24 | | 122817 | 56253 | 2.18 |
| 25 | | 57826 | 11629 | 4.97 |
| 26 | | 39732 | 63342 | 0.63 |
| 27 | | 48495 | 136162 | 0.36 |
| 30 | | 8605 | 25377 | 0.34 |
| 31 | | 12460 | 1709 | 7.29 |
| 33 | | 7468 | 2075 | 3.60 |
| 34 | | 11242 | 1310 | 8.58 |
| 36 | | 41930 | 35344 | 1.19 |
| 37 | | 55746 | 129971 | 0.43 |
| 38 | | 34085 | 27668 | 1.23 |
| 48 | | 15811 | 21273 | 0.74 |
| 50 | | 3024 | 12409 | 0.24 |
| 52 | | 7064 | 11501 | 0.61 |
| 53 | | 42632 | 9962 | 4.28 |
| 54 | | 2672 | 12469 | 0.21 |
| 55 | | 61346 | 13603 | 4.51 |
| 56 | | 10371 | 16019 | 0.65 |
| 57 | | 1328 | 33604 | 0.04 |
| 60 | | 41310 | 76948 | 0.54 |
| 64 | | 18934 | 37864 | 0.50 |
| 65 | | 466 | 2145 | 0.22 |
| 66 | | 27461 | 8593 | 3.20 |
| 71 | | 152 | 439 | 0.35 |
| 72 | | 17839 | 8327 | 2.14 |
| 73 | | 3298 | 12287 | 0.27 |
| 74 | | 7252 | 16465 | 0.44 |
| 81 | | 233 | 1307 | 0.18 |
| 82 | | 2124 | 877 | 2.42 |
| 86 | | 1264 | 2546 | 0.50 |
| 87 | | 892 | 2653 | 0.34 |
| 89 | | 192 | 1489 | 0.13 |
| 97 | | 13439 | 23335 | 0.58 |
| 99 | | 17681 | 10715 | 1.65 |
| 101 | | 118704 | 9115 | 13.02 |
| 102 | | 4125 | 2025 | 2.04 |
| **Mean** | | 30391 | 23992 | 1.27 |

The results of this exercise indicate that the model is only moderately effective at predicting visitor arrivals to individual sites that haven't been used to help derive the coefficients, and is a poor predictor for a small number of sites, i.e. those with adversely high/low observed-predicted ratios. However, the transferred estimates are split relatively evenly between under- and over-predictions and at an aggregate level the model appears to work well, with an aggregate observed-predicted ratio of 1.27.

A consideration of the confidence intervals around the predictions provides a further check of the transferability of the model. These show a high degree of uncertainty in the estimates and suggest the need to exercise caution when transferring the models presented here to predict visit numbers at unsurveyed sites. Given the predictive effectiveness of the full model, the results of the cross-validation are not far from what can be reasonably expected.

Whilst there is clearly room for improvement, the results presented here suggest the forest model approach offers potential for developing transferable TGFs. The model explains a relatively high degree of variation in the visit data. The unexplained variation data is likely to be as much due to inaccuracies in the original visitor counts as to 'missing' or inaccurate independent (predictor) variables. The independent variables are derived from a combination of primary surveys and secondary sources, such as national statistical databases. In the case of the former, the data on site attributes is from a highly reliable source and can, for the most part, be objectively determined and reliably measured, although some woodland characteristics are inherently subjective in nature and present greater measurement challenges. The accuracy of the independent variables derived from secondary statistical data sources is largely dependent on the quality of the original data set. Here, most of the data is derived from national statistical databases, with the input variables calculated using sophisticated GIS technology. Thus, factors that are likely to influence recreation demand, such as substitute recreational opportunities and resident population characteristics, can be measured to a relatively high level of spatial resolution. However, the periodic production and limited spatial resolution of some of certain data sets can limit the accuracy and relevance of derived data. For example, the recently produced ONS census for 2001 was unavailable at the time of this study. Consequently, socio-economic data was derived from the 1991 ONS census. Likewise, the lack of data for day visitors and UK and overseas holidaymaking populations to a high level of spatial resolution was also a limiting factor on the quality of input data. However, given these limitations, the model explains a relatively high degree of variability in the data. Whilst it may be possible to improve this result by improving the quality of the independent variables, there is an inherent 'noise' that is always likely to affect trip generation functions of this nature, where many facets of visitor behaviour and local contextual factors will inevitably remain un-accounted for, however reliable the data inputs.

Overall, the area with the greatest potential for improvement for modelling purposes is in relation to the dependent variable, i.e. site visit data. This could be improved by

- The adoption of a common definition of a 'site' for visitor monitoring purposes;
- The adoption of a common definition of forest 'site' attributes.
- A larger number of sites monitored for visitor counts;
- A more representative sample of sites monitored for visitor counts, particularly in terms of ownership;
- More accurate and comprehensive monitoring of total visitor numbers at sites;
- More accurate and comprehensive monitoring of tourist visitors at sites;
- More transparency in the assumptions used to translate counts into total visit numbers

- Estimation of the potential error range in visit estimates in order to gauge the reliability of the data[27]
- Surveys of households as well as forest visitors to capture future visiting behaviour of non-forest visitors;

Clearly, the availability of this information will not guarantee the development of TGF models that can explain all visits to all forests. However, it should go some way to reducing the uncertainty inherent in the current generation of TGF models.

## 4.3 INDIVIDUAL MODELS TO PREDCIT NUMBERS OF TOURISM VISITS TO GB WOODLANDS

### 4.3.1 Model specification

The ‘individual’ TGF (ITGF) is based on the initial form:

$Visits_{ij} = f(Att_i, Dist_{ij}, Sub_i, Char_j)$

Where $Visits_{ij}$ is the number of visits made to forest i by individual j, $Dist_{ij}$ is the distance to forest i from individual j’s place of residence, $Char_j$ are socio-economic characteristics of individual j. $Att_i$ and $Sub_i$ are as before.

The ITGF involves fitting various linear regression models with the natural logarithm of individual annual trip counts taken as the dependent variable (IND_TRIP)[28]. The variable is derived from a question in the Forest Specific survey (Q. 18) which asked respondents to recall how many visits they had made to the site over the course of the last 12 months. A second dependent variable is derived to represent trips made to forests by day visitors only (DAY_TRIP).

Individual (predictor) variables are derived and selected from each of the following groups:

1. Forest characteristics.
2. Influences over the decision to visit the forest.
3. Characteristics of the trip.
4. Characteristics of forest visitors.
5. Attitudes to forests and the environment.

As with the forest modelling exercise, data is initially explored through correlations analyses to examine bi-variate correlations between all 17 independent and 2 dependent variables. Results from this are then used to inform specification of the multiple regression models, which take relative influences into account and aim to identify the most parsimonious models that explain trip counts to sampled woodlands using backward stepwise techniques. The remainder of this section details the procedures for specifying the dependent and independent (predictor) variables.

#### a) Dependent variables

[27] This may require research into the reliability and accuracy of the different counting mechanisms

[28] As in the case of the Forest TGF taking the natural logarithm of the tip count as the dependent variable proved more satisfactory than negative and Poisson distributions to represent the individual trips to forests. Indeed, many studies incorporating UK travel cost models for forest recreation have concluded that the semi-log form provides the most satisfactory model specification.

Two dependent variables were specified for the ITGF. The first (IND_TRIP) includes site trips made by all surveyed respondents. The second (DAY_TRIP) excludes tourists from the sample to include only those 'day visitors' on a short trip of less than 3 hours from home. Whilst it would be more relevant to the study to single out tourists[29] for a separate ITGF, this is not possible because the majority of these visitors make only one or two trips to any one forest site in any one year. This highly skewed distribution makes it impossible to fit a linear model for tourists alone. Fitting a model for day visitors produces a much more favourable distribution across the sample whilst providing a way of exploring for any differences between tourism and non-tourism trips.

**b) Independent (predictor) variables**

A total of 19 independent variables were specified for initial analyses, 17 of which are individual and trip-specific, derived from the forest visitor survey, and 2 of which are forest-specific. These are the un-weighted attribute index (UNWHT19) and the accessibility index for all substitute woodlands within the two-hour drive time (SAL120). Information derived from the forest-specific survey provided data on the characteristics of the individual respondent, the party and the current trip to the forest. Some variables were subsequently re-specified to provide plausible comparisons and to maximise degrees of freedom.

Forest attribute and substitution issues were also captured at the individual level by defining a continuous variable representing the number of forest attributes with a positive influence on the decision to visit the site (ATTOTAL)[30]; and a dummy variable to compare those respondents that would have visited another forest if the site had been closed on arrival with those that would not (ALT_FOR).

Tourists were distinguished from day visitors through a dummy variable (TOURIST) and a continuous variable was derived for the number of people in the party (PARTY). Trip characteristics were initially incorporated by way of four separate variables: Distance travelled to the forest site (DISTANCE), time taken to travel to the site (TIME), travel costs incurred by the party for the entire day trip (TRAVEL) and total expenditure incurred by the party on that day (COST). Method of travel was also encompassed by a dummy variable to distinguish those arriving by car from those arriving by other forms of transport (CAR).

Socio-economic variables were specified as dummy variables to compare: low and high income groups (INC); low and high social groups (SOC); the effect of a first degree (DEGREE) and a postgraduate qualification (POST); and a comparison between retired (RETIRE) and families with dependants aged nine or under (UNDER9) with other family stage groups. Two final variables encompassed the attitudinal scales developed and explored in Chapter 7. The first is derived from factor scores for the Forest Importance Scale (FIS), with higher scores relating to more positive attitudes towards forests. The second is derived from equivalent scores for the

[29] A tourist visit is one defined as lasting at least three hours.

[30] This information was derived from question 19 of the forest specific survey, which was also used to derive the weighted and un-weighted attributes indices. This variable is based simply on the number of attributes recorded as having a positive influence over the decision to visit the site, irrespective of their rank.

General Awareness and Consequences (GAC) environment attitude scale, with higher scores relating to more positive attitudes towards the environment.

Specification of all dependent and independent variables derived for the ITGF are detailed in Table 4.11.

**Table 4.11 Specification of all dependent and independent variables initially derived for the ITCM**

| Variable name | Description | Specification |
|---|---|---|
| **Dependent variables** | | |
| (log)IND_TRIP | Number of visits made to the site over last 12 months: all respondents | Continuous (natural log) |
| (log)DAY_TRIP | Number of visits made to the site over last 12 months: day visitors only | Continuous (natural log) |
| **Independent variables** | | |
| (log)UNWHT19 | Un-weighted attribute index | Continuous (natural log) |
| (log)SAL120 | Substitute accessibility index for all woodlands | Continuous (natural log) |
| ATTOTAL | Number of forest attributes influencing the decision to visit | Continuous |
| ALT_FOR | Influence of substitute forests in the decision to visit | 1 would have visited another forest had the site been closed<br>0 would not have visited another forest |
| TOURIST | Status distinguishing tourists from leisure day visitors | 1 tourist on holiday or day out of more than 3 hours from home<br>0 on a short trip of less than three hours from home (day visitors) |
| (log)PARTY | Number of people in the party | Continuous (natural log) |
| (log)DISTANCE | Distance travelled to the site | Continuous (natural log) |
| (log)TIME | Time taken to travel to the site | Continuous (natural log) |
| (log)TRAVEL | Expenditure on travel | Continuous (natural log) |
| (log)COST | Expenditure for the entire trip | Continuous (natural log) |
| CAR | Method of travel to the site | 1 arriving by car<br>0 arriving by other means |
| INC | Income group | 1 higher income groups (£24,000 > pre-tax annual household income)<br>0 lower income groups (> £24,000 pre-tax annual household income) |
| SOC | Occupational (social) group | 1 higher occupational groups (A, B, C1)<br>0 lower occupational groups (C2, D, E) |
| DEGREE | Higher Educational level | 1 holds a first degree<br>0 does not |
| POST | Postgraduate Educational level | 1 holds a postgraduate qualification<br>0 does not |
| UNDER9 | Family stage | 1 Families with dependants aged 9 or under<br>0 Other family stage groups |
| RETIRE | Family stage | 1 retired aged 65+<br>0 other family stage groups |
| (log)FIS | Factor scores from Forest Importance Scale | Continuous (natural log) |
| (log)GAC | Factor scores from General Awareness and Consequences environment scale | Continuous (natural log) |

### 4.3.2 Correlation analysis

The coefficients presented in Table 4.12 indicate the extent to which each of the 19 predictor variables are independently correlated with annual forest trips of all individuals in the sample (IND_TRIP) and those on a short trip of less than 3 hours from home (DAY_TRIP). In turn this process helps to identify variables for inclusion into the various ITGF's developed in the following section.

**Table 4.12 Bi-variate correlation coefficients for ITGF's**

| Predictor | IND_TRIP $^{(n)}$ | DAY_TRIP $^{(n)}$ |
|---|---|---|
| (log)UNWHT19 | -.420$^{***}$ *(1799)* | -.431$^{***}$ *(893)* |
| (log)SAL120 | -.130$^{***}$ *(1799)* | -.251$^{***}$ *(893)* |
| ATTOTAL | -.273$^{***}$ *(1718)* | -.316$^{***}$ *(851)* |
| ALT_FOR | .031 *(1701)* | .002 *(843)* |
| TOURIST | -.326$^{***}$ *(1791)* | - |
| (log)PARTY | -.356$^{***}$ *(1730)* | -.433$^{***}$ *(860)* |
| (log)DISTANCE | -.576$^{***}$ *(1752)* | -.673$^{***}$ *(868)* |
| (log)TIME | -.457$^{***}$ *(1775)* | -.503$^{***}$ (882) |
| (log)TRAVEL | -.299$^{***}$ *(1380)* | -.387$^{***}$ *(613)* |
| (log)COST | -.374$^{***}$ *(1460)* | -.412$^{***}$ *(648)* |
| CAR | -.314$^{***}$ *(1776)* | -.353$^{***}$ *(880)* |
| INC | -.151$^{***}$ *(1030)* | -.160$^{***}$ *(518)* |
| SOC | -.095$^{***}$ *(1063)* | -.041 *(508)* |
| DEGREE | -.096$^{***}$ *(1799)* | -.105$^{***}$ *(893)* |
| POST | -.132$^{***}$ *(1470)* | -.145$^{***}$ *(741)* |
| UNDER9 | -.032 *(1799)* | -.042 *(893)* |
| RETIRE | .015 *(1793)* | .002 *(888)* |
| (log)FIS | .094$^{***}$ *(1799)* | .078$^{**}$ *(893)* |
| (log)GAC | .047$^{**}$ *(1799)* | .042 *(893)* |

$^{***}$ 99% significance ($p<0.01$) $^{**}$95% sig. ($p<0.05$) $^{*}$ 90% sig.($p<0.1$)

The first two predictors in the table are site-specific, relating to the number of forest attributes (UNWHT19) and the relative accessibility to substitute woodlands (SAL120). Surprisingly, both are inversely correlated with individual forest visits, which is contrary to their effect on total visitor numbers shown by the Forest Travel Cost Model (FTCM). Thus, more individual visits are associated with a lower number of forest attributes and greater accessibility to substitute woodlands. The most likely reason for this is that repeat visitors in the sample, visiting the site daily or weekly, will visit (for dog walking etc) irrespective of facilities at the forest. It is also likely that even where a substitute site is only marginally further away than the regular choice, it will not be visited due to the convenience factor. Indeed, this hypothesis is supported by the highly significant negative correlation between individual trips and distance from place of residence (DISTANCE).

These observations are exacerbated by the fact that frequent visitors on short trips make many more trips to forest sites than do tourists, as Table 4.13 illustrates. In turn this explains why the tourist dummy (TOURIST) exhibits a high negative correlation with forest visits. Further, the sample contains more frequent visitors and fewer infrequent visitors from the population from which it is drawn due to the inherent sample selection bias (Dobbs, 1993).

**Table 4.13 Mean annual visits and influence of attributes in decision to visit: by visitor type**

| **Visitor type** | ***n*** | **Mean annual forest visits** | **Number of attributes in decision to visit** |
|---|---|---|---|
| On a short trip less than 3 hours from home | 905 | 57.7 | 2.5 |
| On a day out of more than 3 hours from home | 200 | 7.2 | 3.1 |
| On holiday away from home staying in area | 605 | 1.6 | 3.4 |
| On holiday visiting friends and relatives | 79 | 1.6 | 3.4 |
| Passing through the area | 53 | 9.7 | 3.2 |

Two independent-specific variables also examine substitution (ALT_FOR) and attribute (ATTOTAL) issues. The coefficients indicate that a higher number of forest visits is associated with a lower number of attributes playing a role in the decision to visit the site, supporting the pattern shown by the forest-specific attribute variable. The data in Table 2 indicates that tourists tend to take forest attributes into account in site selection to a greater extent than do more frequent visitors. ALT_FOR is not significantly correlated with either dependent variable although the positive correlation is lower when the sample is restricted to day visitors. This may imply that tourists will specifically seek a forest site to a greater extent than day visitors who may simply substitute the forest site for another countryside location if necessary.

Moving down the table, we find that party size (PARTY) is also strongly correlated with annual forest visits, with more frequent visits made by smaller parties. Indeed, one would expect daily or weekly visitors to be in smaller parties than people on holiday who are more likely to make visits in family groups. The next four variables deal more directly with travel cost issues. The patterns shown by the coefficients for distance travelled to the site (DISTANCE) and time taken to travel to the site (TIME) conform with microeconomic theory in showing a negative correlation between frequency of visit and relative proximity to the site. Not surprisingly, therefore, those visitors arriving by car tend to make less annual visits than those using other forms of transport (CAR). The size of the negative coefficient increases when tourists are dropped from the sample, which may indicate that many daily or weekly forest visitors sampled are going to the site on foot.

As expected, a similar relationship is shown between travel expenditure for the trip (TRAVEL) and annual forest visits, with higher travel costs pertaining to less frequent site visits. The equivalent correlation is extended to the total trip expenditure for the visiting party, and indeed the marginally higher coefficient for day visitors reflects the fact that travel costs will make up a higher proportion of total trip expenditure in comparison to those on holiday away from home.

Coefficients for the four socio-economic variables in the table do not show expected relationships in terms of general countryside recreation behaviour, although patterns do support findings from previous travel cost models for forests. Visitors in higher income groups are shown to make less annual visits than those on lower incomes (INC). Whilst this does not conform to general countryside recreation behaviour, it does support the fact that higher annual visits are associated with lower travel costs and visits not made by car. The coefficient for the social class dummy (SOC) follows a similar pattern. Again, whilst we might expect higher occupational groups to visit forests more often, the data indicates that more frequent visits are associated with lower social groups. However, the coefficient is no longer significant when the sample is restricted to day visitors, indicating that the observed correlation is more likely to be associated with tourists.

Of the remaining socio-economic variables only the two education dummies (DEGREE and POST) are significant in both samples. This shows that visitors with higher qualifications tend to make less frequent forest visits than those without, although one might expect better educated people to participate in countryside recreation activities to a greater extent. Coefficients for the family stage dummies (RETIRE and UNDER9) show no significant difference in annual forest visits between, respectively, retired visitors and families with children aged nine years and under and other life stages.

The final two variables in the table consider the effect of attitudes to forests (FIS) and general attitudes to the environment (GAC). The latter shows no significant correlation with frequency of forest visits and annual forest day visits, indicating that environmental attitudes have no bearing on the use of forests for recreation by their most frequent visitors. Across the sample as a whole, however, those visitors with higher environmental values do tend to visit forests more often. In the case of the former the coefficients show a positive correlation between attitudes to forests and annual visits, with those perceiving forests to be more important tending to visit them more frequently. This relationship is consistent across both samples, although would appear marginally weaker for day visitors, as one might expect.

### 4.3.3 Multi-variate individual models

Results of the correlation analysis help to inform selection of variables for the ITGF. A total of 16 predictor variables are shown to correlate with forest visits of all sampled individuals (IND_TRIP) and 13 with equivalent for day visitors only (DAY_TRIP). However, further exploration of the data reveals that multi-collinearity exists between the four travel cost variables (DISTANCE, TIME, TRAVEL and COST). DISTANCE is selected on the basis that it has the highest correlation coefficient of the four variables. This leaves a total of 13 variables for multi-variate analysis. The first ITGF (Model I) is based on initial inclusion of all 13 predictors, taking IND_TRIP as the dependent variable. In each of the four modelling scenarios presented a backward stepwise procedure is used to obtain the most parsimonious model that explains the variation in annual forest visits.

In Model I the stepwise procedure selects 7 out of the 13 variables to predict just over 40% of the variation in annual forest visits. These include the site-specific attribute index and substitute accessibility index, with both showing inverse correlations with individual trips. The 5 individual-specific variables are educational level, distance travelled to the forest site, party size, the forest importance scale and the distinction between tourists and day visitors.

| **Model I (all visitors, all selected variables)** | | (t-statistics) |
|---|---|---|
| **(log)IND_TRIP** | 3.408 | 19.500* |
| POST | -.421 | -4.119* |
| (log)UNWHT19 | -.502 | -6.766* |
| (log)SAL120 | -.347 | -2.498** |
| (log)DISTANCE | -.530 | -17.699* |
| (log)PARTY | -.460 | -7.333* |
| (log)FIS | .131 | 2.434** |
| TOURIST | -.426 | -5.361* |
| Total d.f. 1312 | | |
| **$R^2$ .433** | | |

[1]Sig of t *99% (p<0.01)**95% (p<0.05) ***90% (p<0.1)

Coefficients and *t* statistics for the two site-specific variables indicate that more individual visits are associated with a lower number of forest attributes and greater accessibility to substitute woodlands. However, this unexpected directional influence may not be entirely reliable due to sample selection bias towards the most frequent visitors, who make considerably more trips than other sampled visitors. We therefore fit the same model but this time excluding the attribute and substitute accessibility indices to examine the effects of individual and trip-specific characteristics only.

This results in the addition of two individual-specific variables in the model with only a marginal reduction in explanatory power. The predictors are joined by mode of transport and the number of attributes in the decision to visit the site, with non-car visits and fewer considered attributes both resulting in a greater number of individual visits.

| **Model II (all visitors, excluding forest attribute and substitute indices)** | | (t-statistics) |
|---|---|---|
| **(log)IND_TRIP** | 4.025 | 34.163* |
| CAR | -.370 | -3.117* |
| POST | -.384 | -3.714* |
| ATTOTAL | -.056743 | -2.446** |
| (log)DISTANCE | -.553 | -17.781* |
| (log)PARTY | -.520 | -8.241* |
| (log)FIS | .136 | 2.490** |
| TOURIST | -.511 | -6.481* |
| Total d.f. 1312 | | |
| **$R^2$ .416** | | |

[1]Sig of t *99% (p<0.01)**95% (p<0.05) ***90% (p<0.1)

Whilst the distinction between tourists and day visitors is clearly a useful predictor of forest visits, it is not necessarily realistic to base a trip generation function on such an obvious distinction. Fitting a model with this variable excluded produces an equivalent function, with individual visits predicted by mode of transport to the site, educational level, number of attributes in the decision to visit, distance travelled, party size and attitudes towards forests. Interestingly, the predictive power of the model falls only slightly, despite the fact that modelled on its own the tourist dummy accounts for 10% of the variation in individual trips.

| **Model III (all visitors, excluding forest attribute and substitute indices and tourist dummy)** | | (t-statistics) |
|---|---|---|
| **(log)IND_TRIP** | 3.987 | 33.048* |
| CAR | -.355 | -2.967* |
| POST | -.385 | -3.677* |
| ATTOTAL | -.086752 | -3.806* |
| (log)DISTANCE | -.596 | -19.406* |
| (log)PARTY | -.554 | -8.745* |
| (log)FIS | .140 | 2.528** |
| Total d.f. 1318 | | |
| **$R^2$ .397** | | |

[1]Sig of t *99% (p<0.01)**95% (p<0.05) ***90% (p<0.1)

Whilst attitudes towards forests remains significant in each of the three functions, removing it from Model III reduces the value of $R^2$ by only .002, although its independent contribution when not modelled alongside any other predictors is only .008. The independent $R^2$'s for the 10 variables selected in Models I to III are given below. Distance travelled to the forest site is clearly the most effective predictor of individual forest visits, particularly with respect to day visitors only. Of the independent and trip-specific variables party size and mode of transport are also useful predictors.

| **Variable** | **$R^2$ IND_TRIP** | **$R^2$ DAY_TRIP** |
|---|---|---|
| (log)UNWHT19 | .176 | .185 |
| (log)SAL120 | .016 | .062 |
| (log)DISTANCE | .331 | .453 |
| (log)PARTY | .126 | .187 |
| TOURIST | .106 | - |
| CAR | .098 | .124 |
| ATTOTAL | .074 | .099 |
| POST | .017 | .020 |
| (log)FIS | .008 | .005 |

The final two models focus on individual trips by day visitors only. Again, the attribute and substitute accessibility indices are initially included and a function is obtained from 5 variables to predict just under half of all variation in individual visits. The key difference from Model III is that the numbers of attributes in the decision to visit the educational level of visitors and mode of transport to the site are no longer significant. This may reflect relative differences between tourists and day visitors in the sample. Indeed, day visitors are more likely to arrive at forest sites on foot and make frequent visits irrespective of the attributes present at the site.

| **Model IV (day visitors, all selected variables)** | | (t-statistics) |
|---|---|---|
| **(log)DAY_TRIP** | 4.025 | 34.163* |
| (log)UNWHT19 | -.344 | -3.372* |
| (log)SAL120 | -.569 | -2.661* |
| (log)DISTANCE | -.710 | -15.439* |
| (log)PARTY | -.642 | -6.532* |
| (log)FIS | .141 | 1.669*** |
| Total d.f. 661 | | |
| **$R^2$ .495** | | |

[1]Sig of t *99% (p<0.01)**95% (p<0.05) ***90% (p<0.1)

The final model predicts 48% of variation in individual day visits on the basis of distance travelled to the site, party size and the forest importance scale (FIS).

| **Model V (day visitors, excluding forest attribute and substitute indices)** | | (t-statistics) |
|---|---|---|
| **(log)DAY_TRIP** | 4.190 | 37.321* |
| (log)DISTANCE | -.801 | -19.125* |
| (log)PARTY | -.698 | -7.101* |
| (log)FIS | .146 | 1.722*** |
| Total d.f. 661 | | |
| **$R^2$ .480** | | |

[1]Sig of t *99% (p<0.01)**95% (p<0.05) ***90% (p<0.1)

Again, the FIS is found to contribute relatively little to the explanatory power of the model and removing party size as well leaves a simple but highly effective model to predict annual day visits to forest sites obtained from only distance to the forest site ($R^2$.453).

Overall, the 'individual' TGF proved unsuitable for the main purpose of this project, i.e. predicting visits to unsurveyed sites, for a number of reasons. The data for the dependent variable was derived from the survey of forest visitors and consequently suffered from truncation and sample selection bias (see Dobbs, 1993). Truncation bias occurred due to the fact that the model was based on forest visitor data only, with no information on individuals that chose not to visit the site. This would limit any application of the model to those individual residents and holidaymakers that chose to make at least one visit to the forest in question in the period under consideration. Due to sample selection bias[31], most visitors surveyed made only one or two trips to any one forest site in any one year, giving a highly skewed distribution. This skewed distribution was even greater for the 'tourism' visits, and consequently a model could not be fitted for tourists alone. A further drawback was the lack of data from which to accurately derive and characterise the resident and holidaymaker populations that made 'tourism' forest visits and to which any 'individual' TGF would need to be applied.

[31] Sample selection bias occurs due to the fact that a frequent visitor is more likely to be captured in the sample than an occasional one. Consequently, the sample will tend to contain more frequent visitors and fewer infrequent visitors than the population from which it is taken (Dobbs, I.M. 1993).

# CHAPTER 5 QUANTIFYING THE ECONOMIC SIGNIFICANCE OF FOREST TOURISM - RESULTS

## 5.0 INTRODUCTION

The overall aim of this part of the study was to estimate the economic significance of forest-related tourism day visit expenditure at the country and GB level. In theory, the TGF methods outlined in Chapter 4 could be used to estimate the volume and value of visits to individual sites. In order to scale up to a country and GB level it would be necessary to apply these methods to all publicly accessible forests in GB. However, at present no database exists that identifies the total number of woodland sites in GB or how much of it is open to public access. This chapter presents the estimates of visits and expenditure for those sites for which data was available, along with estimates of the economic significance of forest-related tourism day visits raised to the country and GB level drawing on visitor data in the 1998 UK Day Visits Survey (UKDVS 1998) (Countryside Agency, 1999).

## 5.1 PREDICTING VISITS TO UNSURVEYED FORESTS

### 5.1.1 Site data

A main aim of the study was to predict the annual number of visits to all publicly accessible forests in GB. Table 5.1 presents the total area of woodland in the UK under different types of ownership at the country and GB level. The table shows that there is somewhere in the region of 2.7 million hectares of forest in GB.

**Table 5.1 Area of forest and percentage cover by ownership for country and GB (Smith & Gilbert, 2001)**

| | England | | Scotland | | Wales | | GB | |
|---|---|---|---|---|---|---|---|---|
| Ownership | Area (ha) | (%) | Area (ha) | (%) | Area (ha) | (%) | Area (ha) | (%) |
| 1. Personal | 480794 | 43.8 | 533485 | 41.6 | 95500 | 33.3 | 1109779 | 41.6 |
| 2. Business | 146601 | 13.4 | 100734 | 7.9 | 26089 | 9.1 | 273424 | 10.3 |
| 3. Forestry/timber business | 7200 | 0.7 | 27750 | 2.2 | 6006 | 2.1 | 40956 | 1.5 |
| 4. Charity[#] | 68484 | 6.2 | 14129 | 1.1 | 7784 | 2.7 | 90397 | 3.4 |
| 5. Local Authority | 61098 | 5.6 | 10812 | 0.8 | 7925 | 2.8 | 79835 | 3.0 |
| 6. Other Public (Not FC) | 27302 | 2.5 | 13304 | 1.0 | 4704 | 1.6 | 45310 | 1.7 |
| 7. Forestry Commission | 222694 | 20.3 | 539478 | 42.1 | 119979 | 41.8 | 882151 | 33.1 |
| 8. Community ownership or common land | 3732 | 0.3 | 327 | 0.0 | 652 | 0.2 | 4711 | 0.2 |
| 9. Unidentified | 3917 | 0.4 | 12755 | 1.0 | 1396 | 0.5 | 18068 | 0.7 |
| 10. Total woodland under 2 ha (all ownership) * | 75063 | 6.8 | 28697 | 2.2 | 16734 | 5.8 | 120494 | 4.5 |
| Total | 1096885 | 100.0 | 1281471 | 100.0 | 286769 | 100.0 | 2665125 | 100.0 |

1. Personal: types of private occupation, e.g. individuals, private family trusts and family partnerships.
2. Business: occupiers, e.g. companies, partnerships, syndicates and pension funds.
3. Forestry/timber business: owned by wood processing industry. This category does not include forest management companies.
4. Charity: organisations funded by voluntary public subscription, e.g. National Trust, churches and colleges. WT and RSPB represent around 33% of this category.
5. Local Authority: region, county, district or other council.
6. Other Public (Not FC): Government department/agency, nationalised industry, etc.
7. Forestry Commission.
8. Community ownership or common Land: the common property of all members of the community.

10. Data from the Survey of Small Woodland and Trees (SSWT).

Unfortunately, data was only available for a sample of around 3,000 individual publicly accessible forest and woodland "sites". As with the data used in the TGF modelling exercise, there was no consistent definition of a 'site' between data providers. Nevertheless, it is the most comprehensive data set of publicly accessible woodland in GB that is currently available. A summary of the sites is presented in Table 5.2, analysed by ownership and country. A considerable proportion of the data was provided by ADAS[32], with the remainder coming directly from the respective site owner/manager organisations.

**Table 5.2 Sites for which the necessary data was available for use in aggregation exercise**

| Total Sites | England | Scotland | Wales | GB |
|---|---|---|---|---|
| Private Owners | 195 | 311 | 4 | 510 |
| Local Authority | 252 | 51 | 16 | 319 |
| Wildlife Trust | 121 | 41 | 0 | 162 |
| National Trust | 102 | 1 | 0 | 103 |
| National Park | 15 | 0 | 0 | 15 |
| English Nature | 41 | N/a | N/a | 41 |
| National Forest | 29 | N/a | N/a | 29 |
| RSPB | 15 | 9 | 5 | 29 |
| SNH | N/a | 38 | N/a | 38 |
| Woodland Trust | 792 | 78 | 113 | 983 |
| FE | 299 | 248 | 86 | 633 |
| Total Sites | 1,861 | 777 | 224 | 2,862 |

N/a: Data not available

There are a number of obvious differences in the data available between the three countries. A much larger proportion of Scottish sites are privately owned, compared to England and Wales, where the Woodland Trust accounts for the largest proportion of sites. England has a higher proportion of Local Authority owned sites. There is no way of knowing whether these differences reflect actual differences in ownership patterns. There are a number of key issues that arise from the use of this data set in an aggregation exercise. First, it is difficult to ascertain what proportion of publicly accessible woodland the final data set represents given that:

- the total area of publicly accessible woodland is unknown;
- area data is not always provided with the available site data;
- in many cases the proportion of 'site' area represented by woodland is unknown; and
- even where area data is available, the accuracy of this data is questionable.

Second, it is not possible to say how representative the site data is of the woodlands for each country, and therefore at the GB level. An approximation of the proportion of the total woodland presented above thought to be represented by the site data for some of the ownership categories is given in Table 5.3.

**Table 5.3 Proportion of national woodland cover**

[32] ADAS are currently undertaking a survey to identify all publicly accessible woodland in GB.

| | England | Scotland | Wales | GB |
|---|---|---|---|---|
| Private | 4% | 2% | 1% | 3% |
| Charity | 50% | 159% | 173% | 77% |
| LA | 23% | 1% | 10% | 19% |
| Other | 4% | 0% | 0% | 3% |

The personal, business and forestry business categories listed in Table 5.1, account for just over 50% of all woodland in GB. Table 5.3 shows that the data collected for aggregation accounts for about 3% of this privately owned woodland. Area data for the Forestry Commission, which owns 33% of all woodland in GB, is unavailable. However, it is reasonable to assume that the site data accounts for the majority of the woodland listed under their ownership. Some area data is available for some of the charity organisations and for the woodland owned by Local Authorities. Together, these two categories account for about 6% of the total woodland area in GB. The figures in Table 3.12 suggest that a high proportion of woodland under Charity ownership is represented[33], whilst just under a fifth of Local Authority woodland is represented. Assuming that the data available for the Forest Enterprise sites accounts for all woodland under FE management, the data could represent around 35-40% of all woodland in GB (by area).

**5.1.2 Predicting tourism visits to unsurveyed forest sites**

Predicted annual visits were estimated by applying the models, as set out in Table 3.8 and 3.9, to each of the 2,862 sites for which data was available. Estimates of the mean predicted annual visits are presented in Table 5.4.

**Table 5.4 Predicted annual tourism visits to sites in GB**

| | | Model I | | Model II | |
|---|---|---|---|---|---|
| | *No of.sites* | Total Visits (000's) | Mean site$^{-1}$ * | Total Visits (000's) | Mean site$^{-1}$ * |
| England | *1861* | 19,399 | 10,424 | 14,613 | 7,852 |
| Scotland | *777* | 7,444 | 9,581 | 4,499 | 5,790 |
| Wales | *224* | 275 | 1,228 | 699 | 3,120 |
| GB | *2862* | 27,118 | 9,475 | 19,811 | 6,922 |

* We do not know how representative the sample of sites are for each country or for GB and therefore site means should be treated with caution.

Model I predicted a total of over 27 million annual visits to the 2,862 sites, a mean of 9,475 visits per site. On average, sites in England had the highest number of visits with a mean of 10,424 visits per site, compared to a mean of 9,581 in Scotland and just 1,228 in Wales. On average, sites in England under Model I had the highest number of visits receiving just under 10% more than sites in Scotland and 8.5 times as many visits as the average site in Wales. The relative difference between sites in Wales and the other countries was less under Model II. Model II predicted just under 20 million visits, with respective means of 7,852, 5,790, and 3,120. Table 5.5 presents the number of annual tourism visits predicted analysed by ownership/management category.

[33] The total woodland area represented for Scotland and Wales exceeds the total area of woodland listed in Table 2.2. The reasons for these differences are unclear but it may be due to the definition of a "site", which for charities such as the RSPB and the Woodland Trust, includes the total area of each reserve and not just forest area.

**Table 5.5 Predicted annual total and mean number of tourism visits to sites in GB by site ownership/management**

| | | Model I | | Model II | |
|---|---|---|---|---|---|
| | *No of.sites* | Total Visits (000's) | Mean site$^{-1}$ | Total Visits | Mean site$^{-1}$ |
| Private Owners | *510* | 6,302 | 12,357 | 4,231 | 8,296 |
| Local Authorities | *319* | 4,952 | 14,396 | 3,095 | 9,701 |
| Wildlife Trusts | *162* | 889 | 5,490 | 711 | 4,388 |
| National Trust | *103* | 2,852 | 27,690 | 1,986 | 19,279 |
| National Park | *15* | 333 | 22,233 | 226 | 15,093 |
| English Nature | *41* | 162 | 3951 | 177 | 4,310 |
| National Forest | *29* | 341 | 11,746 | 205 | 7,056 |
| RSPB | *29* | 468 | 16,143 | 369 | 12,739 |
| SNH | *38* | 164 | 4,319 | 119 | 3,127 |
| Woodland Trust | *983* | 1,758 | 1,788 | 2,178 | 2,215 |
| FE | *633* | 9,256 | 14,622 | 6,515 | 10,292 |

The results show considerable variation in the predicted mean number of visits per site between ownership categories, with National Trust sites receiving the highest visits on average and Woodland Trust sites the lowest.

At the country level, the relative differences in the mean number of visitors per site are not in line with expectations based on a consideration of the estimated volume of tourism day visits from home as presented in the UKDVS[34] (Countryside Agency, 1999), and the respective areas of forest over which these visits are distributed (Smith and Gilbert, 2001). The UKDVS indicates that some 90% of tourism day visits from home to woodland in GB take place in England, which only has about 40% of the total woodland area in GB. Only 6% of visits take place in Scotland, which has just under 50% of all GB woodland. This compares with 3% of visits, half that of Scotland, but 11% of woodland in Wales. Thus, from these figures expectations were that the mean number of tourism visits to individual sites would be considerably higher in England than both Wales and Scotland, with sites in Wales receiving higher numbers of tourism visits per annum on average than in Scotland. Clearly, these expectations were based on certain assumptions, including similar numbers of sites per unit area of woodland. The differences between predicted and expected results could be due to a number of factors, including an unrepresentative sample of sites in the aggregation. In addition to the uncertainties inherent in the models, this suggests that the results from the model application should be treated with due care.

This conclusion is further supported by comparing an estimate of total forest tourism day visits per annum at the GB level, based on model results, with estimates from alternative sources. If it is assumed that the 2,862 sites represent around 35% of the total woodland area of GB and are fairly representative, then based on these estimates the total number of tourism visits to woodland in GB would be in the order of 60-80 million. However, the UKDVS (Countryside Agency, 1999) suggests there were around 114 million tourism visits to woodland in GB in 1998. This figure only includes day visits from home. From the visitor survey, day visits from home

[34] Whilst the UKDVS does not take into account tourism day visits by holidaymakers, it provides a reliable indication of the relative orders of magnitude of tourism day visits to woodland across England, Scotland and Wales.

represent only 22% of all tourism day visits to woodland, with holidaymakers accounting for the balance. This would suggest that the estimates based on the TGF model are understated by one order of magnitude. Furthermore, the mean visits per site for Model I and II are considerably below the observed and predicted mean number of visits to the 43 sample sites on which the models were based. This would suggest that the 43 sites were not representative of aggregation sample, at least in terms of the annual number of tourism visits.

## 5.2 ESTIMATING FOREST-RELATED TOURISM EXPENDITURE

This section presents the results of the application of the forest model and tourism expenditure figures to calculate forest-related tourism expenditure at a sample of forest sites in GB.

### 5.2.1 Dissagregation of total 'tourism' visits by trip type and purpose

As the proportion of forest-related tourism expenditure for each visit varies by trip purpose, as does the distribution of total trip expenditure between expenditure categories, it is necessary to split total tourism visits between 'forest only', 'forest combined' and 'forest-casual' visits. Based on the results presented in Table 3.6, it was assumed that 76%, 62% and 65% of all predicted tourism visits were forest only trips, whilst 17%, 23% and 17% were forest combined trips in England, Scotland and Wales respectively. Table 5.6 presents the mean number of predicted tourism visits per site by trip purpose.

**Table 5.6 Mean number of predicted 'tourism' visits per site by trip purpose**

| | Model I | | Model II | |
|---|---|---|---|---|
| | Forest-only | Forest-combined | Forest-only | Forest-combined |
| England | 7,922 | 1,772 | 5,968 | 1,335 |
| Scotland | 5,940 | 2,204 | 3,590 | 1,332 |
| Wales | 798 | 209 | 2028 | 530 |
| GB | 6,443 | 1,800 | 4,707 | 1,315 |

Mean expenditure levels also vary by trip type. Drawing on the results of the visitor survey (see Table 3.5), Table 5.7 presents the proportional split between visitors travelling from home and holidaymakers for Forest Only and Forest Combined visitors.

**Table 5.7 Proportion of tourism trips by trip type for each country (%)**

| Country | Type | Forest only | Forest-combined |
|---|---|---|---|
| England | Day trip from home | 38 | 24 |
| | Day trip from holiday base | 62 | 76 |
| Scotland | Day trip from home | 36 | 18 |

| Country | Type | Forest only | Forest-combined |
|---|---|---|---|
| | Day trip from holiday base | 64 | 82 |
| Wales | Day trip from home | 5 | 5 |
| | Day trip from holiday base | 95 | 95 |
| GB | Day trip from home | 26 | 15 |
| | Day trip from holiday base | 74 | 85 |

The results show considerable variation in the proportional split between visitors from home and holiday bases for Forest Only and Forest Combined visitors in England and Scotland. However, the proportional split in trip types is the same for both categories of trip purpose in Wales. The proportional split presented here suggests that on average about three quarters of the total number of forest only day visits are made by holidaymakers, whilst 85% of the forest-combined are made by holidaymakers, rising to 95% for both categories in Wales. These figures are much higher than might be expected and, as with the expenditure figures at this level of sub-analysis, need to be treated with caution given the relatively small sample sizes. For the purpose of estimating forest-related tourism expenditures, the figures in Table 5.7 were used to further sub-divide the visitor estimates with the exception of the proportional split for Wales. Here a proportional split of 38:62 was used for day visits from home and holidaymakers respectively, for both forest-only and forest-combined visits based on figures supplied by the Forestry Commission (see section 3.1).

**5.2.2 Mean total expenditure per person per trip**

The mean expenditure levels per person per day trip were presented in Table 3.7. However, some cells only had small sample sizes and since the data are highly skewed outliers are very influential. In particular, the very high value for holidaymakers on a combined trip in England is due to an outlier of £521. To reduce the influence of outliers, the expenditure data for the aggregation exercise were derived using a modelling approach. The data were transformed by taking log(expenditure+0.01) and regression was used to determine which factors were significant in influencing expenditure levels. The factors considered were the country in which the trip took place (i.e. England, Scotland or Wales), the type of trip (i.e. day trip from home or holiday base) and the purpose of trip (i.e. forest only, forest-combined or forest-casual). The results showed that country, trip type and purpose were all significant. However, the only interaction that was significant was between country and type of tourist. These terms were therefore fitted to the original untransformed data. This gave the following parameter estimates (model coefficients).

| **Variable type** | **Variable** | **Coefficient** |
|---|---|---|
| | Constant | 10.76 |
| Country | Scotland | -1.13 |
| | Wales | 3.50 |
| Trip type | Day trip from holiday base | 4.05 |
| Trip purpose | Forest casual | 0.33 |

| Variable type | Variable | Coefficient |
|---|---|---|
| | Constant | 10.76 |
| | Forest only | -4.57 |
| Interaction | Scotland. Day trip from holiday base | 2.82 |
| | Wales. Day trip from holiday base | -7.18 |

The expenditure predictions from this model to be used in the aggregation exercise are presented in Table 5.8. Confidence intervals are presented in the extended report.

**Table 5.8 Modelled mean total expenditure predictions by type/country and purpose (£ person$^{-1}$ visit$^{-1}$)**

| Country | Type | Forest-combined | Forest only |
|---|---|---|---|
| England | Day trip from home | 10.76 | 6.19 |
| | Day trip from holiday base | 14.81 | 10.24 |
| Scotland | Day trip from home | 9.63 | 5.06 |
| | Day trip from holiday base | 16.51 | 11.93 |
| Wales | Day trip from home | 14.25 | 9.68 |
| | Day trip from holiday base | 11.12 | 6.55 |

### 5.2.3 Apportioning forest-related tourism expenditure

As outlined in Chapter 2, an expenditure partition approach was adopted for the purpose of apportioning forest-related tourism expenditures. Partition methods are arbitrary but provide a transparent and logical method for apportioning expenditures. For this study, following earlier examples of the partition method (e.g. Harley and Hanley, 1989 and Crabtree *et al*., 1994), 100% of the day visit expenditure of "forest only" visits was assumed to relate to forest-tourism. Conversely, for casual forest visits, it is assumed that the trip would have been made regardless of the existence of forests, thus 0% of day visit expenditure was assumed to be forest-related[35]. For "forest combined" visits, expenditure was apportioned based on the importance of the forest in motivating the trip, relative to other trip motivating influences. In addition to the forest visit, forest-combined visitors were asked to specify up to four other reasons why they had made their day trip and to score each reason (including the forest visit) from 1-10, where 1 was not important and 10 was very important. The forest score was then divided by the sum of the scores for all reasons for making the trip, with the resulting proportion being used as the basis of apportioning the total trip expenditure for that respondent. Based on the results of the visitor survey regarding the importance of forests in motivating trip decisions (Table 3.10), it was assumed that 44.7% (+/- 2%) of forest-combined day visit expenditure related to forest tourism. A summary of the general approach proposed for apportioning total tourism expenditures to forest-related tourism for the three main categories of visitor is set out in Table 5.9.

**Table 5.9 General approach for apportioning total tourism expenditures to forest-related tourism**

| Visitor category | Forest-related tourism |
|---|---|
| Forest specific– forest only | 100% |
| Forest specific– forest combined | 44.7% |
| Casual forest visitors | 0% |

[35] The decision to visit a forest could have resulted in an increase or a decrease in the overall expenditure incurred on the trip, depending on the type of activity foregone by visiting a forest. However, it is assumed here that this impact is neutral.

Whilst the expenditure figures considered here are only those incurred on the day visit, for day visitors from a holiday base this will represent only a proportion of the overall cost of a holiday. Where a holiday involves forest-only or forest-combined day visits, as opposed to forest-casual trips[36], it could be argued that some of the tourism expenditure associated with the overall holiday is also forest-related. However, a separate study of holidaymakers would be required in order to estimate this element of forest-related tourism expenditure.

### 5.2.4 Seasonal effect on visitor numbers and expenditures

The expenditure figures presented above are based on the data from the visitor survey, which was undertaken throughout the summer months of July to September. However, there is some evidence to suggest that levels of tourism expenditure per visit vary considerably throughout the year. In order to estimate the seasonal effect on forest-related-tourism expenditure it is necessary to estimate both the distribution of forest visits across the year as well as any fluctuation in the total expenditure per visit. Table 5.10 presents the distribution of visits to woodlands from the UK Day Visit Survey (Countryside Agency, 1999) .

**Table 5.10 Seasonality of visits to forests based on UK DVS (%)**

| | Jan-Mar | Apr-June | July-Sep | Oct-Dec | Total |
|---|---|---|---|---|---|
| Mean | 24 | 31 | 25 | 18 | 100 |

The results show a similar numbers of visits undertaken in the first and third quarters. As noted by Jones *et al.* (2002), this is in contrast to evidence from site specific studies raising questions over the reliability of the data. These results can be compared with an estimated breakdown of forest visits across a 12 month period based on data from 207 forest sites recorded in the Visitor Monitoring Trends Index 1999-2000 (Forestry Commission, 2002) (Table 5.11).

**Table 5.11 Seasonality of visits to forests based on Visitor Monitoring Trends Index 1999-2000 (%)**

| | *No.of sites* | Jan-Mar | Apr-June | July-Sep | Oct-Dec | Total |
|---|---|---|---|---|---|---|
| England | *105* | 16 | 30 | 38 | 17 | 100 |
| Scotland | *77* | 15 | 30 | 37 | 18 | 100 |
| Wales | *25* | 16 | 31 | 37 | 16 | 100 |
| Mean | *207* | 16 | 30 | 37 | 17 | 100 |

More in line with expectations, the table shows a greater contrast in forest visits between the spring/summer and autumn/winter months, with the seasonal effects consistent across the three countries. These results are for all visits made to forests. Seasonal variation could be expected to be even more pronounced for 'tourism' visits to forests, particularly given the high proportion made by holidaymakers. However, there is insufficient information in the Forestry Commission's Trends Index to distinguish between different visitor categories. An examination of the International

[36] It is worth re-emphasising that the concept of forest-related tourism expenditure, as used in this study, is different to that of forest "additionality". Thus, for holidaymakers that make no visits to a forest whilst on holiday, or only make forest-casual visits, none of their day visit or holiday expenditure is considered forest-related. However, there may be some local additionality from forests where these individuals are attracted to an area by the countryside, of which forests are a part. The additionality of forests in relation to countryside visits is considered in more detail in Chapter 4.

Passenger Survey 2000 (National Statistics, 2001) shows that the seasonal distribution of overseas visitors coming to the UK on holiday is very similar to the seasonal distribution of visits to forests presented in Table 5.11. Thus, for the purpose of estimating the seasonal effect on forest-related tourism expenditure, the mean seasonal distribution presented Table 5.11 was assumed for 'tourism' visits to forests.

To take into account the seasonal fluctuation in expenditure levels, the mean tourism expenditure figures presented in Tables 5.8 were adjusted using a seasonality index. Despite concerns over data reliability, in the absence of alternative data the index was based on expenditure data for visits to woodland from the UKDVS (Countryside Agency, 1999). Given the period of data collection in the survey, the third quarter is used as the base period for the index. Table 5.12 presents the mean total trip expenditure per day visit from the UKDVS and the derived seasonality index.

**Table 5.12 Seasonality of day visit expenditure (UKDVS, 1998)**

| | Jan-Mar | Apr-June | July-Sep | Oct-Dec |
|---|---|---|---|---|
| Mean expenditure per day visit (£) | 2.49 | 3.69 | 4.58 | 2.70 |
| Indexed to 3rd quarter | 0.544 | 0.806 | 1.000 | 0.589 |

The results show that day visitors to woodlands in the first and fourth quarter spend only 55% and 59% per trip of day visitors in the third quarter. These seasonal differences are high compared to other studies. For example, the Yorkshire Dales Visitor Study in 1992 found that day visit spending fell by only 5% in low season. However, for the purpose of this study the expenditure figures for predicted visits assumed to take place in each of these quarters were adjusted downwards by the respective percentages in Table 5.12.

### 5.2.5 Mean total forest-related tourism expenditures per forest site

Drawing the different elements of tourism visits and expenditure modelling results together, Table 5.13 presents the mean total forest-related tourism expenditure per forest site.

**Table 5.13 Mean total forest-related tourism expenditure per forest site (£)**

| | *No of. sites* | Model I | Model II |
|---|---|---|---|
| England | *1,861* | 71,989 | 54,227 |
| Scotland | *777* | 69,863 | 42,220 |
| Wales | *224* | 6,583 | 16,725 |

The results from Model I show that, on average, forest-related tourism expenditure associated with visits to forest sites in England is highest at around £72,000 per annum. This is equivalent to a mean value per forest-related tourism day visit (i.e. including forest-only and forest combined visits) of £7.43. Scotland had a similar mean value of expenditure per site at just under £70,000 (a mean of £8.58 per forest-related visit). Mean forest-related tourism expenditure associated with visits to forest sites in Wales is much lower than both England and Scotland, at only £6,500 per site, mainly due to the much lower mean number of visits per site, although, mean forest-related expenditure per visit was only slightly less at £6.54. The total forest-related tourism expenditures per site estimated using Model II show a similar pattern, although the gap between sites in Wales and the other two countries is reduced. This is entirely due to the differences in mean visits per site, as the mean expenditure figures per visit do not change. The total forest-related tourism expenditures per site estimated using Model II show a similar pattern, although the gap between sites in Wales and the other two countries is reduced. This is entirely due to the differences in mean visits per site, as the mean expenditure figures per visit do not change. Drawing on the results presented in Tables 3.5 and 3.6., the mean total expenditure figures per site apportioned to the different expenditure categories are presented in Table 5.14.

**Table 5.14 Mean total forest-related tourism expenditure per forest site by expenditure category (£)**

| | MODEL I | | | MODEL II | | |
|---|---|---|---|---|---|---|
| | England | Scotland | Wales | England | Scotland | Wales |
| Travel | 23,599 | 21,175 | 3,273 | 17,776 | 12,797 | 8,316 |
| Food/drink | 35,870 | 26,677 | 2,051 | 27,019 | 16,122 | 5,211 |
| Entertainment | 6,322 | 7,662 | 195 | 4,762 | 4,630 | 495 |
| Clothing etc. | 45 | 486 | 57 | 34 | 294 | 144 |
| Gifts/souvenirs | 3,712 | 3,868 | 808 | 2,796 | 2,337 | 2,053 |
| Other | 2,442 | 9,995 | 199 | 1,839 | 6,040 | 505 |
| Total | 71,989 | 69,863 | 6,583 | 54,227 | 42,220 | 16,725 |

These estimates should be interpreted with due care for the various reasons already outlined. Nevertheless, the results presented here represent our 'best guess' of mean forest-related tourism expenditure for individual sites in GB.

## 5.3 ECONOMIC SIGNIFICANCE OF FOREST-RELATED TOURISM AT THE COUNTRY AND GB LEVEL

The lack of reliable data regarding publicly accessible forest sites for the majority of the wooded area of GB currently presents an insurmountable barrier to the use of the TGF approach to estimate the total number of tourism day visits to publicly accessible woodland in GB. This section sets out the alternative approach used to estimate the economic significance associated with forest-related tourism in GB.

### 5.3.1 Total annual tourism visits to forests/woodlands

The following estimates are based on figures taken from the UKDVS (Countryside Agency, 1999). Table 5.15 presents a summary analysis of the type and volume of 'tourism'[37] visits made from home.

**Table 5.15 Summary of the volume of tourism visits in GB (millions) (Countryside Agency, 1999)**

| | England | Scotland | Wales | GB |
|---|---|---|---|---|
| Woods/forests | 104.1 | 6.5 | 3.6 | 114.2 |

In 1998 there was an estimated 114 million 'tourism' day visits from home to woodlands, 104 million made by people living in England, 6.5 million made by people living in Scotland and 3.5 million made by those living in Wales. Virtually all of these trips took place within the country of origin. The UKDVS 1998 includes only

[37] The definition of tourist visits is that used for this project, i.e. a trip with a duration of 3 hours or more, rather than the UKDVS tourism definition which also excludes regular users.

those visits made from home. In addition, the UKDVS doesn't distinguish between forest only, forest combined and forest casual trips[38]. After deducting forest-casual visits, and drawing on the data from the visitor survey on trip type and purpose[39], Table 5.16 presents the estimated total woodland tourism visits in GB analysed by trip type and purpose.

**Table 5.16 Total number of tourism woodland visits by trip type and purpose based on UKDVS estimates of tourism day visits from home (millions)**

| | England | Scotland | Wales | GB |
|---|---|---|---|---|
| **Forest only** | | | | |
| Day trip from home | 85.9 | 5.0 | 2.4 | 93.3 |
| Day trip from holiday base | 140.1 | 8.9 | 3.8 | 152.8 |
| Total | 226.0 | 13.9 | 6.2 | 246.1 |
| | | | | |
| **Forest combined** | | | | |
| Day trip from home | 12.1 | 1.0 | 0.6 | 13.7 |
| Day trip from holiday base | 38.5 | 4.2 | 1.0 | 43.7 |
| Total | 50.6 | 5.2 | 1.6 | 57.4 |
| | | | | |
| **All forest visits** | | | | |
| Day trip from home | 98.0 | 6.0 | 3.0 | 107.0 |
| Day trip from holiday base | 178.6 | 13.1 | 4.8 | 196.5 |
| Total | 276.6 | 19.1 | 7.8 | 303.5 |

After taking into account day visits by holidaymakers, the total annual number of tourism day visits to forests in GB is estimated to be in the region of 352 million, of which 107 million are day trips from home and 245 million are trips made by holidaymakers. Just under 277 million of these took place in England, with only 19 million in Scotland and 8 million in Wales. It should be noted that the ratio of tourism visits from home and visits by holidaymakers from the survey is higher than expected and may be subject to review following the publication of the 2002 UK DVS.

### 5.3.2 Total annual forest-related tourism expenditure

The 'best guess' estimates of total annual forest-related day visit tourism expenditure are presented in Table 5.17 after applying the same assumptions that were applied in the site based aggregation regarding:

- the modelled mean expenditure per trip,
- the apportionment of forest-related tourism expenditure,
- the influence of seasonality on expenditure levels; and
- the proportional breakdown of expenditure between expenditure categories.

---

38 It is assumed here that all three trip types are included in the UKDVS 1998 figures.

39 The same assumptions were adopted here as those set out in section 5.2.1 for the purpose of estimating site level expenditure.

**Table 5.17 Forest-related tourism expenditure by expenditure category (£ millions)**

| | England | Scotland | Wales | GB |
|---|---|---|---|---|
| Travel | 673.2 | 49.5 | 25.3 | 748.0 |
| Food/drink | 1,023.2 | 62.4 | 15.8 | 1101.5 |
| Entertainment | 180.0 | 17.9 | 1.5 | 199.5 |
| Clothing etc. | 1.9 | 1.2 | 0.4 | 3.5 |
| Gifts/souvenirs | 105.8 | 9.0 | 6.2 | 121.0 |
| Other | 69.9 | 23.4 | 1.5 | 94.8 |
| Total | 2,054.1 | 163.4 | 50.8 | 2268.3 |

The results suggest that forest-related tourism expenditure for day visits in GB is in the region of £2.3 billion, over £2 billion of which was in England. The forest-related tourism expenditure in Scotland is £163 million, and around £51 million in Wales.

### 5.3.3 Economic significance of forest-related tourism expenditure in GB

Table 5.18 relates the 'best-guess' estimates of forest-related day visit tourism expenditure to total tourism expenditure in GB.

**Table 5.18 Forest related tourism's share of GB tourism expenditure (£ millions)**

| | England | Scotland | Wales | GB |
|---|---|---|---|---|
| GB residents holiday tourism[a] | 19,890 | 3,699 | 1,654 | 25,243 |
| Overseas tourism [b] | 11,358 | 817 | 267 | 12,442 |
| GB residents day visit from home [c] | 28,300 | 2,100 | 900 | 31,300 |
| Total GB tourism spending | 59,548 | 6,616 | 2,821 | 68,985 |
| Forest related expenditure | 2,054 | 163 | 51 | 2,268 |
| Forest related expenditure (% share) | 3.4 | 2.5 | 1.8 | 3.3 |

Sources: [a] UKTS, [b] IPS; [c] UKDVS

It is estimated that forest-related day visit tourism accounts for over 3% of total tourism expenditure in GB. The proportionate share is highest in England at 3.4%, compared to 2.5% and 1.8% in Scotland and Wales respectively. This can be interpreted as the ratio of business turnover that is explained by the existence of forest related tourism. This implies, for instance, that travel or entertainment activities (and others, see Table 5.16) rely to some extent on the forest-related tourism to stay in business. Similarly, forest related tourism safeguards existing employment[40] in those sectors to a certain extent.

These figures are sensitive to the methodological assumptions on which they are based. The analysis presented in Table 5.19 highlights the sensitivity of the results to some of the assumptions adopted, specifically in relation to expenditure per trip, the apportionment of forest-related expenditure for forest-combined trips, the proportion

[40] Translating these expenditure figures into an employment effect presents a number of difficulties due to the lack of reliable information. Available employment statistics focus on "employees", whilst many of those working within the sectors affected are self-employed, for which no reliable data is available.

of forest tourism visits made by holidaymakers and day visitors from home respectively, and seasonality.

**Table 5.19 Sensitivity analysis: individual assumptions**

| | England | Scotland | Wales | GB |
|---|---|---|---|---|
| *Scenario 1 – Assuming upper 95% confidence limit for modelled mean expenditure per trip* | | | | |
| Forest related tourism expenditure | 3,481 | 227 | 77 | 3,785 |
| % of total GB tourism expenditure | 5.8 | 3.4 | 2.7 | 5.5 |
| *Scenario 2 – Assuming lower 95% confidence limit for modelled mean expenditure per trip* | | | | |
| Forest related tourism expenditure | 1,336 | 113 | 31 | 1,480 |
| % of total GB tourism expenditure | 2.2 | 1.7 | 1.1 | 2.1 |
| *Scenario 3 – Assuming 50% of expenditure of forest-combined trips attributable to forests* | | | | |
| Forest related tourism expenditure | 2,112 | 170 | 52 | 2,334 |
| % of total GB tourism expenditure | 3.5 | 2.6 | 1.9 | 3.4 |
| *Scenario 4 – Assuming a mean ratio of visits by holidaymakers and visits from home of 62:38 for all countries* | | | | |
| Forest related tourism expenditure | 1,864 | 118 | 51 | 2,033 |
| % of total GB tourism expenditure | 3.1 | 1.8 | 1.8 | 2.9 |
| *Scenario 5– Assuming seasonality of visits based on UKDVS visits to woodland* | | | | |
| Forest related tourism expenditure | 2063 | 172 | 51 | 2286 |
| % of total GB tourism expenditure | 3.5 | 2.6 | 1.8 | 3.3 |
| *Scenario 6 – Assuming a 5% seasonal difference in expenditure between winter & summer* | | | | |
| Forest related tourism expenditure | 2816 | 237 | 70 | 3123 |
| % of total GB tourism expenditure | 4.7 | 3.6 | 2.5 | 4.5 |

Scenarios 1 and 2 present the results where, *ceteris paribus*, the upper and lower 95% confidence intervals for the expenditure figures per trip[41] are adopted. The results show that at the 95 % confidence level based on modelled expenditure figures per trip, that the proportion of total GB tourism expenditure represented by forest-related day visit tourism expenditure lies somewhere between 2.1 and 5.5%. In scenario 3, the sensitivity of the results to assumptions adopted regarding the apportionment of forest-related tourism expenditure is considered. In the initial 'best guess' estimate a figure of 44.7% of forest-combined expenditure was assumed to be forest-related, from a range of between 2-91%. Scenario 3 presents the results where, *ceteris paribus*, this proportion is increased to 50%. The results show that this assumption has only a minor influence on the overall estimates of economic significance, increasing the proportion of GB tourism from 3.3% to 3.4%. Scenario 4 examines the impact on the economic significance of changes in the proportion of forest tourism day visits made by holidaymakers and day visits from home. In the 'best guess' estimate, country level estimates were used, with there being considerable variation in this proportion across the three countries. Scenario 4 presents the results where, *ceteris paribus*, the same proportion of holidaymakers and day visits from home, based on FC data, is used for all countries, i.e. 62:38. This has the effect of reducing the economic significance in both England and Scotland, with the proportionate share of GB tourism expenditure dropping to 2.9%. Finally, scenarios 5 and 6 consider, *ceteris paribus*, the influence of changes in the assumptions regarding seasonal differences in visits and expenditure respectively. In scenario 5, the UKDVS derived estimates of seasonal differences are adopted. Scenario 6 assumes only a 5% seasonal

[41] The expenditure per trip figures presented in Table 3.16 were results from a model in order to reduce the influence of outlying values.

difference in expenditure between winter and summer. The results show that a change in the assumptions regarding the seasonality of visits has a much smaller influence on the overall economic significance compared to the changes in expenditure assumptions. Taking into account the influence of the different factors, the estimates of economic significance are clearly most sensitive to the assumptions adopted here regarding the value of expenditure per day visit.

Table 5.20 presents some combined assumptions to give a higher and lower inclined estimate of the economic significance of forest-related day visit tourism.

**Table 5.20 Sensitivity analysis: combined assumptions**

| | England | Scotland | Wales | GB |
|---|---|---|---|---|
| *Combined scenario 2 and 4 – lower estimate* | | | | |
| Forest related tourism expenditure | 1,222 | 80 | 31 | 1,333 |
| % of total GB tourism expenditure | 2.1 | 1.2 | 1.1 | 1.9 |
| *Combined scenario 1 and 6 – upper estimate* | | | | |
| Forest related tourism expenditure | 5179 | 347 | 111 | 5637 |
| % of total GB tourism expenditure | 8.7 | 5.2 | 3.9 | 8.2 |

The results suggest that the economic significance of forest-related day visit tourism is somewhere between £1.3 and £5.6 billion, about 1.9% and 8.2% of total GB tourism expenditure respectively, with a conservative 'best guess' of £2.3 billion (3.3%).

## 5.4 DISCUSSION AND CONCUSIONS

Following a line of research that has received considerable recent attention, this part of the study has investigated the use of linear regression TGF models to predict woodland recreation demand. Whereas many of the previous studies using TGF models have been concerned with estimating economic benefits or the 'value' of woodlands for recreation in a single country or locality, the focus of this study was an assessment of the economic 'significance' at the country and GB level. Previous similar studies have generally suffered from limited data on visits to forest sites. Whilst also the case here, this study has benefited from the availability of the latest data on visit numbers to forests managed by the Forestry Commission and other organisations, as well as primary data from an extensive visitor survey, both data sets covering sites throughout GB. In line with the more sophisticated modelling approaches in this field of research, the study considered a wide range of predictor variables found to be significant in explaining arrivals to GB woodlands in past studies. As well as including detailed information on site attributes from a survey of forest managers, the models incorporated travel costs, the socio-economic traits of the users, and substitution effects through an index of availability of alternative woodland sites for recreation. Despite strong theoretical grounds for their inclusion, surprisingly few of these variables had any statistically significant explanatory power in the models. This raises the issue, also noted in previous studies, that modelling approaches such as those employed in this study require high cost primary data and use complex and costly data handling and statistical analysis techniques which, despite their sophistication, cannot make up for the inherent data quality constraints on model inputs. Whilst many facets of visitor behaviour and local contextual factors will inevitably remain unaccounted for in studies of this nature, improvements in the quantity and quality of tourism visit data have the potential to greatly enhance the future development of statistically defensible transferable models. At present, the Forestry Commission are the only land managers that monitor visits to woodlands on a regular basis at a significant number of sites. Other organisations (e.g. WT) do record visitor numbers but not in such a systematic and co-ordinated fashion. A wider range of landowners/managers recording visit[42] data in a consistent and reliable way at sites, also defined in a consistent way, would undoubtedly enhance the quality and transferability of 'forest' (zonal) models. The key areas for improved visitor monitoring are:

- The adoption of a common definition of a 'site' for visitor monitoring purposes;
- The adoption of a common definition of forest 'site' attributes.
- A larger number of sites monitored for visitor counts;
- A more representative sample of sites monitored for visitor counts, particularly in terms of non-FC privately and publicly owned woodlands;
- More accurate and comprehensive monitoring of total visitor numbers at sites;
- More accurate and comprehensive monitoring of tourist visitors at sites;
- More transparency in the assumptions used to translate counts into total visit numbers;
- Estimation of the potential error range in visit estimates in order to gauge the reliability of the data[43];
- Surveys of households as well as forest visitors to capture future visiting behaviour of non-forest visitors;

There are also other key practical constraints to the transferral of TGF models and their use in any kind of aggregation exercise to country and GB level. In particular, the development of a reliable database of forest sites in GB, again using a common 'site' definition, must be a key objective if any aggregation exercise is to be comprehensive. At a minimum, this database must also include information on the site attributes that are predictor variables in any model. A further consideration for any future project is that the processing time required to calculate the necessary secondary data using GIS should not be underestimated. Even for the relatively simple models used in this study, secondary data collection and calculation for nearly 3,000 privately and publicly owned sites was an onerous task.

Nevertheless, the type of models developed in this study are, in theory at least, suited to economic significance analysis at the country and GB level. They can also be used to assess additionality of changes in forest management at a local level, and therefore to inform forest and tourism policy decisions in terms of investment priorities between alternative sites and recreational facilities. However, from the approach adopted in this study it is not possible to quantify the additionality of forests at the country and GB level. Such a question could not be answered by simple aggregation of the results using the type of models developed in this study and would require an altogether different methodological approach.

In conclusion, the figures presented here are 'best guess' estimates of the economic significance of forest-related day visit tourism at site, country and GB level. Whilst the site level estimates could be improved upon, particularly with respect to quality

[42] Where tourism is the main focus of interest, then some means of distinguishing between visitor types is also necessary.

[43] This may require research into the reliability and accuracy of the different counting mechanisms

improvements in the relevant data inputs for the models used, these estimates clearly indicate that the forest-related expenditures on tourism day visits to forests make an important contribution to the tourism economy of GB.

## CHAPTER 6 QUANTIFYING THE ECONOMIC SIGNIFICANCE OF FORESTS TO TOURISM IN THE COUNTRYSIDE

### 6.0 INTRODUCTION

The previous sections were concerned with the economic significance of forest-related tourism day visits at the site, country and GB level. As well as being a destination for day visitors, forests attract people to visit the countryside more generally. It can be argued that where forests are a factor in attracting day or staying visitors to a specific area a proportion of that expenditure can be associated with forests, regardless of whether they visit a forest site. The aim of this part of the study was to quantify, in economic terms, the significance of forests in attracting tourists to the countryside, comparing areas contrasting in their forest characteristics across England, Scotland and Wales. Thus, it differed from the first part of the study in four key respects:

(i) it was focussed at the local area level;

(ii) it was concerned with visitors to the countryside, rather than just to forest sites;

(iii) it was concerned with both staying and day visitors; and

(iv) it measured economic significance in terms of "forest associated expenditures"[44], as opposed to "forest-related expenditure" as defined for the first phase of this study.

This chapter presents the methods used and a summary of the key results.

### 6.1 CASE STUDY AREAS

For each case study area, the study examines the importance of the local forests in determining decisions to visit the area. The importance of forests in trip decisions is then used to estimate the economic significance of forests in the context of tourism expenditures. Six case study areas were selected based on the assumption that they would differ in terms of the importance of forests and woodlands in relation to tourism and recreation. Two areas in each of England, Scotland and Wales were selected in consultation with the Forestry Commission. These were: the New Forest and the Lake District in England; the Trossachs and the Borders in Scotland; and Snowdonia and the Wye Valley in Wales. These areas were selected on the basis of the following criteria:

- Each area had a significant[45] coverage of woodland and forest.
- Each area represented a distinct regional tourism destination[46].

[44] Forest associated expenditures are defined as the proportion of total trip expenditure incurred by a day or staying visitor that is associated with an area's forests through the influence of those forests on the choice of trip destination. This can be distinguished from "forest-related tourism expenditure" which is directly related to forest recreation activity.

[45] Here, significant was interpreted as being similar to the national average.

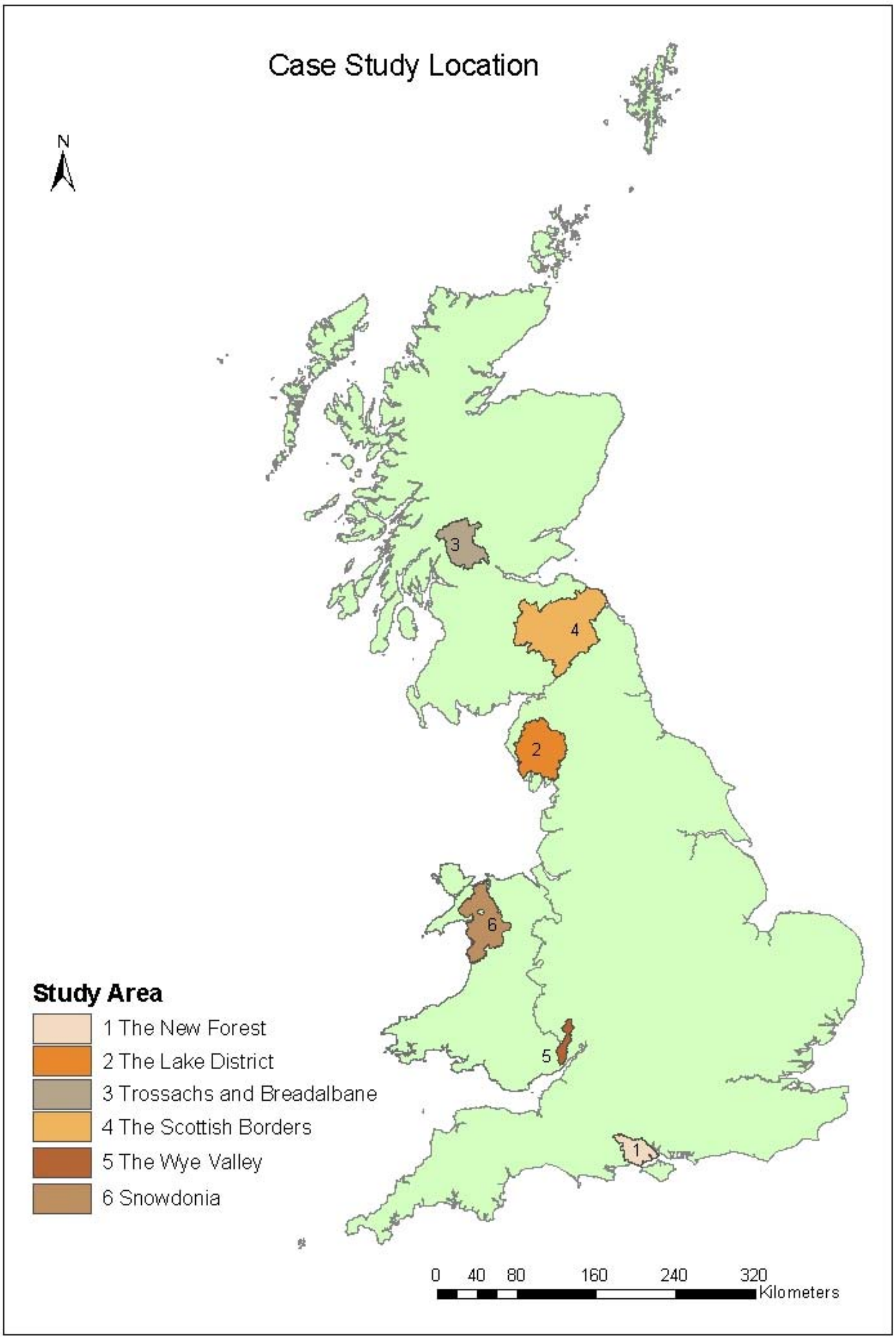
[46] A key aim of the survey was to establish why tourists had chosen to visit or stay in the area, consequently it was important that the case study areas selected were, as far as possible, resonant with the tourists within those areas.

- For each country, an area was selected where forests/woodlands were strongly associated with the area, and therefore might be reasonably assumed to be an important factor in tourist decisions to visit or stay in the area.
- A second area in each country was selected where the association with forests/woodlands was less strong.

Figure 6.1 shows the locations of the case study areas[47], whilst the boundary definitions, size of the areas, percentage of forest cover and location of survey sites within each area are detailed in Table 6.1.

47 Ideally for comparative purposes, the case study areas would also have been defined in terms of statistically equivalent boundaries. However, the tourist locations selected did not always lend themselves to such easy characterisation. Consequently, the case study areas are defined in terms of a range of different types of administration or designated area boundaries.

**Figure 6.1 Location of six case study areas**




Outline based on Bartholomew's Digital Database

**Table 6.1 Profile of countryside visitor survey case study areas**

| | England | | Scotland | | Wales | |
|---|---|---|---|---|---|---|
| | New Forest | Lake District | Trossachs | Borders | Wye Valley | Snowdonia |
| Boundary definitions | Unitary Authority | National Park | Scottish Tourist Board | Scottish Admin. Region | Area of Out-standing Natural Beauty | National Park |
| Area ($km^2$) | 753 | 2,292 | 1,508 | 4,731 | 328 | 2,132 |
| Forest cover (%)* | 23% | 9% | 19% | 12% | 20% | 13% |
| Forest profile | High | Low | High | Low | High | Low |
| Survey site | Lyndhurst | Winder-mere | Aberfoyle | Selkirk/ Jedburgh | Tintern Abbey | Betws-y-Coed |

*Forest Cover Calculated using Bartholomew's 1:200000 UK Digital Database. These figures will vary to other sources and are presented here as an initial indication of relative differences between areas.

The areas selected as the basis for the case studies ranged significantly in both size and in percentage of forest cover. The New Forest, the Trossachs and the Wye Valley were chosen as areas where forests were considered an important part of the tourism identity. The percentage of forest cover in these areas is considerably higher than country and GB average. The Lake District, the Borders and Snowdonia were selected as areas where forests were assumed to be less important to tourism. In these areas the forest cover is fairly similar to the country and GB average.

**New Forest**

Located in the south of England (Southern Tourist Board region) within the county of Hampshire, the New Forest[48] covers an area of around 750 square kilometres. Hampshire, and the New Forest in particular, is a popular tourist destination for both holiday and day trippers. In 1998, around 94 million day visits were made to the Southern Tourist board region, spending over £2 billion (UKDVS, 1998). In 2000, the UK population made around 4.1 million holiday trips to the Hampshire area, spending around £508 million (UKTS 2001). Overseas visitors also make 0.47 million trips, spending around £221 million in the county (IPS, 2001). Relative to the rest of Great Britain, the New Forest is a highly wooded area with some 23% of area covered by woodland and forests. The area has a number of high nature value areas, including important areas of ancient woodland, and is renowned as a former royal hunting ground. Consequently, it is assumed that the forests of the area have a high tourist profile compared to many other tourism destinations in England.

**Lake District**

The Lake District National Park is in the county of Cumbria in the North West of England. The Lake District is the biggest of the National Parks, covering some 2,292 square kilometres. The area is renowned for its lakes and mountains, including some of the highest peaks in England. In 1998, around 10.4 million day visits were to made Cumbria spending some £142 million (UKDVS, 1998). In 2001, UK residents made around 4.5 million holiday trips to Cumbria, spending an estimated £738 million, a large proportion of which was in the Lake District National Park (UKTS 2001). Overseas visitors made 0.21 million trips, spending a further £40 million in the area

[48] Unitary Authority Boundary

(IPS 2001). The percentage of woodland coverage of the area is average for England at around 9%, however is low compared to the New Forest. Given the importance of the lakes and mountains of the area, it is assumed that woodlands of the Lake District NP play less of an important role in attracting tourists than the woodlands of the New Forest.

**Trossachs**

The Trossachs and Breadalbane study area is situated in Central Highlands of Scotland covering an area of 1,508 square kilometres. The landscape of this area is one of spectacular mountains, woodlands, moor and lochs, and the forest cover is higher than the Scottish average[49] at about 19% of the total area. The area is a popular tourist destination for both holidaymakers and day visitors, many of whom, it is assumed, will come to the area because of the landscape, of which forests are an important part. The Trossachs case study area is within the Argyll, The Isles, Loch Lomond, Stirling and the Trossachs (AILLST) regional tourist area. In 1998, day visits to the area were around 31 million, with visitors spending some £316 million (UKDVS, 1998). In 2001, UK residents took around 2.2 million trips to the area and spent around £374 million (UKTS 2001), whilst overseas visitors made 0.2 million trips and spent around £40 million (IPS 2001).

**Borders**

The Scottish Borders stretch from the English border in the south, to the outskirts of Edinburgh in the north and Dumfries and Galloway to the west. The Borders area is the largest of the case study areas covering around 4,730 square kilometres. The Borders is a popular tourist destination for both staying visitors and day trips. In 1998, in the region of 10.1 million day visits were made to the area, contributing £152 million to the area's economy (UKDVS, 1998). In 2001, some 0.4 million trips were taken by UK residents to the Scottish Borders, spending around £65 million pounds (UKTS 2001), whilst in the same year, overseas visitors also made around 40,000 trips spending around £8 million (IPS 2001). Tourists come to the Borders for many reasons, including the Borders towns and its landscape. The landscape is characterised by rolling hills and moorland in the west and the rocky Berwickshire coastline in east. At around 12%[50] , the area has a relatively low level of forest cover compared to the Trossachs, and forests are assumed, therefore, to play a less important role in attracting tourists to the area than forests in the Trossachs.

**Wye Valley**

The Wye Valley Area of Outstanding Natural Beauty (AONB) is an internationally important protected landscape straddling the border between Wales and England. The study area includes Monmouthshire where the landscape is one of steep valleys, spectacular gorges and thick forest. This case study area covers some 328 square kilometres, of which around 20% is forested, almost double the national average. Consequently, it is assumed that the forests of the Wye Valley play an important role in attracting tourists to the area. Identification of visitor numbers to the Wye Valley is difficult due to its relatively small area and the boundaries spanning two countries and 3 counties. However, it is estimated that South Wales received around 5.7 million

[49] Woodlands and forest cover around 16-17% of Scotland's total land area (FE, 2001)

[50] The National Inventory of Woodland and Trees (Smith & Gilbert, 2001) suggests that forest cover in the Borders is closer to the Scottish average of around 17%.

trips by UK residents in 2001, spending some £862 million (UKTS 2001), while overseas residents made 0.6 million visits spending £179 million (IPS 2001).

**Snowdonia**
Located in the North of Wales Snowdonia is the second largest of the National Parks in England and Wales', covering some 2,130 square kilometres. It is estimated that around 3.3 million UK residents went on a holiday to North Wales in 2001, spending around £429 million. In the same year, overseas tourists made around 0.26 million visits spending £49 million. There are no estimates for day visitors to the North Wales area, but Snowdonia National Park estimate that the figure is around 6 to 10 million. The forest cover in this case study area is close to the Welsh average at around 13.8% (FE, 2001), the majority of which is managed by the Forestry commission. The Snowdonia National Park is renowned for its beautiful and varied scenery, including coastline, valleys, lakes and open mountains. Whilst forests form an important part of the landscape, it is assumed that they are less important in attracting tourism to the area than the forests of the Wye Valley.

## 6.2 THE SURVEY

A visitor survey was undertaken in the six areas with the main objectives:

- To collect data on the tourism expenditures of visitors to the countryside.
- To collect data on the importance of forests in trip decisions to visit or stay in the areas.
- To collect data on the attitudes of countryside visitors towards forests (presented in Chapter 5).

A total of 739 face to face interviews with adults (aged 16 or over) were completed across the six case study areas throughout the months of July, August and September 2002. Interviews were conducted at busy sites in popular tourist locations within the case study areas. Each case study area had one interviewer and respondents were selected for interview on a continuous survey basis, where-by the next person to pass the interviewer after completion of the previous questionnaire was approached. Where a group of people were approached one person was selected for interview. A quota was set of 120 interviews in each location. No other quotas were set. For the purpose of this part of the study, only individuals whose trips were non-routine in nature were interviewed.

A structured questionnaire was used comprised of seven main sections:
1. Introduction
2. Identification of the type of tourist
3. Visitor characteristics
4. Visitor expenditure
5. Attitudes towards the environment and forests
6. Socio-economic characteristics
7. Interviewer feedback

Each questionnaire was accompanied by a map identifying the case study area in order to familiarise respondents with the area under consideration and to avoid any confusion over the area boundaries. A copy of the questionnaire can be found in the Appendix to this chapter.

## 6.3 THE SAMPLE

Comparing the socio-economic characteristics of respondents between case study areas, employment status was relatively similar with around 68% of all respondents in some form of employment and 22% being retired. Figure 6.2 shows the employment status of respondents across the six areas.

**Figure 6.2 Employment status of respondents**

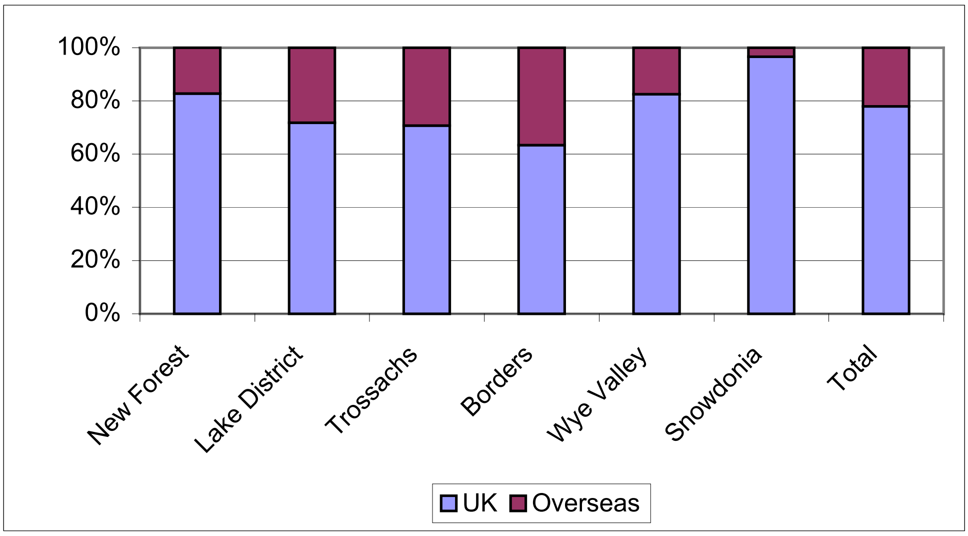

Table 6.2 provides a breakdown of the sample by age group. Overall, 82% of respondents were aged between 25 and 64 years old. There was some small variation across the case study areas. The New Forest, the Lake District and the Trossachs having the highest proportion of respondents under the age of 45, whilst the Wye Valley had the highest percentage of visitors over the age of 55.

**Table 6.2 Respondents in each age group (%)**

| | New Forest | Lake District | Tross-achs | Borders | Wye Valley | Snow-donia | Total |
|---|---|---|---|---|---|---|---|
| *n* | *128* | *124* | *124* | *123* | *120* | *120* | *739* |
| 16-24 | 5 | 6 | 4 | 6 | 2 | 3 | 4 |
| 25-34 | 20 | 23 | 25 | 17 | 12 | 12 | 18 |
| 35-44 | 31 | 21 | 24 | 17 | 23 | 30 | 24 |
| 45-54 | 21 | 23 | 15 | 24 | 20 | 20 | 21 |
| 55-64 | 14 | 16 | 21 | 20 | 24 | 18 | 19 |
| 65+ | 9 | 11 | 10 | 16 | 19 | 17 | 14 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

In terms of gender, overall, a slightly higher proportion of the respondents were male (54%). Generally, there were more males than females, with the exception of Snowdonia where around two thirds of those questioned were female. Figure 6.3 presents a breakdown of UK and overseas resident respondents across the six areas. On average across the six areas UK residents accounted for 78% of respondents.

**Figure 6.3 UK and overseas respondents (%)**




On average across the six areas, UK residents accounted for 78% of respondents and overseas residents 22%. However, there was considerable variation across the areas. Snowdonia had the lowest proportion of overseas resident respondents at only 3%, whilst the Borders had the highest proportion at 37%.

## 6.4 TOURIST PROFILE

Unlike the forest visitor survey, where a sample of all forest visitors was necessary, only those people on "tourism" trips were interviewed for the countryside visitor survey. Here, tourism was defined in terms of the non-routine nature of the activity, rather than being based simply on where the individual lived or worked or the length of the trip in question. Thus, if those approached lived or worked in the area but described their trip as non-routine[51] in nature, they were interviewed further, whilst those living or working in the area on a routine trip, such as shopping or walking the dog etc., were excluded.

In total, only two percent of those interviewed for the full questionnaire lived or worked in the case study area, 33% were visiting the area for the first time and 65% were repeat visitors, having visited the area at least once before. Table 6.3 presents the type of tourist surveyed, split between local residents, first time visitors and repeat visitors. The proportion of tourists in each group was relatively similar across the six case study areas, with the exception of Snowdonia, where 85% of respondents were repeat visitors.

**Table 6.3 Repeat visits (%)**

| | New Forest | Lake District | Tross-achs | Borders | Wye Valley | Snow-donia | Total |
|---|---|---|---|---|---|---|---|
| *n* | *128* | *124* | *124* | *123* | *120* | *120* | *739* |
| Living/working in the area | 3 | 0 | 0 | 0 | 1 | 0 | 2 |
| First time visitor | 39 | 38 | 38 | 34 | 40 | 15 | 33 |
| Repeat visitor | 58 | 62 | 62 | 66 | 59 | 85 | 65 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Table 6.4 provides a breakdown of respondents by purpose of trip. On average across the six areas, 42% of visitors were on holiday away from home staying inside the case study area, 28% were on holiday away from home staying outside the area or passing through, whilst 28% were day visitors from home.

**Table 6.4 Purpose of trip (%)**

| | New Forest | Lake District | Tross-achs | Borders | Wye Valley | Snow-donia | Total |
|---|---|---|---|---|---|---|---|
| *n* | *128* | *124* | *124* | *123* | *120* | *120* | *739* |
| Short day trip (<3hrs) | 20 | 12 | 27 | 9 | 20 | 8 | 16 |
| Long day trip(<3hrs) | 5 | 7 | 5 | 9 | 22 | 23 | 12 |
| Staying inside area | 50 | 60 | 35 | 35 | 27 | 43 | 42 |
| Staying outside area | 12 | 6 | 22 | 28 | 21 | 21 | 18 |
| Passing through | 12 | 11 | 6 | 17 | 10 | 4 | 10 |
| Other | 1 | 4 | 5 | 2 | 0 | 1 | 2 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

[51] Non-routine was defined as something that the respondent does just now and again.

There was considerable variation in the purpose of trip across the six areas. The Wye Valley had the largest proportion of day visitors from home (43%) whilst the Borders (18%) and the Lake District (18%) had the lowest. On average, 58% of day visitors were on a short trip from home of less than 3 hours. However, the split between day visitors on a short and long trip largely reflected the proximity of each case study area to large centres of population. For the New Forest and the Trossachs, over 80% of day visitors were on a short trip from home of less than 3 hours, whilst only 26% of day visitors in Snowdonia were in this category.

The Lake District had the largest proportion of respondents staying inside the area (60%) and a relatively small proportion of respondents on a day visit from a holiday base (6%) or passing through (11%). The Wye Valley had the lowest proportion of respondents on holiday staying inside the area (27%). The Borders had the highest proportion of respondents on holiday away from home staying outside the area (28%) or passing through (17%).

Table 6.5 provides a breakdown by area of the mean total length of holiday and mean total length of stay in the case study area for those visitors staying away from home.

**Table 6.5 Mean length of holiday and stay in case study area for visitors staying away from home (nights)**

| | New Forest | Lake District | Tross-achs | Borders | Wye Valley | Snow-donia | Total |
|---|---|---|---|---|---|---|---|
| *n* | *73* | *99* | *61* | *65* | *42* | *54* | *394* |
| Case study area | 5.0 | 5.2 | 4.7 | 4.8 | 4.6 | 7.6 | 5.3 |
| Total Holiday | 9.3 | 8.5 | 9.4 | 16.8 | 8.6 | 7.9 | 10.1 |
| % of stay in case study area | 54% | 61% | 50% | 29% | 53% | 96% | 52% |

Overall, staying visitors stayed a mean of 5.3 nights, around 52% of their total trip, in the case study areas. Across the case study areas, respondents in Snowdonia had the shortest length of trip (7.9 nights) but stayed the longest number of nights and spent the highest proportion of their total trip (96%) in the case study area. Conversely, respondents in the Borders had the longest trip length (16.8 nights) but spent the lowest proportion of their stay in the case study area (29%).

Respondents were asked to indicate from a list of activities how they would best describe their trip. The percentage of respondents undertaking each type of activity is presented in Table 6.6 (where respondents were allowed to tick more than activity).

**Table 6.6 Activities undertaken by respondents* (%)**

| | New Forest | Lake District | Tross-achs | Borders | Wye Valley | Snow-donia | Total |
|---|---|---|---|---|---|---|---|
| *n* | *128* | *124* | *124* | *123* | *120* | *120* | *739* |
| Activity holiday | 59 | 44 | 47 | 30 | 14 | 26 | 37 |
| Relaxing holiday | 92 | 84 | 60 | 43 | 47 | 68 | 66 |
| VFR | 14 | 5 | 3 | 9 | 12 | 11 | 9 |
| Sight-seeing | 77 | 44 | 52 | 64 | 40 | 33 | 52 |
| Touring | 20 | 2 | 4 | 16 | 24 | 14 | 14 |
| Other | 2 | 4 | 1 | 4 | 4 | 3 | 3 |
| Total | 264 | 183 | 167 | 166 | 141 | 155 | 181 |

* Respondents were allowed to tick more than one type of activity.

Overall, the majority of respondents described their day trip or holiday in terms of more than one-activity. Two thirds of respondents described their trip as a relaxing holiday or day trip and over half indicated they were sightseeing, however, the results varied considerably across the case study areas.

## 6.5 TOURISM EXPENDITURE

Respondents were asked to provide details of their trip expenditure for the whole of their current trip, including any expenditure on accommodation. The expenditure figures presented here represent all expenditures incurred on the overall trip, both in and outside the case study area. For visitors staying away from home, daily expenditures are calculated by dividing the total expenditure by the total length of trip in nights to give a mean daily expenditure.

### 6.5.1 Mean expenditure for all day visitors

Mean expenditure for all day visitors from home for the six case study areas are presented in Table 6.7. The small sample sizes suggest the figures should be treated with caution.

**6.7 Mean expenditure for ALL day visitors from home (£ $person^{-1}$ $day^{-1}$)**

| | New Forest | Lake District | Tross-achs | Borders | Wye Valley | Snow-donia |
|---|---|---|---|---|---|---|
| *n* | *34* | *24* | *42* | *22* | *51* | *38* |
| Travel | 4.88 | 4.18 | 4.41 | 6.31 | 6.48 | 4.88 |
| Food/drink | 6.87 | 9.58 | 5.45 | 6.82 | 7.30 | 3.89 |
| Entertainment | 0.42 | 3.77 | 0.70 | 3.63 | 1.26 | 0.66 |
| Clothing/ footwear | 0.32 | 0.75 | 3.12 | 0.76 | 0.65 | 0.00 |
| Gifts/ souvenirs | 1.21 | 2.93 | 1.57 | 1.94 | 4.33 | 1.13 |
| Other | 0.97 | 1.44 | 0.33 | 0.00 | 0.48 | 0.12 |
| Total | 14.67 | 22.66 | 15.59 | 19.45 | 20.50 | 10.68 |

The Lake District had the highest mean total expenditure per person at £22.66 per person, over twice as much as respondents in Snowdonia which had the lowest mean expenditure per day at £10.68.

**6.5.2 Respondents on holiday staying away from home within the case study area**

Table 6.8 presents the total mean expenditure per person per night for UK and overseas residents on holiday staying away from home.

**Table 6.8 Mean expenditure for UK and overseas respondents on holiday staying away from home in the case study area (£ $person^{-1}$ $night^{-1}$)**

| | UK | Overseas | Total |
|---|---|---|---|
| *n* | *248* | *58* | *306* |
| Accommodation | 15.77 | 14.94 | 15.61 |
| Travel | 5.38 | 15.58 | 7.32 |
| Food/drink | 8.95 | 10.00 | 9.15 |
| Entertainment | 2.09 | 3.00 | 2.26 |
| Clothing/ footwear | 0.96 | 1.17 | 1.00 |
| Gifts/ souvenirs | 1.80 | 1.43 | 1.73 |
| Other | 0.56 | 0.33 | 0.52 |
| Total | 35.51 | 46.45 | 37.59 |

Overall, the mean total expenditure per person per night was £37.59, of which 40% was spent on accommodation. Together, Travel and Food and Drink accounted for 46%, whilst combined expenditure on Entertainment, Clothing/footwear and Gifts/souvenirs accounted for 13% of expenditure. Overseas staying visitors total mean expenditure per person per night was 46% higher than that of UK staying visitors mainly due to higher expenditure on travel.

Table 6.9 presents the total mean expenditure per person per night for respondents on holiday staying away from home in the case study area for the six case study areas.

**Table 6.9 Mean expenditure for respondents on holiday staying away from home in case study areas (£ person$^{-1}$ night$^{-1}$)**

| | New Forest | Lake District | Tross-achs | Borders | Wye Valley | Snow-donia |
|---|---|---|---|---|---|---|
| *n* | *62* | *74* | *44* | *43* | *32* | *51* |
| Accommodation | 15.01 | 16.57 | 14.70 | 16.29 | 21.07 | 11.42 |
| Travel | 7.47 | 9.25 | 7.20 | 8.67 | 6.32 | 3.84 |
| Food/drink | 10.28 | 9.52 | 8.96 | 9.35 | 9.04 | 7.17 |
| Entertainment | 1.80 | 3.53 | 1.27 | 1.93 | 2.37 | 2.32 |
| Clothing/ footwear | 0.63 | 1.89 | 1.18 | 0.96 | 0.45 | 0.4 |
| Gifts/ souvenirs | 1.71 | 2.99 | 1.57 | 1.31 | 1.34 | 0.64 |
| Other | 1.11 | 0.39 | 0.49 | 0.60 | 0.93 | 0.19 |
| Total | 38.01 | 44.14 | 35.37 | 39.11 | 41.52 | 25.98 |

Of the six areas, the Lake District had the highest expenditure at £44 per person per night whilst Snowdonia had the lowest at just under £26. The low levels of expenditure in Snowdonia are consistent with those of the day visitors, and may also be partly explained by the low numbers of respondents from overseas (4% of all respondents on holiday away from home).

**6.5.3 Respondents on holiday away from home staying outside the area**

Table 6.10 presents mean expenditure per person per night for UK and overseas respondents on holiday away from home staying at holiday bases outside the area (including visitors passing through the area to or from their holiday destination).

**Table 6.10 Mean expenditure for UK and overseas on holiday away from home staying outside the case study area (£ person$^{-1}$ night$^{-1}$)**

| | UK | Overseas | Total |
|---|---|---|---|
| *n* | *119* | *98* | *218* |
| Accommodation | 14.36 | 19.05 | 16.42 |
| Travel | 5.62 | 15.53 | 10.06 |
| Food/drink | 8.94 | 11.62 | 10.11 |
| Entertainment | 2.47 | 3.18 | 2.79 |
| Clothing/ footwear | 1.74 | 1.16 | 1.47 |
| Gifts/ souvenirs | 1.55 | 2.08 | 1.79 |
| Other | 0.47 | 0.53 | 0.49 |
| Total | 35.15 | 53.15 | 43.13 |

Overall, at £43.13 per person per night the mean total expenditures are higher for day visitors staying outside the area than for those staying within the area. Accommodation accounted for 48%, whilst travel and food and drink also accounted for 48% of daily expenditures. Overseas residents spent around 50% more per night than their UK counterparts.

Table 6.11 presents the mean expenditure per person per night for day visitors staying at holiday bases outside the area to each of the case study areas.

**Table 6.11 Mean expenditure for respondents on holiday away from home staying outside the area (£ person$^{-1}$ night$^{-1}$)**

| *n* | New Forest *30* | Lake District *26* | Tross-achs *38* | Borders *58* | Wye Valley *36* | Snow-donia *30* |
|---|---|---|---|---|---|---|
| Accomm-odation | 15.40 | 16.10 | 24.43 | 16.30 | 14.58 | 10.37 |
| Travel | 10.12 | 14.26 | 11.76 | 11.22 | 9.65 | 2.54 |
| Food/drink | 9.05 | 9.41 | 11.24 | 14.30 | 7.85 | 5.21 |
| Enter-tainment | 2.30 | 3.67 | 2.97 | 3.29 | 2.22 | 2.07 |
| Clothing/ footwear | 0.49 | 1.23 | 1.16 | 3.65 | 0.28 | 0.25 |
| Gifts/ souvenirs | 1.64 | 2.77 | 2.48 | 1.55 | 1.93 | 0.52 |
| Other | 0.68 | 0.34 | 0.36 | 0.37 | 1.20 | 0.00 |
| Total | 39.68 | 47.78 | 54.40 | 50.68 | 37.71 | 20.96 |

The total mean expenditures varied considerably between the locations. Of the six areas, the Trossachs had the highest expenditure per person per night at £54.40, whilst Snowdonia had the lowest at £20.27. Once again, the low figures in Snowdonia are consistent with the other visitor categories and can also be partly explained by the low numbers of respondents from overseas.

## 6.6 THE IMPORTANCE OF FORESTS IN TRIP LOCATION DECISIONS

A key objective of the survey was to establish the importance of forests in decisions to visit or stay in the area for a day trip or holiday. In order to minimise the introduction of instrument bias, the information was elicited from the respondents through a series of independent, but related, questions.

The first question was designed to start the respondent thinking about the relative importance of different factors that may influence their trip location decisions in general. Respondents were first asked to score the relative importance of a selection of location characteristics that they may **generally** consider when deciding on where to go for a day trip or holiday. Five characteristics found to be resonant with visitors in the pilot study were selected: peace and tranquillity; good food and drink; good scenery; interesting visitor attractions and historic buildings; and interesting local shops. Scores were from 0-10, where 0 was “not at all important” and 10 was “very important”. Table 6.12 shows the rankings of the mean scores for each category for all areas.

**Table 6.12 Importance of area characteristics in general trip location decisions by case study area for all tourists** *(Ranked by mean scores, where 0 was not at all important and 10 was very important)*

| | New Forest | Lake District | Tross-achs | Borders | Wye Valley | Snow-donia | Total |
|---|---|---|---|---|---|---|---|
| Peace & Tranquillity | 2 | 2 | 2 | 2 | 2 | 3 | 2 |
| Good food & drink | 4 | 3 | 3 | 3 | 3.5 | 2 | 3 |
| Good scenery | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Interesting visitor attractions | 3 | 4 | 4 | 4 | 3.5 | 4 | 4 |
| Interesting local shops | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

In all six areas, the results show that "Good Scenery", was the most important of the five factors for general trip location decisions. As forests are a major part of the "scenery" in countryside areas, this would suggest that forests play a key role in general trip making decisions. The aim of the other questions in this section was to get the respondents to express this quantitatively.

Each visitor was asked, for their current trip, to identify up to four[52] main reasons why they had chosen to visit or stay in the case study area (as opposed to any another destination). Table 6.13 presents the area characteristics/reasons for visiting the area summarised into 27 general response categories. The order in which these reasons are listed is not significant.

[52] Clearly, there are a potentially unlimited number of factors that any individual may take into account when selecting a trip destination. However, it is assumed here that there are not likely to be more than four main reasons.

**Table 6.13 Characteristics/Reasons given for choosing to visit the area with identifying code**

| Coding | Characteristic/Reason |
|---|---|
| 1. | Attractive scenery |
| 2. | Attractive/unspoilt towns |
| 3. | Local Produce/Crafts |
| 4. | Accommodation/Pubs/Restaurant/Hospitality |
| 5. | Tranquillity/Relaxing |
| 6. | Accessibility |
| 7. | Nice/friendly people |
| 8. | Wildness/Remoteness |
| 9. | Good shops |
| 10. | Nature/Wildlife |
| 11. | Climate |
| 12. | Specific event |
| 13. | Forest/Forest facilities |
| 14. | History/buildings/heritage/culture of the area |
| 15. | Family history/nostalgia/historic Ties |
| 16. | House Relocation |
| 17. | Lochs/lakes, Rivers |
| 18. | Visitor attractions/activities |
| 19. | Exploring a new area |
| 20. | Rurality |
| 21. | Visiting family/ friends |
| 22. | Free Lodgings |
| 23. | Outdoor Recreation/facilities |
| 24. | Familiarity |
| 25. | Beaches/coast |
| 26. | Hills/ Mountains |
| 27. | Spiritual |

Table 6.14. presents the five most frequently cited responses for each area, along with the ranking of forests.

**Table 6.14 Most frequently cited characteristics that influenced trip location decisions for current trip for all tourists ranked by frequency** *(Characteristic identity code: where 1 = Scenery; 2 = Attractive towns; 4 = Good accommodation & hospitality; 5 = Tranquillity; 6 = Accessibility; 13 = Forests/forest facilities; 14 = History and heritage; 17 = Lakes, lochs and rivers; 18 = Visitor attractions; 23 = Outdoor recreation/facilities)*

| | New Forest | Lake District | Tross-achs | Borders | Wye Valley | Snow-donia | Total |
|---|---|---|---|---|---|---|---|
| 1st | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2nd | 23 | 23 | 6 | 14 | 14 | 5 | 6 |
| 3rd | 13 | 6 | 23 | 6 | 5 | 17 | 23 |
| 4th | 6 | 5 | 5 | 23 | 6 | 18 | 14 |
| 5th | 5 | 17 | 4 | 2 | 23 | 6 | 5 |
| Forest rank | 3/16 | 0/18 | 10/20 | 18/20 | 11/18 | 20/21 | 11/27 |

The most frequently cited reason for choosing to visit the area in all case studies was "Scenery". Across the six areas, "Accessibility", "Outdoor recreation/facilities", "History and Heritage", and "Tranquillity" were the next most frequently cited reasons. Forests or forest facilities were cited at least once in all areas except the Lake District, where forests would not appear to be an important part of the scenery. Forests were most frequently cited in the New Forest, where they were ranked third. Significantly, the three areas where forests were cited most frequently were the case study areas where forests were assumed to have a higher profile, i.e. the New Forest, the Trossachs and the Wye Valley areas. This supports the earlier assumptions behind the classification of the case study areas based on the relative importance of forests in tourist's trip decisions between case study areas in each country.

Where forests were unspecified as one of the main reasons for coming to the area, and thus fell into the latter category, respondents were asked to score the importance of forests and woodlands in their trip decision from 0-10, relative to their most important characteristics. By prompting this group of respondents, this final step could possibly result in the overstatement of the importance of forests in relation to trip-location decisions. However, examination of the results showed that these respondents always scored forests lower than the main reasons specified.

For comparing the relative importance of forests between areas, Table 6.15 gives the mean scores for all day visitors from home and respondents on holiday away from home staying inside and outside the area (the latter includes all respondents on holiday passing through the area).

**Table 6.15 Mean forest scores by purpose of trip**

| | New Forest | Lake District | Tross-achs | Borders | Wye Valley | Snow-donia |
|---|---|---|---|---|---|---|
| All day visitors from home | 6.0 | 5.5 | 5.1 | 6.3 | 9.1 | 6.6 |
| Staying inside area | 8.1 | 6.0 | 7.0 | 5.3 | 8.2 | 5.9 |
| Staying outside area | 7.6 | 6.1 | 6.5 | 5.1 | 8.6 | 5.7 |
| All visitors | 7.6 | 5.9 | 6.3 | 5.4 | 8.6 | 6.1 |

Overall, the three case study areas assumed to have a high forest profile, i.e. the New Forest, the Trossachs and the Wye Valley areas, have the higher mean scores. Once again this confirms earlier assumptions regarding the relative importance of forests to visitors to those areas. However, this was not the case for all individual categories of tourist, the main exceptions being day visitors from home in the Borders where the mean score was higher than for the Trossachs, and day visitors from holiday bases where the mean score for the Lake District was also higher than the Trossachs.

For the purpose of this study, estimates of expenditure attributable to forest were based on the importance of forests in the decisions of individuals to visit or stay in the area for a day trip or holiday. As there may be a great many reasons why an individual might chose to make a trip to a specific area, tourism expenditure was partitioned by dividing the forest score by the sum of the total possible scores for all trip motivating reasons. The balance unaccounted for by specified trip motivating reasons, is assumed to relate to unspecified reasons for making the trip. The method adopted means that the proportion of expenditure attributed to forests could range between 0-100%, i.e. where only forests are specified and scored 10, then 100% (10/10) of trip expenditure is attributed to forests and where forests score 0, 0% of expenditure is attributed to forests. Table 6.16 presents the mean percentage of expenditure attributable to forests for the main trip types.

**Table 6.16 Importance of forests in motivating trips to case study areas – mean forest score as a proportion of total possible score (%)**

| | New Forest | Lake District | Tross-achs | Borders | Wye Valley | Snow-donia | Total |
|---|---|---|---|---|---|---|---|
| Day visits from home | 12 | 11 | 11 | 13 | 18 | 13 | 14 |
| Staying inside area | 16 | 12 | 14 | 10 | 16 | 12 | 13 |
| Staying outside area | 15 | 12 | 13 | 11 | 17 | 11 | 13 |
| All visitors | 15 | 12 | 13 | 11 | 17 | 12 | 13 |

The mean forest score as a proportion of the sum of possible scores across the six case study areas was 0.13. Thus, it was assumed that 13% of the total mean tourism expenditure was associated with forests. The results are in line with the area classification, i.e. those case study areas where forests were assumed to be more important in trip location decisions (New Forest, Trossachs and Wye Valley) have the highest percentages of expenditure attributable to forests. Overall, the results suggest that forests are an important factor influencing both day visitors and staying visitors to visit the countryside.

Based on the forest importance proportions in Table 6.16 and the expenditure figures presented in Tables 6.7, 6.9 and 6.11, estimates of mean total forest-related tourism expenditure per person, can be estimated (Table 6.17).

**Table 6.17 Mean total expenditure attributable to forests (£ person$^{-1}$ day/night$^{-1}$)**

| | New Forest | Lake District | Tross-achs | Borders | Wye Valley | Snow-donia | Total |
|---|---|---|---|---|---|---|---|
| Day visitors from home | 1.74 | 2.42 | 2.03 | 2.34 | 3.69 | 1.39 | 2.37 |
| Staying inside area | 6.08 | 5.30 | 4.95 | 3.91 | 6.78 | 3.12 | 4.89 |
| Staying outside area | 5.95 | 5.73 | 7.07 | 5.57 | 6.41 | 2.23 | 5.63 |

The forests of the Wye Valley had the highest level of expenditure attributable to forests for day visitors from home and holidaymakers staying in the area, whilst the forests of the Trossachs had the highest level for visitors staying away from home outside the area.

## 6.7 CASE STUDY SUMMARIES

**New Forest**

A relatively high proportion of New Forest respondents were holidaymakers compared to the other areas, and forests clearly played a key role in attracting them to the area. The majority of respondents came to the New Forest because of the scenery, to enjoy outdoor activities and because it was considered to be accessible. In line with expectations, forests were more important in influencing respondents decisions to visit the New Forest than in the Lake District, Borders and Snowdonia. The importance of forests was considerably higher for holiday makers (22% of which were overseas respondents), than for the day visitors (all UK residents). Expenditure levels per person were generally average, or slightly below, for the three main visitor types.

**Lake District**

Respondents in the Lake District were predominantly holiday makers staying in the area, 35% of which were overseas visitors. As with the New Forest, the three main reasons for coming to the Lake District were the scenery, to enjoy outdoor activities and because it was considered to be accessible. However, forests were less important in attracting respondents to the Lake District than in most other areas. Expenditure levels per person were higher than average for all three of the main visitor categories.

**Trossachs**

Respondents in the Tossachs were relatively evenly split between day visitors from home, holiday makers staying inside the area, and those staying outside the area. After scenery, accessibility was given as the main reason for respondents to visit the area. In line with assumptions, forests were more important in the Trossachs than the Borders the Lake District and Snowdonia. Of the three visitor types, forests were most important in influencing holidaymakers to visit the Trossachs, almost half of which were overseas residents.

**Borders**

A lower than average proportion of respondents in the Borders were day visitors from home and a higher than average proportion of visitors were passing through the area on the way to or from a holiday destination. Further analysis of the data shows that 45% of respondents on holiday (staying in the area or passing through) were overseas visitors. After scenery, the history and heritage of the area was the next most important reason for visiting the area. Forests were relatively compared to the other reasons given. Expenditure levels per person were around average compared to the other areas.

**Wye Valley**

Respondents in the Wye Valley were older compared to other areas and were predominantly day visitors from home or from holiday bases out with the area or passing through. Those visitors staying in the area stayed for fewer nights than average across the six areas, although mean expenditures per person per night were generally higher. After scenery, the main reasons for visiting the Wye Valley were its tranquillity and its history and heritage. Forests were a moderately important reason. However, in line with assumptions, forests were more important in influencing tourist's decisions to visit the Wye Valley than Snowdonia, the Lake District and the

Borders. Of the three visitor types, the forests most important in influencing respondents on day visits from home to visit the area.

**Snowdonia**
Snowdonia differed to the other case study areas in a number of characteristics. Of the six areas, It had the highest proportion of female respondents and repeat visitors. The proportion of respondents staying in the area was relatively low and the respondents on holiday in the area were almost entirely from the UK. However, whilst those staying in Snowdonia had the shortest overall trip length, they tended to stay considerably longer as a proportion of the total trip. Snowdonia also had the lowest levels of expenditure per person across all three main visitor types. Surprisingly, after scenery, accessibility was cited as a main reason for visiting the area. In line with assumptions, forests were less important in influencing tourist's decisions to visit Snowdonia than the Wye valley. Of the different visitor categories, the forests of Snowdonia were most important in influencing respondents on day visits from home to visit the area.

## 6.8 DISCUSSION AND CONSCLUSIONS

This part of the study set out to assess the influence of forests on tourism to the countryside and the associated economic significance for six case study areas. The six areas considered differ in terms of their general characteristics as well as in terms of forest characteristics. These general characteristics include location in relation to areas of population as well as other physical factors, facilities etc., all of which undoubtedly influence tourism activity and mix in any given area. However, this survey has shown that forests play a positive and significant role in influencing tourists to visit forested areas of the countryside in GB. The research has also been able to attempt an initial quantification of the resulting economic significance, in terms of the expenditure associated with visits to the area due to the presence of forests. Although the expenditures were not spatially tracked, the results presented here give a general indication of the economic importance of forests to the case study areas considered and to the countryside more generally.

Significantly, and in line with expectations, the survey showed that forests were more important in attracting visitors to stay in or visit the New Forest, the Trossachs and the Wye Valley than the other case study areas. These areas were selected based on assumptions that they were tourism destinations renown for their forests. Whilst these were also the most heavily forested areas, the general extent of forest cover is just one of many characteristics of the forests likely to influence tourism decisions to visit an area. Other characteristics will include the specific attributes of the forests themselves, whilst the general marketing of an area is also likely to have an influence. Further research would be required to identify the specific forest-related factors that attract people to visit each area and their respective economic significance.

# CHAPTER 7 MEASURING VISITOR ATTITUDES TOWARDS THE ENVIRONMENT AND FORESTS

## 7.0 INTRODUCTION

Undertaking a visit to a forest or the countryside, and spending money to do so, are specific examples of individual behaviour. Understanding the factors that motivate these behaviours can provide useful information for those organisations engaged in managing forest-related tourism. Attitudes[53] are generally considered to be a major motivational factor influencing behaviour. Where an individual maintains a positive attitude towards a behaviour it is likely (given that situational demands are satisfied) that that behaviour will be undertaken, whereas, when the reverse is true, the behaviour is unlikely to be performed. For example, when an individual maintains a positive attitude towards recreation in forests it is likely that they will undertake recreational activities and this will, in turn, be reflected in spending levels. This chapter describes the approach used to measure the attitudes of two groups, forest users and countryside visitors, and outlines some preliminary findings.

## 7.1 ATTITUDES AND BEHAVIOUR

Social psychologists postulate that attitudes are amongst the most important motivators of behaviour. The central theory in this field is that developed by Fishbein & Ajzen (1975) – the *theory of reasoned action* – which postulates that attitudes (as influenced by belief structures) are used to construct behavioural intentions, and that, given favourable circumstances and opportunities, these behavioural intentions then lead to action. In addition, some studies have suggested that attitudes themselves are advised by the higher level evaluative constructs ‘values’ which are abstract beliefs “about how (people) ought or ought not to behave, or about some end-state of existence worth or not worth attaining” (Bonninger *et al.*, 1995: 63). In the case of forest recreation preferences it may be hypothesised that one of the key contributors to attitudes to the importance of forest is the environmental values of the individual, which essentially measures the relationship of the individual to the natural environment.

The attitude component of this study is premised on the notion that the decision made by the individual to visit forests is strongly influenced by their attitude towards the overall importance of forests for leisure and recreation, both on an individual level and for the well-being of the nation, and that this preference will then be reflected in recreational spending patterns. The general conceptual model is laid out in Figure 7.1.

[53] The conceptual definition of an attitude used here is “a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour” (Eagly and Chaiken, 1993).

**Figure 7.1 Conceptual framework for attitude work**

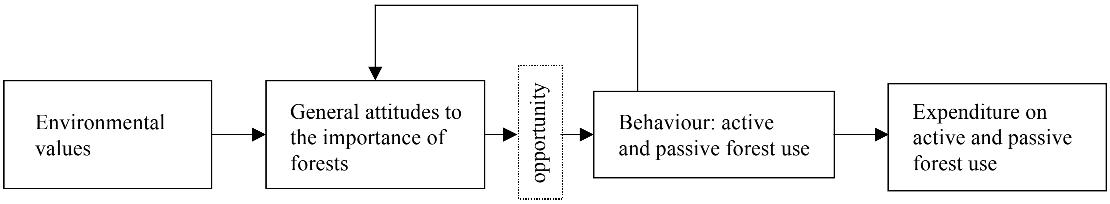



Figure 7.1 shows the conceptual model which is loosely based on the theory of reasoned action. In order to subscribe to the conditions for attitude-behaviour consistency laid out in the Fishbein-Ajzen models, an indication of the role of opportunity (i.e. circumstances that allow the expression of attitudes as a behaviour) is included. Opportunity concerns features such as the presence of woodland, the desires of other family members to perform the same behaviours etc.

## 7.2 DEVELOPMENT OF THE INSTRUMENT

### 7.2.1 Measurement of attitudes

As a psychological construct attitudes are not directly observable and their existence must, therefore, be inferred from overt responses. The most common way to measure attitudes is to use psychometric scaling techniques: measures which allow the individual to evaluate belief statements on an ordinal scale ranging from a strongly positive response to a strongly negative response. To get an accurate result, attitude should be measured across a number of different situations in which it might be expressed rather than taking a single item measurement as is often the case. To investigate attitudes an attitude *scale* – a series of belief statements designed to measure different aspects of the underlying attitudinal construct – needs to be developed. In order to confirm that the scale items all measure the same construct a reliability analysis must be conducted (in this case using Chronbach's alpha) which calculates the degree to which the items are correlated. The final attitude measure can be calculated by conducting a factor analysis on the scale items and recording the factor scores.

### 7.2.2 Construction of the general "Forest Attitude" scale

Construction of scales begins with the expert knowledge of researcher (informed through literature) being employed to develop a number of items that may be aspects of the same attitudinal construct. Thus a number of potentially important attitude items were assembled into a scale. In this case, to ensure that different aspects of the same construct were being measured, items were selected to represent both ego-oriented (attitudes to woodland for self) and society-oriented (attitudes to woodland for society) attitudes, and covered a variety of different strains of 'leisure' such as 'heritage', 'recreation' and 'aesthetic enjoyment'. In order to avoid response effects the questions were allocated a random order and an equal number of the statements were worded positively as negatively. Table 7.1 shows the statements selected initially for testing as potential scale items.

**Table 7.1 Items initially selected for the pre-test of the forest attitude scale**

| Construction | | Statement |
|---|---|---|
| GA soc | + | All forests and woodlands should be open to everyone. |
| GA soc | - | Forests are [not] an important part of the national heritage. |
| GA soc | + | Forests for recreation and leisure are [not] important for the wellbeing of the nation. |
| GA ego | - | Forests offer me little or no opportunities for leisure and recreation. |
| GA ego | + | Visiting forests is [not] important to my wellbeing. |
| GA soc | - | Recreation should not be a priority for forest and woodland managers. |
| GA soc | - | The primary aim of forest management should be as a resource for timber. |
| GA ego | - | Spending time in forests is relatively unimportant for me, personally. |
| GA soc | + | We should [not] view the wildlife and plants in our forests as a national treasure |

To establish which items on the scale were representative of the construct a pilot survey was conducted. Interviewees were asked to assess each item by indicating their strength of agreement or disagreement using a five point Likert-type scale ranging from strongly agree to strongly disagree. Two populations were surveyed: forest users (Badger's Holt, 30 respondents) and town visitors (Bovey Tracey, 30 respondents) under the hypothesis that there may be a significant difference in the frequency of woodland visits between the two groups. In actual fact, analysis suggested that there was no significant difference in terms of woodland visits between the town and forest samples enabling the two groups to be combined for analysis. A further pilot of passive visitors (30 respondents) was carried out in the Braemar/Ballater area of the Cairngorms.

The data for the scale were analysed following the methodology employed by Spash (1998). A Principle Components Analysis (PCA) (varimax rotation) was used to locate items that measured the same attitudinal dimension and, having isolated the items, a reliability co-efficient was calculated (Chronbach's alpha).

Items selected for the scale were those with factor loadings greater than 0.3 (see Figure 7.2). While there are no firm 'rules' for what comprises an acceptable factor loading; this figure is suggested by Child (1970) as appropriate when considering loadings on the first factor. The final list of items for the general forest attitude scale was therefore:

1. Forests are not an important part of the national heritage.
2. Forests for recreation and leisure are important for the wellbeing of the nation.
3. Spending time in forests is relatively unimportant for me, personally.
4. Forests offer me little or no opportunities for leisure and recreation.
5. We should not view the wildlife and plants in our forests as a national treasure.
6. Visiting forests is not important to my wellbeing.

Given the nature of the items identified within the first factor, the scale was termed "*The importance of forests for personal and national wellbeing scale*", or simply "*The Forest Importance Scale*" (FIS). Note that the loading on the first factor is negative, i.e. a positive score on this factor (with positive items reversed) would indicate a negative attitude towards the importance of forests. While many of these items were reversed in the pilot scale (in an attempt to prevent simple repetition of answers), for the final scale items 1, 5 and 6 were converted back to positive statements. Conducting a PCA on the reduced scale revealed that it identified only one factor with an Eigen value of over 1.0, accounting for 40.4% of the variance. An analysis of the reliability provided a Chronbach's alpha value of 0.7014[54].

**Figure 7.2 Results of the principle components analysis for forest items**

| | Compone | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| All forests and should be open everyon | .135 | .754 | .177 |
| Forests are [not] important part of national | .546 | .399 | .227 |
| Forests offer me no opportunities leisure and | .751 | 1.155E- | -8.50E- |
| Visiting forests is important to my | .656 | -9.55E- | 4.521E- |
| Recreation should a priority for forests woodland | .137 | -.853 | -.102 |
| The primary aim of management as a resource for | -6.24E- | -.155 | .844 |
| Spending time in is unimportant for personall | .676 | .305 | .191 |
| We should [not] view wildlife and plants in forests as a treasur | .372 | .143 | .643 |
| Forests for recreation leisure are [not] for the wellbeing of natio | .551 | -.336 | .211 |

Extraction Method: Principal Component
a.

The final test was to confirm the external validity of the scale. This was done by correlating the results against a behavioural indicator, in this case the frequency of visits to woodland areas, under the hypothesis that those with a positive attitude towards woodlands should undertake more frequent visits. A single measure for the scale was calculated by recording factor scores. The correlation with the frequency of forest visits showed that those who scored highly on the attitude scale also visited forests more frequently (Spearman rank correlation coefficient (SR) = 0.301, n = 60, P = 0.020). The result was significant at the 95% level.

While the results for this 6-item scale were acceptable, discussions within the research team resulted in the addition of three additional variables in order to try and increase the reliability of the scale. These were:

[54] De Vaus (1991) suggests that, as a rule of thumb, an alpha value of greater than 0.7 indicates that the scale is reliable.

1) Our landscape would look just as beautiful even if there were no forests
2) I feel perfectly safe when visiting forests
3) Forests make great holiday destinations for me and my family

In addition, it was decided that “Spending time in forests is relatively unimportant for me, personally” and “Visiting forests is not important to my wellbeing” (which turned out to be very strongly correlated) were too close in wording to be said to be measuring different aspects of the attitude. As a consequence, “Visiting forests is not important to my wellbeing” was dropped from the final list of items.

While the new items were subject to brief testing in the Braemar/Balletar sample, time constraints meant that there was not sufficient time to test the full scale completely. However, as 5 core items were included in the scale it was intended that, should the additional variables prove unsuitable, the scale would revert back to using the original items. The final scale used is displayed in table 7.2:

**Table 7.2 The FIS attitude scale used in the questionnaire**

| Construction | | Statement |
|---|---|---|
| 1. GA soc | + | Forests are an important part of our national heritage. |
| 2. GA soc | + | Forests for recreation and leisure are important for the wellbeing of the nation. |
| 3. GA soc | - | Our landscape would look just as beautiful even if there were no forests |
| 4. GA soc | + | We should view the wildlife and plants in our forests as a national treasure |
| 5. GA ego | - | Forests offer me little or no opportunities for leisure and recreation. |
| 6. GA ego | + | Visiting forests is important for my wellbeing. |
| 7. GA ego | + | I feel perfectly safe when visiting forests |
| 8. GA ego | + | Forests make great holiday destinations for me and my family |

### 7.2.3 Environmental values and the general awareness and consequences scale

‘Environmental values’ were evaluated on the premise that they are a contributory factor to general attitudes towards forest use. Here, environmental values are conceived of in terms of people’s general attitudes towards the environment. General attitudes towards the environment were measured using the using the General Awareness and Consequences (GAC) environmental attitude scale, initially developed by Stern *et al*. (1995a; 1993; 1995b) and subsequently extended by Spash (1998).

Due to limited space in the questionnaire, the 11 item GAC scale from Spash (1998) was reduced to a 6-item scale using a series of reliability analyses on the pilot data. In each instance, the item that would cause the least lowering of the alpha value was removed. The resulting scale (Table 7.3) showed an alpha value of 0.9148 compared to the original alpha of 0.9231.

**Table 7.3 The GAC items selected for the study**

| Statement |
|---|
| A clean environment provides me with better opportunities for recreation |
| Environmental protection will provide a better world for me and my children |
| Tropical rainforests are essential to maintaining a healthy planet earth |
| Environmental protection is beneficial to my health |
| Environmental protection benefits everyone |
| The effects of pollution on public health are worse than we realise |

### 7.2.4 Reliability of the final scales

The reliability of the final scales is shown in Table 7.3. In the analysis two of the FIS items "I feel perfectly safe when visiting forests" and "Forests make great holiday destinations for me and my family" did not increase the reliability of the scale, therefore they were dropped. For the GAC one of the items "Environmental protection does not benefit everyone" was left out because it substantially lowered the reliability coefficient. The final reliability coefficients for the scales are shown in Table 7.4.

**Table 7.4 Chronbach's alpha and variance scores of FIS and GAC scales**

| | Chronbach's α of scale |
|---|---|
| GAC: Forest users scale analysis: | 0.8123 |
| GAC: Passive users scale analysis: | 0.8119 |
| FIS: Forest users scale analysis: | 0.7593 |
| FIS: Passive users scale analysis: | 0.7767 |

To combine the individual items of the scale a PCA was employed to identify the first factors and the factor scores recorded. For both the FIS and GAC there was only one factor with an eigenvalue over 1 identified, and the proportion of the variance covered by the first factor was high – 63.9% and 49.9% of the variance for the GAC and FIS respectively for the forest sample and similar scores for the passive users.

The analysis of results is presented in 3 sections: (1) The forest users survey results, (2) The passive users survey results and (3) an assessment of the model and approach. It focuses largely on the forest users survey, however information from all areas of the survey is drawn in for the analysis when necessary.

## 7.3 FOREST USERS SURVEY RESULTS

### 7.3.1 Environmental/ forest attitudes of visitor types

There are interesting differences in the attitudes of the different types of visitor to the forests. In particular, visitors with the highest scores for both general environmental attitude and attitudes towards the importance of forests are the those who are making frequent short-term trips to forests, followed by those who are holidaying in the area (see Table 7.5). In addition, there is another category of forest visitor for whom attitudes to the environment/forestry provide less of a motivation to visit forests, namely those using the forest as a short rest-stop to break a longer journey. Unlike the short term visitors, this group are infrequent forest users.

**Table 7.5 Type of trip against environmental/forest attitudes and features of forest visits.** *(Figures given are the mean rank score using a Kruskal-Wallace analysis (KW)).*

| | GAC | FIS | Visit length | No. visits[55] |
|---|---|---|---|---|
| Trip less than 3 hours | 995.98 | 992.86 | 811.10 | 1185.31 |
| Trip more than 3 hours | 824.10 | 753.07 | 1215.23 | 900.89 |
| Holiday staying in area | 894.43 | 911.27 | 1062.87 | 606.24 |
| Holiday visiting friends | 962.39 | 929.92 | 1097.69 | 590.87 |
| Passing through area | 750.75 | 762.05 | 643.47 | 586.21 |
| Chi-square | 31.382 | 41.915 | 161.844 | 203.078 |
| d.f. | 4 | 4 | 4 | 4 |
| Significance | .000 | .000 | .000 | .000 |

Visitor types can also be categorised by the type of activity undertaken at the forest. In terms of the importance of forests attitudes, the only significant result was that those who come to the forest to go cycling score higher on the FIS than those who do not (MW, $z = -3.478$, $p = .001$). The most likely reason for this is because, whereas most of the other activities have a wide range of areas suitable, off-road bicycle tracks are very much limited to forests – thus the importance of forests is high. This is supported by the fact that there is no significant difference between the strength of general environmental attitudes of cyclists and non-cyclists – thus the higher FIS scores do not appear to be related to a general higher environmental awareness among cyclists.

### 7.3.2 Gender differences in attitude

There was a significant difference between men and women in the strength of both environmental attitudes (MW, $z = -4.153$, $P < .001$) and attitudes towards the importance of forests (MW, $z = -2.843$, $p = .004$) with women, in both cases, showing more positive attitudes. This concurs with studies of general attitudinal biases which suggest that women are more environmentally aware than men. It is interesting that there is no significant difference between men and women in terms of the number of visits made to woodland in the last 12 months. Given that there is a relationship between the number of visits to woodland and both the GAC (Spearman rank, $p = .012$) and FIS (Spearman rank, $p = .002$), it suggests that women may be discouraged from visiting forests. One possibility is the safety issue. Women feel significantly less safe in forests than men (MW, $z = -2.903$, $p = .004$) thus, while they maintain a more positive attitude about forests, they are less inclined to visit.

### 7.3.3 Differences in attitude of overseas visitors

Against the general trend, there is a considerable difference between the evaluation of the GAC and FIS scales, with the GAC analysis returning a non-significant result – i.e. overseas visitors have similar levels of general environmental concern, but significantly less concern for the importance of forests (MW, $z = -4.293$, $P < .001$).

[55] Visits to forests in the last year

While this may be attributable to feeling unable to answer questions about UK forests, further analysis suggests this is unlikely. For example, overseas visitors were far less likely to have visited a forest in the last 12 months (MW, $z = -7.901$, $P < .001$) and were less likely to believe that forests make good holiday destinations (MW, $z = -1.882$, $p = .060$) although only at the 90% confidence level.

### 7.3.4 Effect of age on environmental/forest importance attitudes

There is a known relationship between age and environmental concern, with younger people showing greater concern for the environment than older people. This was also the case with the forest survey. There was a significant negative correlation between the age of the respondents and their score on the GAC index (SR = -.062, N = 1876, $P = .008$). An interesting feature, however, is that there is no similar significant relationship between age and the appraisal of the importance of forests. In other words, older people are equally likely to consider forests important as young people. Given that there is a strong correlation between the FIS and GAC (SR = .666, N = 1856, $P < .000$) this raises the question of why older and younger people consider forests equally important. The probable reason for this is that the GAC and FIS scales are measuring different constructs, environmentalism in the case of the GAC and importance for leisure, heritage and the countryside aesthetic for the FIS. It can be surmised that while young people rate the importance of forests high at least in part because of the environmental aspects older people are rating it more for its leisure, heritage and aesthetic values.

### 7.3.5 Number, length and frequency of visits to forests

If attitudes to the importance of forests are influencing behaviour it may be expected that individuals with high FIS scores are likely to spend more time in forests and to make more frequent forest visits. Table 7.6 shows the correlations (SR) between attitudes and frequency/length of forest visits. There is clearly a strong relationship between forest visits and both environmental attitudes and the importance of forests – although the FIS scale shows a slightly stronger relationship than the more general environmental attitudes. As might be expected, individuals with higher scores are making both longer and more frequent visits to woodland.

**Table 7.6 Length and frequency of visits to forests and attitudes**

| | Correlation coefficient | N | Sig. (2 tailed) | GAC/FIS |
|---|---|---|---|---|
| Times visiting forest | .168** | 664 | .000 | GAC |
| during trip | .101** | 660 | .010 | FIS |
| Length of visit | .082** | 1884 | .000 | GAC |
| | .100** | 1872 | .000 | FIS |
| Visits to *this* forest | .059* | 1834 | .012 | GAC |
| in last 12 months | .071** | 1823 | .002 | FIS |
| Frequency of forest | .195** | 1868 | .000 | GAC |
| visits in last 12 months | .192** | 1858 | .000 | FIS |

### 7.3.6 Relationship between income and environmental/forest attitudes

It is clear from figure 7.3a that there is a relationship between income and environmental and forest attitudes, with the attitudes of the lower income categories being less strong than those in the higher income categories. For general environmental attitudes the correlation coefficient (SR) is .103 (N = 1093, P = .001) and for the Forest attitudes the relationship is even stronger at .124 (N = 1082, P < .001). Thus it seems likely that income plays an important role in determining how positive an individual's attitudes are to the importance of forests. The reason for this is probably more complex than that poorer people cannot afford to visit woodland frequently as there is no correlation between income and the frequency of forest visits. Further, this would not explain why general environmental attitudes are also strongly correlated with income. Rather, it seems likely that people with lower incomes have priorities in areas other than woodland for leisure and recreation.

**Figure 7.3a Mean rank score of GAC and FIS scores by income category**

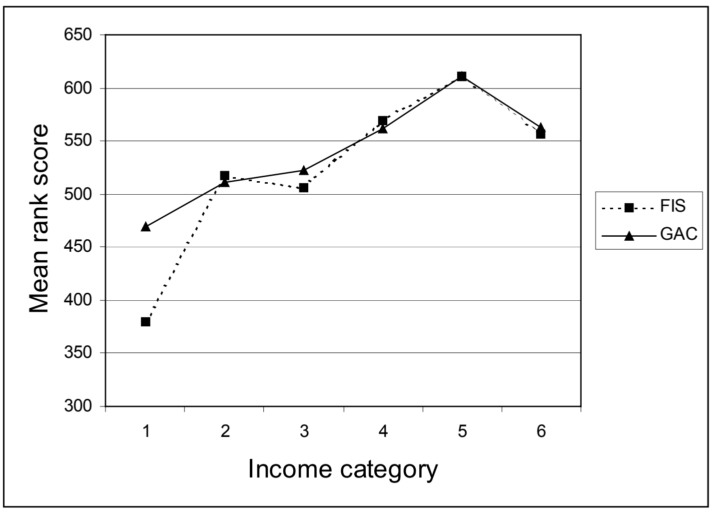


**Figure 7.3b Mean rank score of number of visits to sampled forest in the last 12 months by income category**

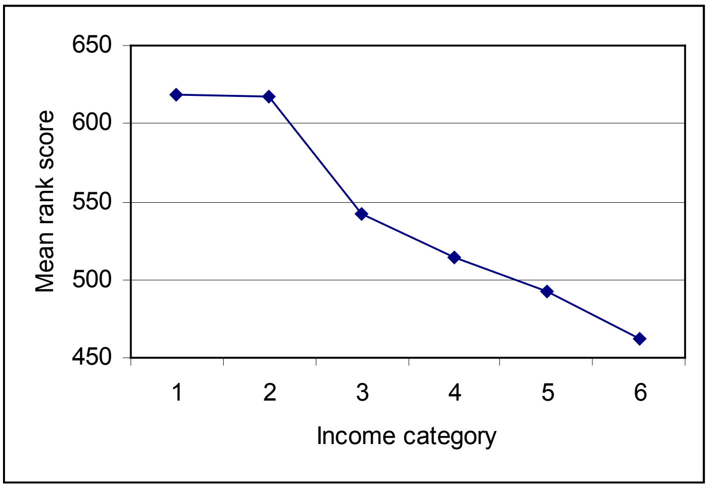



Figure 7.3b shows that despite the fact that people in lower income categories have visited significantly fewer forests and have lower FIS scores than those in the higher categories, they are significantly more likely to have visited the sampled forest within the last 12 months (SR = -.151, N = 1068, P < .001). Further they will have travelled a shorter distance to the forest (SR = .124, N = 1068, P < .001) and were less likely to have come to the forest by car (MW, z = -5.827, P < .001). This suggests the motivation for visiting forests may differ between respondents with high and low incomes, with high income earners being motivated by positive attitudes towards forests, and those with low incomes motivated by the accessibility of the forests.

### 7.3.7 Importance of forest facilities – relationship with attitudes

Table 7.7 is an analysis of the facility that was *most important* in influencing the decision to visit the forest. The table shows those facilities (site attributes) that were correlated with attitude scores. It is interesting that while some of the attributes have a positive relationship with attitude, for others the relationship was negative. This tended to divide along two types of facility. Facilities that involved direct leisure activities amongst the trees themselves, such as cycling trails, forest walks and fishing access were associated with high environmental/forest attitudes. However, those who considered facilities which involved use of cars (car parking, forest drive, viewpoint) important or did not involve direct contact with the trees themselves (visitor centre, picnic site) tended to have lower attitudes. Ownership of cars in general shows a strong negative relationship with both environmental and forest attitudes. It appears the more cars owned the less concerned individuals were about both environmental protection in general (SR = .159, N = 1795, P < .001), and the importance of forests (SR = .120, N = 1786, P < .001).

**Table 7.7 Facilities at the forest that were ranked as 'most important' against GAC and FIS scores[56]**

| | | GAC Sig. (2 tailed) | FIS Sig. (2 tailed) |
|---|---|---|---|
| Forests/Environment important | Cycle trail | .012 | .000 |
| | Forest walk | .000 | .015 |
| | Water feature | .004 | NS |
| Forests/Environment unimportant | Visitor centre | .000 | .000 |
| | Picnic site | .000 | .000 |
| | Forest drive | NS | .001 |
| | Viewpoint | NS | 003 |
| | Car parking | .039 | NS |

## 7.4 PASSIVE USERS SURVEY RESULTS

As a result of the questionnaires for the forest users and passive users being different, in many places it is not possible to draw a direct comparison between the forest users sample and the passive users.

### 7.4.1 Environmental/ forest attitudes of visitor types

Unlike the forest users survey, there was no between group difference based on the type of visitor (short trip, day out, etc.) in either environmental or forest attitudes for the passive users survey. The probable reason for this is that very few people had environmental or forest related motives for visiting the non-forest areas, thus length of trip was unlikely to be motivated by forest/environmental attitudes.

### 7.4.2 Characteristics sought in a holiday destination

Respondents to the passive users survey were asked to rank the importance of 5 characteristics of an area for planning a holiday in the UK. The results (Table 7.8) show that away visitors who ranked peace and tranquility, good scenery and interesting visitor attractions high also had significantly higher scores on both the GAC and FIS scales. In comparison, where visitors considered interesting local shops as more important, their attitudinal scores were significantly lower than those who considered them unimportant. When this result is looked at in the context of the number of visits to forests made in the last 12 months an interesting result emerges. While the search for peace and tranquility correlates with the number of visits to forests, good scenery shows no significant difference. This implies that while people who look for good scenery also have positive attitudes towards the importance of forests, these attitudes are not necessarily expressed in terms of visits to forests – the implication being that unlike 'peace and tranquility' respondents did not necessarily visit forests to view 'good scenery'.

[56] Note, for a number of activities there were insufficient respondents to enable a reliable statistical test to be conducted of the results, whilst others were non-significant and these were therefore omitted.

**Table 7.8 Characteristics sought in a holiday destination and differences in GAC/FIS scores and visits to forests for both day visitors and those staying away from home**

| | Visitors (combined) | | Visits to forests |
|---|---|---|---|
| | GAC sig. | FIS sig. | sig. |
| Peace and tranquility | .032 | .000 | .004 |
| Good food and drink | NS | NS | -.001 |
| Good scenery | .001 | .000 | NS |
| Interesting visitor attractions | .026 | .025 | NS |
| Interesting local shops | -.018 | NS | -.000 |

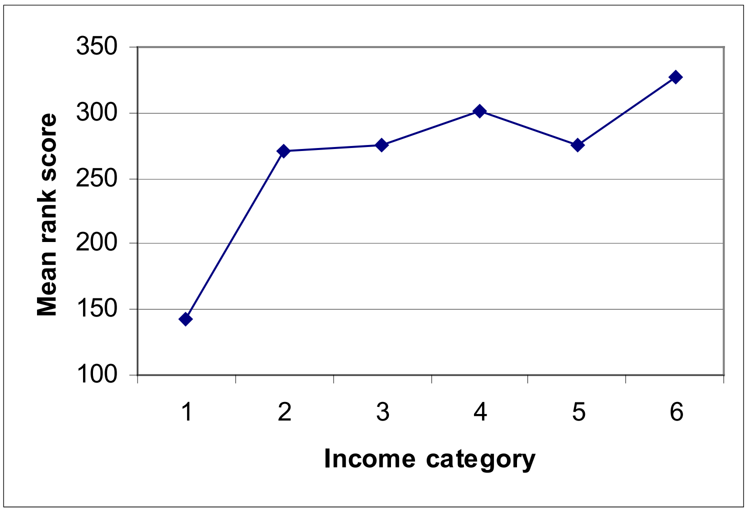
### 7.4.3 Importance of woodland for visit relative to other uses

As may be expected, the importance of woodland for making the journey correlated strongly with both the GAC (SR = .232, N = 727, P < .001) and FIS (SR = .365, N = 724, P < .001) attitude scales. People who made the journey for the purpose of seeing woodland are clearly more likely to hold higher forest attitudes than those who came for, for example, shopping or visiting historic buildings.

### 7.4.4 Relationship between income and environmental/forest attitudes

Analysis of the relationship between income and the GAC and FIS scores shows a significant correlation between income and GAC (SR = .117, N = 571, P = .005), but no relationship between income and FIS. It is interesting that, as with the result for the forest survey, there is a dramatic drop-off in strength of pro-forest attitude for people in the lowest income category (see Figure 7.4). People in the lowest income category (Up to £7,500) for both the passive and forest users samples appear to consider forests substantially less important than respondents on higher incomes.

**Figure 7.4 Mean rank score of FIS scores by income category**



### 7.4.5 Frequency of visits to woodland and attitudes

As with the forest users sample the frequency of forest visits in the passive sample correlated strongly with the strength of both environmental attitudes (SR = .228, N = 727, P < .001) and forest attitudes (SR = .323, N = 724, P < .001).

## 7.5 ASSESSMENT OF THE MODEL AND APPROACH

The results presented in this chapter indicate that attitudes can be a useful tool for exploring the relationship between the public and forests. The question remains, however: How useful is the model (and thereby attitude construct) as a predictor of behaviour? While it is not possible to assess the virtue of the attitude approach as a forecasting tool without further monitoring of the individuals who participated in the research, the relationship between attitudes and behaviour can be assessed on the basis of past behaviours. In the study, there were four measures which could be used as behavioural indicators of pro-forest behaviours: namely, the frequency of visits to forests, the number of visits to forests on this trip, the length of the current visit to the forest, and the first alternative choice if this forest was closed (Table 7.9).

**Table 7.9 Behavioural measures of forest activity against FIS score**

| | | Forest | Passive |
|---|---|---|---|
| Number of visits to forests in last 12 months | SR | : P < .001 ** | P < .001 ** |
| Number of visits to forests on this trip | SR | : P = .010 ** | |
| The length of the current visit to the forest | SR | : P < .001 ** | |
| Visit another forest if this site closed? | MW | : P < .001 ** | |

The results show that respondents' behaviour is consistent with their attitudes to forests. High scores on the forest attitude scale indicate that respondents are likely to be more frequent visitors to forests (both in general and on their current trip) and, if this visit can be said to be typical, are likely to plan to remain at the forests for longer periods of time. Further, high scores also indicated respondents were more likely to visit another forest if they could not gain access to their chosen one.

The value of using a multi-item scaling technique such as this for assessing forest attitudes lies in its potential use for assessing community response to potential new forest initiatives. For example, if there is an issue of whether a forest should be opened to the public, sampling the local community areas and determining how positive their attitudes to forests were may provide valuable indications as to the likely future usage of the forest. By including different dimensions within a single scale (biodiversity, recreation, heritage, aesthetics, personal well-being, ego-orientation) the scale can balance out variation in response to produce an overall assessment of forest preference that is more accurate than simply looking at individual items. It provides a single measure of overall forest importance that can be easily applied in a postal or telephone survey format.

Despite the success of the scale, it is noticeable from the above analysis that there are differences between the passive users and the forest users groups in terms of the strength of the GAC and FIS relationships, i.e. forest attitudes for the passive users show much stronger relationships with pro-forest actions than the general environmental attitudes whereas for the forest sample the GAC results are often more significant. As a result it appears as though the GAC may be a better indicator of pro-forest actions for the forest survey than forest attitudes themselves. However, this may not be the case. Rather, the forest sample has already been selected for respondents with strong forest attitudes; thus it is possible that there was not sufficient definition in the 5-point scale used for forest users to accurately reflect differences in the strength of their forest attitudes. An analysis of the skewness of the responses for the respective surveys supports this hypothesis as the skewness of the FIS responses for the forest sample (-.585) was almost double that of the passive users (-.304) yet the GAC responses were similar. In any re-application of the Forest Importance Scale, therefore, it may be advisable to either use a different scaling technique – for example a 10 point rather than a 5 point scale, or restrict the use of the scale to surveys of the general population where a greater variety of forest attitudes may be expected.

The overall objectives of the study and time constraints meant that it was not possible to conduct an adequate assessment of the extent to which the lack of opportunity may be affecting the relationship between the FIS and behaviour (see model Figure 7.1). However, as a crude assessment a subgroup of respondents were selected that (a) had high FIS scores and (b) either had not visited a forest in the last 12 months or only visited forests a few times in 12 months – i.e. their attitudes appear to be inconsistent with their behaviour. The cut-off point was arbitrarily decided as the first 10% respondents with high FIS scores but low forest visit frequency. Possible constraining factors to be looked at were income, accessible capital (spending per person per day for trip), access to private transport and age.

**Table 7.10 Respondents with noticeable discrepancy between attitude and behaviour and potential constraining factors (MW)**

| | Forest sample | |
|---|---|---|
| Income | P = .811 | [similar incomes] |
| Spending per person for day | P = .016 * | [higher spending] |
| Vehicles in family | P = .017 * | [more vehicles] |
| Age | P = .098 | [possibly higher age] |

The results (shown in Table 7.10) suggest that in general the respondents with high attitude scores but low behaviour scores did not appear to be limited by lack of opportunity. Income levels of both groups were not significantly different, and respondents in this group actually had higher spending per person per day and access to transport than others. As the analysis was only partial, it is entirely possible that other constraining factors such as commitments to job or family matters have caused the discrepancy. There may be a relationship, however, between age and the opportunity to express attitudes as behaviour, with older people having positive attitudes to forests but making less frequent visits possibly because of mobility reasons – although it should be stressed that this is only significant at the 90% confidence level.

The relationship between pro-forest attitudes and the spending is a complex one. A simple correlation between FIS (SR, -.043, N = 1803, P = .068) and GAC (SR, -.065, N = 1814, P = .006) attitudes and spending per person per day shows that people with higher attitudes scores, if anything, were likely to spend less money (despite having significantly higher incomes). This may simply be because people with higher FIS and GAC scores were likely to spend more time in forests which provides cheaper entertainment than more structured forms of tourism. However, the fact that there is no significant relationship between the frequency of forest visits on this trip and the spending per person per day would suggest this may not be the case. An alternative possibility is that the preference for nature associated with pro-environmental attitudes may be linked with a dislike of commercial forms of tourism. From existing data it is impossible to say whether people with higher assessments of the importance of woodland would be prepared to pay more for access, however, given the overall neutral to negative nature of the relationships, it seems unlikely.

The development of the FIS and GAC provided an opportunity to incorporate attitudinal variations of forest visitors into trip generation functions (TGF's) to predict annual visits to forest sites. The results, presented in detail in Chapter 4 of this report, indicate that the FIS is a useful contributor to TGF's for both tourist and day visits. When modelled alongside other individual and trip-specific characteristics, the FIS remained in the most parsimonious functions to predict individual visits, alongside distance travelled to site, party size, mode of transport, number of attributes in the decision to visit and educational level. Restricting the sample to predict trips by day visitors only, the FIS remained alongside distance travelled and party size, although the former accounts for the majority of the observed variation in trip counts.

## 7.6 CONCLUSION

Drawing on methods employed by social psychologists, this study has developed a novel instrument for investigating the extent to which individuals consider forests important for their personal wellbeing and the wellbeing of the nation and then used this instrument to explore the relationship between attitudes and behaviour. The general conclusion of the research has been that attitudes are an important motivational force behind the nature, type and frequency of forest visits. Although there is a strong relationship between general environmental attitudes and the forests attitudes, not all of the behaviour is attributable to the association of forests with positive environmental values. Utilitarian concerns such as the provision of car parking and picnic areas are also important for some, and these people tend to have less strong forest attitudes.

While the study used the theory of reasoned action as the foundation of its conceptual framework it must be emphasised that this was never intended to be a full test of the model, i.e. it has not looked at the role of social norms (social pressure) or perceived behavioural control in influencing behaviour. Including these items in the study and running the full model may have provided a more thorough test of the relationship between attitude and behaviour, but this was not possible in the context of this study. The scale developed may be useful in further studies as a means of assessing how a community is likely to respond to the creation of a new forest area or the opening up of a new forest for recreation. In particular, where telephone or postal surveys are to be used, the 6-item scale developed may provide a simple measure of attitudes towards forest importance and therefore forest usage.

# CHAPTER 8 CONCLUSIONS AND RECOMMENDATIONS

The study has focussed on the economic significance of forest-related tourism day visit expenditures, and the economic significance of forests in relation to tourism in the countryside, as well as the link between attitudes towards forests and forest visiting behaviour.

Site level estimates of the economic significance of forest-related tourism day visits were calculated for England, Scotland and Wales using TGFs to predict visit numbers at individual sites and by drawing on findings from an extensive survey of forest visitors. The TGFs were derived from an extensive modelling exercise using sophisticated statistical and data handling techniques. In this modelling exercise a wide range of predictor variables were considered. These included variables measuring travel cost, the availability of substitute woodland sites, the socio-economic characteristics of the users and their attitudes towards forests for recreation. This involved an extensive and costly primary and secondary data collection exercise, along with the use of GIS techniques to derive spatial statistics. However, the resulting models were only moderately effective at predicting visits to unsurveyed sites. Consequently, the transfer exercise, applying the models to unsurveyed sites, was not strictly statistically defensible. Despite the access to the most comprehensive and up to date visitor monitoring data available, the lack of reliable visit data proved to be one of the key constraints to the modelling exercise. Ultimately modelling exercises of this nature will always be constrained by the quality of the data inputs. Here, the benefits from having improved models for policy analysis must be weighed up against the costs of improving input data quality.

Although limited in their transferability, these models were applied to a sample of unsurveyed sites. The collection of site data involved a further extensive survey due to the lack of an existing database of publicly accessible woodlands. This exercise was made considerably easier by the availability of data from a parallel study currently being undertaken by ADAS. The results from the model application gave mean estimates of tourism visit numbers to GB woodland sites, which were combined with expenditure data from the visitor survey. The results suggested that mean forest-related tourism day visit expenditure per site in England was between £54,000 and £72,000. The figures in Scotland were slightly lower at £42,000 to £70,000, with the lowest mean figures in Wales at £6,000 to £16,000. Mean forest-related expenditure per forest-only and forest combined visit was £7.43, £8.58 and £6.54 in England, Scotland and Wales respectively. These results represent 'best guess' estimates, but were subject to considerable uncertainty and consequently should be treated with due care.

Despite the inherent limitations of this modelling exercise, with some improvements in statistical robustness, such TGF models have considerable potential to contribute to the development of local and regional economic development strategies and policies of forestry and non-forestry organisations. Key measures to enhance their application potential are:

- The development of comprehensive and co-ordinated programme for monitoring visits to a representative sample of publicly and privately owned woodland sites, including a common set of monitoring protocols and common definition of a "site", is a key priority.

- Where 'tourism' is the key focus of interest, the collection of data on visitor type in future forest surveys is required to more accurately assess the ratio of tourism to non-tourism day visits to forests and woodlands across GB.

- Further research into the development of model input variables, particularly in the use of social psychology theory to explore factors motivating trip location decisions and the use of GIS to derive spatially explicit socio-economic and recreation variables such as substitute recreation site indices.

- Household surveys to ascertain how changes in forest cover and management will affect current and future forest tourism day visit and holidaymaking behaviour at a local and national level.

- The development of a national database of publicly accessible forest "sites", both privately and publicly owned, including details on site characteristics and attributes defined on a common basis. The database should also incorporate accurate information about the size of wooded area included in each "site".

Ultimately, even with a more statistically reliable TGF, the lack of a readily accessible comprehensive database of publicly accessible woodlands was a key constraint to achieving the initial objectives of the study. Consequently, it was necessary to draw on data from the 1998 UKDVS (Countryside Agency, 1999) in order to estimate the economic significance of forest-related tourism day visits at the country level. It was estimated that the forest-related tourism expenditures on day visits to forests contribute about £2.3 billion to the GB economy per annum. These figures do not take into account the expenditure undertaken through organised activities in woodlands or that proportion of general holiday expenditures that could be attributable to forests for holidays involving forest-related activities. Nevertheless, it was estimated that in terms of economic significance this represented in the region of 3.3% of all tourism expenditure in GB, giving an indication of the considerable importance of tourism day visits to forests to the GB tourism economy.

A second aim of the study was to quantify the influence of forests on tourism to the countryside and the associated economic significance for six case study areas. The study showed that forests play an important role in attracting people to the countryside, even where they don't visit forests specifically. On average across the six areas considered, 13% of all tourism expenditures incurred by tourists visiting and staying in these areas were "forest-associated tourism expenditures". For those areas more renowned for their forests, this estimate was even higher showing that the forests of these areas are an important economic asset.

The study also developed a novel instrument for investigating individuals attitudes towards forests for recreation and how attitudes relate to behaviour. The study has shown that there is a clear link between individuals attitudes and their forest visiting behaviour. Again, as with the TGF models, the attitude scale has the potential to be used in the development of local forestry policies.

Together the results from the different parts of the study highlight the important and integral role of woodland and forests in the tourism economy. In terms of recommendations, these findings suggest the need for:

- close integration of woodland and forestry policies with those on tourism, recreation and land use;
- close liason between the Forestry Commission and those organisations charged with the responsibility for collecting statistical data on tourism in GB;
- further development and promotion of multi-purpose forestry by public and private organisations.

## REFERENCES


Bateman, I., Garrod, G., Brainard, J. and Lovett, A. (1997). Measurement issues in the travel cost method: a geographical information systems approach. *Journal of Agricultural Economics*, **47** (2) 191-205.

Bateman, I., Lovett, A. and Brainard, J. (1999) Developing a methodology for benefit transfers using geographical information systems: modelling demand for woodland recreation. *Regional Studies*, **33**: 191-205.

Bell, F. and Leeworthy, V. (1990) Recreational demand by tourists for saltwater beach days. *Journal of environmental economics and management*, **18**, 189-205.

Benson, J. and Willis, K. (1992) Valuing informal recreation on the Forestry Commission Estate. *Forestry Commission Bulletin* **104**. HMSO, London.

Bonninger, D.S.; Krosnick, J.A.; Berent, M.K. (1995). Origins of attitude importance: self interest, social identification, and value relevance. *Journal of Personality and Social Psychology*, Vol. 68, No. 1, 61-80.

Bostedt, G. and Mattsson, L. (1995). The value of forests for tourism in Sweden. *Annals of Tourism Research*, **22**(3), 671- 680.

Brainard, J., Lovett, A. and Bateman, I. (1999). Integrating geographical information systems into travel cost analysis and benefit transfer. International Journal of *Geographical Information Science*, **13**(3): 227-246.

Brainard, J., Bateman, I., and Lovett, A. (2001) Modelling demand for recreation in English woodlands. *Forestry* 74(5), 423- 438.

Child, D. (1970). *The Essentials of Factor Analysis*. London, Holt, Rinehart and Winston.

Countryside Agency, (1999). *United Kingdom Day Visits Survey, 1998.* Colchester: Essex.

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

Creel, M. and Loomis, J. (1990)Theoretical and empirical advantages of truncated count data estimators for analysis of deer hunting in California. *American Journal of Economics*, **72**, 434- 441.

De Vaus, D.A. (1991). *Surveys in Social Research*. Third Edition. UCL Press, London.

Dobbs, I.M. (1993). Adjusting for sample selection bias in the individual travel cost method*, Journal of Agricultural Economics*, V44, 335-341.

Eagly, A.; Chaiken, S. (1993). *The Psychology of Attitudes*. Harcourt Brace Janovich, San Diego.

Englin, J. and Mendelsohn, R. (1991). A hedonic travel cost analysis for valuation of multiple components of site quality: the recreation value of forest management. *Journal of Environmental Economics and Management*, **21**: 275-290.

Fishbein, M., and Ajzen, I. (1975). *Belief, attitude, intention and behaviour: An introduction to theory and research.* Reading MA: Addison-Wesley.

Hanley, N., and Ruffel, R. (1993). The contingent valuation of forest characteristics: two experiments. Journal of Agricultural Economics, 44(2), 218-229.

Harley, D., and Hanley, N. (1989). Economic benefit estimates for nature reserves: methods and results. *Discussion Paper in Economics* **89/6**, Department of Economics, University of Stirling.

Jones, A., Bateman, I. And Wright, J. (2002). Estimating arrival numbers and values for informal recreational use of British woodlands. Final report to the Forestry Commission.. CSERGE School of Environmental Sciences, University of East Anglia.

Loomis, J.B. (1995). Four models for determining environmental quality effects on recreational demand and regional economics. *Ecological Economics* **12**: 55-65.

Lovett, A., Brainard, J. and Bateman, I. (1997). Improving benefit transfer demand functions: a GIS approach. *Journal of Environmental Management*, **51**: 373-389.

Office for National Statistics, *1991 Census : Digitised Boundary Data (Great Britain).* ESRC/JISC Census Programme, Census Geography Data Unit (UKBORDERS), University of Edinburgh.

Office for National Statistics, *1991 Census : Small Area Statistics and Local Base* . ESRC/JISC Census Programme, Census Dissemination Unit, University of Manchester.

Roberts, D., Eiser, D., and Broom, G. (2000). *Forests' Role in Tourism: Phase 1*. A final report for the Forestry Commission, Forestry Commission : Edinburgh.

Scarpa, R., Hutchinson, G., Chilton, S., and Buongiorno, J. (2000). Importance of forest attributes in the willingness to pay for recreation: a contingent valuation study of Irish forests. *Forest Policy and Economics*,1, 315-329.

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

Spash, C.L. (1998). Environmental values and wetland ecosystems: CVM, Ethics and Attitudes, University of Cambridge: Cambridge.

Stern, P.C., Dietz, T., and Guagnano, G.A. (1995a). The New Ecological Paradigm in Social-psychological context. *Environment and Behaviour*, 27(6), 723-743.

Stern, P.C., Dietz, T., and Kalof, L. (1993). Value orientation, gender and environmental concern. *Environment and behaviour*, 25(3), 322-348.

Stern, P.C., Dietz, T., Kalof, L. and Guagnano, G.A. (1995b). Values, beliefs and pro-environmental action: attitude formation toward emergent attitude objects. Journal of Applied Social Psychology, 25(18), 1611-1636.

*Travel Trends: A report on the International Passenger Survey 2001* (2002) Office for National Statistics. ISSN 13605895

Tourism Associates with Geoff Broom Associates (1999). *Valuing our environment: a study of the economic impact of landscapes and the National Trust in the South West*, National Trust.

West, V. and Balachandran, V. (2002). Visitor monitoring trends index report: Report on the changes in visitor numbers from 1999 to 2000 for Forest Enterprise sites. Forestry Commission.

Willis, K. and Benson, J. (1989). Recreational values of forests. *Forestry*, **62** (2) 93- 110.

Woodland Trust Visitor Survey March 2000-April 2001 Final Report (2001). Prepared for the Woodland Trust Scotland and supported by Scottish Natural Heritage

## GLOSSARY

**Additionality**: Additionality is a general concept and is defined relative to the counterfactual. In the context of forest-related tourism, forest additionality is the extent to which forests lead to tourism visits and expenditures over and above that which would occur in the absence of those forests.

**Attitudes**: The conceptual definition of an attitude used in this study is "a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour" (Eagly and Chaiken, 1993).

**Backward stepwise regression**: In multiple regression analysis, backward stepwise variable elimination enters all of the variables in a block in a single step and then removes them one at a time based on removal criteria defined in probabilistic terms.

**Bayesian analysis:** Bayesian analysis is a statistical technique that allows new information to update the conditional probability of an event.

**Binomial distribution:** The binomial distribution is the name given to the probability distribution of an outcome occurring from a series of independent events when there are only two possible outcomes with known probabilities for each event.

**Casual forest visitor:** A visitors who did not specifically set out to visit a particular forest site on their day trip but, during the course of their outing, decided to spend some time in a forest. The forest plays no role in motivating their day trip, which would be made regardless of whether or not a specific forest existed.

**Collinearity:** A statistical term relating to multiple linear regression analysis, also sometimes referred to as multicollinearity. Informally, collinearity occurs where an independent (explanatory or predictor) variable is highly correlated with one or more other independent variables.

**Correlation**: The strength of linear association between two variables.

**Counterfactual:** The counterfactual is a statement of what would have happened without policy intervention, or if policy intervention had taken a different but specified form.

**Dependent variable:** A statistical term relating to multiple linear regression analysis, where the dependent variable is a linear function of a combination of independent variables. It is also referred to as the response variable.

**Displacement:** The extent to which the extra demand on resources (or output) resulting from a policy intervention leads to less supply of resources (or output) in a given area.

**Economic significance**: An estimation of the economic importance of an activity to an economy based on expenditure taking place within the economy.

**Economic impact**: An estimation of the economic importance of an activity to an economy based on the injection of "new money" from elsewhere into an economy.

**Expenditure partition method:** An arbitrary method of attributing expenditures to given economic activities, in this case expenditures associated with forest-related and countryside tourism.

**Forest**: The term forest is a general term used here to describe all trees and woodland in a landscape.

**Forest-associated tourism expenditure**: The proportion of total trip expenditure incurred by a day or staying visitor that is associated with an area's forests through the influence of those forests on the choice of trip destination. This can be distinguished from "forest-related tourism expenditure" which is directly related to forest recreation activity.

**Forest-combined visit**: A visitor who combines a visit to a forest with other activities on their day trip.

**Forest model:** The forest model refers to a trip generating function that predicts the number of visits made by a given population to a specified site in a given time period.

**Forest-only visitor:** A visitor who makes a conscious decision to visit a specific forest on their day trip and for whom the forest is of central importance to their decision to make the trip.

**Forest-related tourism expenditure**: The proportion of day visit expenditure that is directly related to a visit to a forest site through the importance of the forest visit in relation to other trip motivating factors.

**Forest sites**: This is a general term used to refer to a distinct location that is characteristically wooded or partially wooded. As well as the actual woodland, the forest site itself includes man-made site attributes such as paths, visitor centres etc. and natural physical site characteristics such as water features (rivers, lakes etc.) located within the site.

**Independent variable:** A statistical term relating to multiple linear regression, where the dependent variable is a linear function of a combination of independent variables, which may also sometimes be referred to as explanatory or predictor variables.

**Individual model:** The individual model refers to a trip generating function that predicts the number of visits made by a given individual to a specified site in a given time period.

**Multiple linear regression:** A statistical technique used to study the dependence of one variable (the dependent variable) on more than one explanatory (independent) variable.

**Multiplier:** The second round effects on the level of economic activity (output, income or employment), generally associated with a policy intervention. There are several types of multiplier (income, long-run, short-run and supply), the size of which depends on the time period over which it is measured and the geographical area considered.

**Poisson distribution:** The Poisson distribution is the name given to the probability distribution of the number of times an event occurs in a certain time interval.

**Tourism day visits**: For the purpose of this study tourism day visits includes day trips from home that last 3 hours or more in duration, and all day trips by holidaymakers regardless of trip duration.

**Trip Generating Function (TGF):** A trip generating function is a linear equation used to predict the number of visits made to a given site by a given individual or population. The number of visits is the dependent variable, whilst the independent variables include travel cost, socio-economic characteristics, the availability of alternative (substitute) recreation locations, etc.

## APPENDIX TO CHAPTER 2

### A2.1 Forest Specific Visitor Survey Questionnaire

Interviewer ID code: ____________ Place of Interview: ______________________________
Date: ____________ Number of interview: ______________________________

**Forest Specific Visitor Questionnaire**

Intro: **"Good morning/ afternoon/ evening. I am conducting a visitor survey on behalf of the Forestry Commission. Could you spare a few (15-20) minutes to answer some questions? Your views are extremely valuable and all information will be treated in the strictest confidence"**

**SECTION A: DISTINGUISHING TOURISTS FROM LEISURE DAY VISITORS**

1. Which of these following statements best describes your trip today? **READ OUT**

| | | |
|---|---|---|
| On a short trip (of less than 3 hours) from home | ❑ | *Go to section C* |
| On a day out (of more than 3 hours) from home | ❑ | *Go to section C* |
| On holiday away from home staying in the area | ❑ | *Go to section B* |
| On holiday visiting friends and relatives in the area | ❑ | *Go to section B* |
| Passing through the area to/from your holiday destination | ❑ | *Go to section B* |
| Other (SPECIFY) …………………………………………. | ❑ | *Go to section B or C* |

**SECTION B: TRIP CHARACTERISTICS FOR VISITORS STAYING AWAY FROM HOME**

2. How long is the whole of your **current** trip away from your home? [ nights ]

3. How many nights will you be staying in the area? [ nights ]

4. During your trip away from home, how many times will you set out specifically to visit a forest or wood?

__________times

**SECTION C: VISIT CHARACTERISTICS AND EXPENDITURE FOR ALL VISITORS**

5. Which of these following statements best describes your visit to this forest today?

| | | |
|---|---|---|
| I/We specifically set out to visit this forest today and not to do anything else | ❑ | *Go to Question 8* |
| I/We specifically set out to visit this forest today but as part of a trip combining more than one activity | ❑ | *Go to Question 6* |
| I/We did not set out to visit this forest, but decided to visit the site while passing | ❑ | **Go to Question 6** |
| Other (SPECIFY) …………………………………………. | ❑ | **Go to Question 6** |

6. As your visit to this forest is part of a trip combining more than one activity, what other reasons did you have for making your trip today?

Could you tell me the relative importance of each of these reasons for making the trip today? (Score between 0 and 10, where 0 is not important and 10 is very important).

a) ---------------------------------------- ______

b) ---------------------------------------- ______

c) ---------------------------------------- ______

d) ---------------------------------------- ______

7. **NOW, RELATIVE TO THE REASONS GIVEN ABOVE,** how important was the visit to this forest as a reason for making your trip?" (Score between 0 and 10, where 0 is not important and 10 is very important).

**VISITING THE FOREST** [ ]

8. We would like to ask you about your expenditure on your **current** day trip. For **your party (group/family)**, **APPROXIMATELY** how much do you expect to spend on each of the following categories for your trip **today**?

| | Amount |
|---|---|
| Travel (inc. fuel, parking etc.) | £ |
| Food and drink | £ |
| Entertainment & attractions | £ |
| Clothing and footwear | £ |
| Gifts, Souvenirs | £ |
| Other expenditure | £ |

9. How many people are in your party? [ ]

10. How far did you travel ***today*** to get to this site? ____________miles

11. What is the name of the place that you travelled from to get here today?

Town____________ County____________

12. How did you travel to the forest today?

By car ❑
Other (specify) ❑ ____________

13. How long did it take you to travel here today? ______ Hrs ______ mins

14. What would you have done instead if the site had been closed on arrival, for example due to logging?

Visited another forest **❑ If so, where?** ………………………………….

Gone to a visitor attraction ❑
Visited a town ❑
Gone to the seaside ❑
Returned home / to accommodation ❑
Other (specify) ❑ …………………………………………….

15. Which of the following activities have you participated in / do you intend to participate in, on your visit to this forest today? (**SHOW LIST** Tick any that apply)

Short walk/ stroll/ walking the dog ❑
Long walk/ rambling/ hiking ❑
Biking ❑
Horse riding ❑
Orienteering ❑
Taking the children out ❑
General recreation ❑
Viewing scenery ❑
Watching birds and animals ❑
Looking at trees and flowers ❑
Picnicking ❑
Other (specify) ❑ ______________________________

16. How long do you expect your visit to the forest will last today? ________ Hrs ________ mins

17. Why did you choose to visit this particular forest site today?

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

18. How many visits have you made **to this site** over the course of the last 12 months?

____________visits

19. a) When choosing this site today did any of the following facilities have a positive influence on your decision to visit? **SHOW LIST, READ AND TICK RELEVANT ATTRIBUTES**

b) Could you please rank the ones that you have selected with respect to their influence over the decision to visit the site? **(Where 1 is the most important)**

**If the respondent has not visited the site before (from question 18) and therefore has no prior knowledge of the site, ask them to select and rank attributes for a decision to visit the site again, on the basis of the knowledge gained through this visit.**

**Ranking should be done on the basis of the number of attributes ticked in 19a. I.e. If 3 attributes are selected, ranking should be from 1 to 3, where 1 is the most important attribute in the decision to visit.**

| **FOREST ATTRIBUTES** | **a) TICK** | **b) RANK** |
|---|---|---|
| CAR PARK | | |
| PICNIC SITE | | |
| FOREST WALK | | |
| CYCLE TRAIL | | |
| HORSE RIDING ROUTE | | |
| ORIENTEERING COURSE | | |
| PLAY EQUIPMENT | | |
| FOREST DRIVE | | |
| VIEWPOINT | | |
| HIDES | | |
| CAMPING/CARAVAN SITE | | |
| YOUTH CAMPING/ BACKPACKING | | |
| BOTHIES | | |
| VISITOR CENTRE | | |
| FOREST INTERPRETATION CENTRE | | |
| FOREST CLASSROOM | | |
| TOILETS | | |
| DISABLED FACILITIES | | |
| WATER FEATURE / FISHING | | |

*Section D: Attitudes towards the environment and forests*

20. "I am going to ask you how you feel about the following statements. These statements are things that people sometimes say about the environment. For each statement could you indicate your strength of agreement or disagreement. There is no right or wrong answer, all responses are equally valid."

| | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
|---|---|---|---|---|---|
| Environmental protection will help people have a better quality of life | ❑ | ❑ | ❑ | ❑ | ❑ |
| A clean environment provides me with better opportunities for recreation | ❑ | ❑ | ❑ | ❑ | ❑ |
| Environmental protection will provide a better world for me (and my children) | ❑ | ❑ | ❑ | ❑ | ❑ |
| Tropical rain forests are not essential to maintaining a healthy planet earth | ❑ | ❑ | ❑ | ❑ | ❑ |
| Environmental protection is beneficial to my health | ❑ | ❑ | ❑ | ❑ | ❑ |
| Environmental protection does not benefit everyone | ❑ | ❑ | ❑ | ❑ | ❑ |

21. These statements are things that people sometimes say about forests. Again, For each statement could you indicate your strength of agreement or disagreement? There is no right or wrong answer, all responses are equally valid."

| | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
|---|---|---|---|---|---|
| Forests are an important part of our national heritage | ❑ | ❑ | ❑ | ❑ | ❑ |
| Forests make great holiday destinations for me and my family | ❑ | ❑ | ❑ | ❑ | ❑ |
| I feel perfectly safe when visiting forests | ❑ | ❑ | ❑ | ❑ | ❑ |
| Our landscape would look just as beautiful even if there were no forests | ❑ | ❑ | ❑ | ❑ | ❑ |
| We should view the wildlife and plants in our forests as a national treasure | ❑ | ❑ | ❑ | ❑ | ❑ |
| Visiting forests is important for my wellbeing | ❑ | ❑ | ❑ | ❑ | ❑ |
| Forests offer me little or no opportunities for leisure and recreation | ❑ | ❑ | ❑ | ❑ | ❑ |
| Forests for recreation and leisure are important for the wellbeing of the nation | ❑ | ❑ | ❑ | ❑ | ❑ |

*Section E: Socio-economic characteristics*

"Finally, it helps us in our work if you can provide some background information about yourself. This information will only be used for statistical purposes".

22. How often have you visited a forest or woodland for recreation in the last 12 months? (Tick one box only)

More than once a week ❑

| | |
|---|---|
| About once a week | ❑ |
| About once every two weeks | ❑ |
| About once a month | ❑ |
| A few times each year | ❑ |
| Never | ❑ |

23. Which age bracket do you fall into?

| | | | |
|---|---|---|---|
| 16-24 | ❑ | 45-54 | ❑ |
| 25-34 | ❑ | 55-64 | ❑ |
| 35-44 | ❑ | 65+ | ❑ |

24. Which of the following categories best describes your employment status?

| | | |
|---|---|---|
| Working full-time | ❑ | **Go to 25** |
| Working part-time | ❑ | **Go to 25** |
| House husband/wife | ❑ | **Go to 26** |
| Retired | ❑ | **Go to 26** |
| Unemployed | ❑ | **Go to 26** |
| Not working: disability/ sickness | ❑ | **Go to 26** |
| At school | ❑ | **Go to 26** |
| In full-time higher education | ❑ | **Go to 26** |
| In further education or training | ❑ | **Go to 26** |
| Other (specify) ……………………… | ❑ | **Go to 26** |

25. What is your occupation? ______________________________

26. Which of the following qualifications do you possess? **READ OUT** (Tick as many boxes as required)

| | |
|---|---|
| O' Levels/GCSE's/Standard Grade | ❑ |
| Highers/ A' Levels | ❑ |
| Technical qualifications | ❑ |
| First degree | ❑ |
| Postgraduate qualification | ❑ |
| Other (specify) | ❑ ____________ |

27. How many people live in your household? ☐

28. Which age groups do the other people in your household fall into? Please indicate how many people fall into each age band. **READ OUT**

| Ages | Number of people | Ages | Number of people |
|---|---|---|---|
| 0-4 | | 35-44 | |
| 5-10 | | 45-54 | |
| 11-15 | | 55-64 | |
| 16-24 | | 65+ | |
| 25-34 | | | |

29. Which of the following best describes the total **pre-tax annual** income of your household?

| | | | |
|---|---|---|---|
| Up to £7,500 | ❑ | £24,001- £37,000 | ❑ |
| £7,501 - £15,000 | ❑ | £37,001- £60,000 | ❑ |
| £15, 001 - £24,000 | ❑ | Above £60,000 | ❑ |

30. How many vehicles are there in the household? ☐

31. Are you resident in the UK? Yes ❑ No ❑

31a. Could you tell us where you live?

| **UK Residents** | | **Overseas Residents** | |
|---|---|---|---|
| Town | ---------------------------------------------------- | Country | ---------------------------------------------------------------- |
| County | ---------------------------------------------------- | | |
| Postcode | ---------------------------------------------------- | | |

32. Interviewer- what sex is the respondent? Male ❑ Female ❑

**Thank you for taking part. There are no further questions. If you would like to know more about this survey please contact:**

Peter Shannon
Socio-Economic Research Programme (SERP)
The Macaulay Institute
Countesswells Road
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**INTERVIEWER**

How long did the interview take? ☐

Were there other people in the group overlooking the interview? Yes ❑ No ❑

Were the respondent's answers clearly influenced by the presence of any other group members? Yes ❑ No ❑

Did the respondent struggle to answer any of the questions? If so, which ones and can you say why? Yes ❑ No ❑

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| | | | | |
|---|---|---|---|---|
| Did the respondent appear to answer the questions in a rushed manner? | Yes | ❑ | No | ❑ |

Any other comments?

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## APPENDIX TO CHAPTER 6

## A6.1 Countryside Visitor Survey Questionnaire

Interviewer ID code: ____________ Place of Interview: __________________________
Date: ____________ Number of interview: __________________________

**Questionnaire: Countryside Visitor Questionnaire**

Intro: **"Good morning/ afternoon/ evening. I am conducting a visitor survey on behalf of the Forestry Commission. Could you spare a few (15) minutes to answer some questions? Your views are extremely valuable and all information will be treated in the strictest confidence"**

I First of all, can I check that we have not already interviewed you at this location?

Been interviewed ❑ *Don't interview* Not been interviewed ❑ *Continue*

II Do you live or work in the Snowdonia National Park area? **Show Map**

Yes ❑ *Continue* No ❑ *Go to IV*

III Would you describe your visit here today as a routine or regular trip, **or** something that you just do now and again.

Yes (Routine) ❑ *Don't interview* No ❑ *Go to Section A.*

IV Is this your first visit to the Snowdonia National Park area?

Yes ❑ No ❑

**SECTION A: DISTINGUISHING TOURISTS FROM DAY VISITORS**

1. Which of these following statements best describes your trip today?

| | | |
|---|---|---|
| On a short trip (of less than 3 hours) from home | ❑ | *Go to section C* |
| On a day out (of more than 3 hours) from home | ❑ | *Go to section C* |
| On holiday away from home staying in the Snowdonia area | ❑ | *Go to section B* |
| On holiday away from home staying outside the Snowdonia area | ❑ | *Go to section B* |
| Passing through the area to/from your holiday destination | ❑ | *Go to section B* |
| Other (SPECIFY) ………………………………………… | ❑ | |

*If working, don't interview, if day visitor go to C, if staying visitor go to B*

**SECTION B: VISITORS STAYING AWAY FROM HOME: VISIT CHARACTERISTICS AND EXPENDITURE**

2. Imagine you are planning a **HOLIDAY** in **the UK countryside. IN GENERAL**, how important to you is each of **these characteristics of an area** when deciding on where to go for the holiday. (*Please score each reason from 0 to 10: where 0 is not at all important and 10 is very important*).

| | Score |
|---|---|
| Peace and tranquillity | ______ |
| Good food and drink | ______ |
| Good scenery | ______ |
| Interesting visitor attractions and historic buildings (e.g. castles) | ______ |
| Interesting local shops | ______ |

3. Which category best describes your holiday in the Snowdonia NP area? (Tick as many as apply)

| | | | |
|---|---|---|---|
| Activity holiday (walking, cycling etc.) | ❑ | Sightseeing holiday | ❑ |
| Relaxing holiday (rest, respite, repose) | ❑ | Touring holiday | ❑ |
| Visiting friends and relatives | ❑ | Other (specify) ------------------ | ❑ |

4. **FOR THIS TRIP,** what are the main characteristics about this area that made you choose to come here on your holiday? **(PROBE for specific characteristics but don't prompt – Try to get four if possible and record below).**

5. Could you tell me the importance of each of these characteristics in your decision to visit or stay in the Snowdonia NP?" (*Score between 0 and 10, where 0 is not important and 10 is very important*).

a) ---------------------------------------------------------------- ______

b) ---------------------------------------------------------------- ______

c) ---------------------------------------------------------------- ______

d) ---------------------------------------------------------------- ______

***If one of the characteristics is forests and woodlands then go to 7. If not, ask question 6.***

6. **NOW RELATIVE TO THE CHARACTERISTICS ABOVE,** could you tell me the how important the forests and woodlands of the Snowdonia National Park were in your decision to visit or stay in the Snowdonia National Park area today?" (Again score between 0 and 10)

**THE FORESTS AND WOODLANDS OF THE SNOWDONIA NP** [ ]

7. How long is the whole of your **current** trip away from your home? [ nights ]

8. How many nights will you be staying in the Snowdonia National Park area? [ nights ]

9. We would like to ask you about your expenditure on the **whole** of your **current trip away from home**. For **your party (group/family)**, **APPROXIMATELY** how much will you expect to spend on each of the following categories for your **whole trip**? *(Include any purchases of goods and services made before the trip that related to the trip, e.g. purchases of sun tan lotion, travel insurance etc, as well as purchases made during the trip.)*

| | Amount |
|---|---|
| Accommodation | £ |
| Travel (inc. fuel, parking etc.) | £ |
| Food and drink | £ |
| Entertainment and attractions | £ |
| Clothing and footwear | £ |
| Gifts, Souvenirs | £ |
| Other expenditure (insurance etc.) | £ |

10. How many people are in your party? ☐

GO TO SECTION D

## SECTION C: DAY VISITORS: VISIT CHARACTERISTICS AND EXPENDITURE

11. Imagine you are planning a **DAY TRIP** in **the UK countryside. IN GENERAL**, how important to you is each of **these characteristics of an area** when deciding on where to go for the day. (*Please score each reason from 0 to 10: where 0 is not at all important and 10 is very important*).

| | Score |
|---|---|
| Peace and tranquillity | ______ |
| Good food and drink | ______ |
| Good scenery | ______ |
| Interesting visitor attractions and historic buildings (e.g. castles) | ______ |
| Interesting local shops | ______ |

12. Which category best describes your trip to the Snowdonia NP area today? (Tick as many as apply)

| | | | |
|---|---|---|---|
| Activity day trip (walking, cycling etc.) | ❏ | Sightseeing day trip | ❏ |
| Relaxing day trip (rest, respite, repose) | ❏ | Touring day trip | ❏ |
| Visiting friends and relatives | ❏ | Other (specify) ------------------ | ❏ |

13. **FOR THIS TRIP,** what are the main characteristics about this area that made you choose to come here on your holiday? **(PROBE for specific characteristics but don't prompt – Try to get four if possible and record below).**

14. Could you tell me the importance of each of these characteristics in your decision to visit or stay in the Snowdonia NP?" (Score between 0 and 10, where 0 is not important and 10 is very important).

a) ---------------------------------------------------------------- ______

b) ---------------------------------------------------------------- ______

c) ---------------------------------------------------------------- ______

d) ---------------------------------------------------------------- ______

***If one of the characteristics is forests and woodlands then go to 16. If not, ask question 15.***

15. **NOW RELATIVE TO THE CHARACTERISTICS ABOVE,** could you tell me the how important the forests and woodlands of the area were in your decision to visit or stay in the Snowdonia National Park area?" (Again, score between 0 and 10).

**THE FORESTS AND WOODLANDS OF THE SNOWDONIA NP**

16. We would like to ask you about your expenditure on your **current** day trip. For **your party (group/family)**, **APPROXIMATELY** how much do you expect to spend on each of the following categories for your trip **today**?

| | Amount |
|---|---|
| Travel (inc. fuel, parking etc.) | £ |
| Food and drink | £ |
| Entertainment & attractions | £ |
| Clothing and footwear | £ |
| Gifts, Souvenirs | £ |
| Other expenditure | £ |

17. How many people are in your party?

## *Section D: Attitudes towards the environment and forests*

18. "I am going to ask you how you feel about the following statements. These statements are things that people sometimes say about the environment. For each statement could you indicate your strength of agreement or disagreement. There is no right or wrong answer, all responses are equally valid."

| | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
|---|---|---|---|---|---|
| Environmental protection will help people have a better quality of life | ❑ | ❑ | ❑ | ❑ | ❑ |
| A clean environment provides me with better opportunities for recreation | ❑ | ❑ | ❑ | ❑ | ❑ |
| Environmental protection will provide a better world for me (and my children) | ❑ | ❑ | ❑ | ❑ | ❑ |
| Tropical rain forests are not essential to maintaining a healthy planet earth | ❑ | ❑ | ❑ | ❑ | ❑ |
| Environmental protection is beneficial to my health | ❑ | ❑ | ❑ | ❑ | ❑ |
| Environmental protection does not benefit everyone | ❑ | ❑ | ❑ | ❑ | ❑ |

19. These statements are things that people sometimes say about forests. Again, For each statement could you indicate your strength of agreement or disagreement. There is no right or wrong answer, all responses are equally valid."

| | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
|---|---|---|---|---|---|
| Forests are an important part of our national heritage | ❑ | ❑ | ❑ | ❑ | ❑ |
| Forests make great holiday destinations for me and my family | ❑ | ❑ | ❑ | ❑ | ❑ |
| I feel perfectly safe when visiting forests | ❑ | ❑ | ❑ | ❑ | ❑ |
| Spending time in forests is not important for me personally | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Our landscape would look just as beautiful even if there were no forests | ❑ | ❑ | ❑ | ❑ | ❑ |
| We should view the wildlife and plants in our forests as a national treasure | ❑ | ❑ | ❑ | ❑ | ❑ |
| Visiting forests is important for my wellbeing | ❑ | ❑ | ❑ | ❑ | ❑ |
| Forests offer me little or no opportunities for leisure and recreation | ❑ | ❑ | ❑ | ❑ | ❑ |
| Forests for recreation and leisure are important for the wellbeing of the nation | ❑ | ❑ | ❑ | ❑ | ❑ |

*Section G: Socio-economic characteristics*

**"Finally, it helps us in our work if you can provide some background information about yourself. This information will only be used for statistical purposes".**

20. How often have you visited a forest or woodland for recreation in the last 12 months? (Tick one box only)

| | |
|---|---|
| More than once a week | ❑ |
| About once a week | ❑ |
| About once every two weeks | ❑ |
| About once a month | ❑ |
| A few times each year | ❑ |
| Never | ❑ |

21. Which age bracket do you fall into?

| | | | |
|---|---|---|---|
| 16-24 | ❑ | 45-54 | ❑ |
| 25-34 | ❑ | 55-64 | ❑ |
| 35-44 | ❑ | 65+ | ❑ |

22. Which of the following categories best describes your employment status?

| | | |
|---|---|---|
| Working full-time | ❑ | Go to 23 |
| Working part-time | ❑ | Go to 23 |
| House husband/wife | ❑ | Go to 24 |
| Retired | ❑ | Go to 24 |
| Unemployed | ❑ | Go to 24 |
| Not working: disability/ sickness | ❑ | Go to 24 |
| At school | ❑ | Go to 24 |
| In full-time higher education | ❑ | Go to 24 |
| In further education or training | ❑ | Go to 24 |
| Other (specify) ……………………… | ❑ | Go to 24 |

23. What is your occupation? ________________________________

24. Which of the following qualifications do you possess? (Tick as many boxes as required)

| | |
|---|---|
| O' Levels/GCSE's/Standard Grade | ❑ |
| Highers/ A' Levels | ❑ |
| Technical qualifications | ❑ |
| First degree | ❑ |
| Postgraduate qualification | ❑ |

Other (specifiy) ❑ ______________________

25. How many people live in your household? [ ]

26. What are their ages? Please indicate how many people fall into each age band.

| Ages | Number of people | Ages | Number of people |
|---|---|---|---|
| 0-4 | ______ | 35-44 | ______ |
| 5-10 | ______ | 45-54 | ______ |
| 11-15 | ______ | 55-64 | ______ |
| 16-24 | ______ | 65+ | ______ |
| 25-34 | ______ | | ______ |

27. Which of the following best describes the total pre-tax annual income of your household?

| | | | |
|---|---|---|---|
| Up to £7,500 | ❑ | £24,001- £37,000 | ❑ |
| £7,501 - £15,000 | ❑ | £37,001- £60,000 | ❑ |
| £15, 001 - £24,000 | ❑ | Above £60,000 | ❑ |

28. How many vehicles does the household own? [ ]

29. Are you resident in the UK? Yes ❑ No ❑

Could you tell us where you live?

**UK Residents**

Town ______________________

County ______________________

Postcode ______________________

**Overseas Residents**

Country ______________________

30. Interviewer- what sex is the respondent? Male ❑ Female ❑

**Thank you for taking part. There are no further questions. If you would like to know more about this survey please contact:**

Peter Shannon
Socio-Economic Research Programme (SERP)
The Macaulay Institute
Countesswells Road
Aberdeen
AB15 8QH

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**INTERVIEWER**

How long did the interview take? [ ]

Were there other people in the group overlooking the interview? Yes ❑ No ❑

Were the respondent's answers clearly influenced by the presence of any other group members? Yes ❑ No ❑

Did the respondent struggle to answer any of the questions? If so, which ones and can you say why? Yes ❑ No ❑

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Did the respondent appear to answer the questions in a rushed manner? Yes ❑ No ❑

Any other comments?

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