Upland Landscapes: What do people want, who wants it and can they have it all?

A thesis presented

by

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Declaration

In accordance with Regulations for Higher Degrees by Research, I hereby declare that this thesis now submitted for the candidature of Doctor of Philosophy is a result of my own research and independent work except where reference is made to published literature. I hereby certify that the work embodied in this thesis has not already been submitted in candidature for any other institute of higher learning.

All errors remain my own.

Candidate:

Dugald Tinch

Preface

I would like to thank my PhD supervisor, Professor Nick Hanley. I thank Professor Hanley for his support, dedication, critical feed-back, enthusiasm, intellectual support and patience throughout the process of this research.

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Abstract

The objective of this thesis is to investigate the preferences of individuals for the management of upland landscapes in the UK. Environmental valuation techniques are becoming an increasingly important tool in the development of environmental management policy, however, they are not without their detractors. In particular a school of thought, developed from the work of Bentham, takes issue with the behavioural foundations of the dominant welfare economic doctrine which underpins many of the valuation techniques commonly adopted. They identify that heuristic rules, experience and memory can all play a role in the development of 'value' for a good. This thesis aims to investigate the roles of these, along with the role of association with an environmental good, in the development of value for upland landscapes using the Peak District National Park as a case study. This objective is developed in three parts. Part I introduces the topic, identifies the background of research against which this thesis is presented and introduces the case study. This part also attempts to identify how well the complex economy – ecology interactions in this landscape are understood by stakeholders. It shows that, given the complexities of the systems, there are key omissions in stakeholder knowledge and understanding. Part II uses Discrete Choice Experiments to analyse the impact on value of experience, memory, heuristics and association. A series of experiments are applied to the same landscape characteristics in order to achieve this. The results show that value can be impacted in a number of ways with implications for the development of future valuation studies. This thesis concludes with a discussion of the policy implications, limitations and future work associated with this research.

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Part I

Introduction, Background and Policy Setting

Chapter 1: Introduction and Policy Background

1.1 Introduction

Making decisions and choices is an everyday activity often completed entirely subconsciously by every one of us. How people go about making decisions is much studied, not least by Economists. An important question is raised; are any of us rational or indeed logical when faced with complex decision making processes. A central tenet of this dissertation is that a fuller understanding of how decisions are made is necessary before policy evaluation relies on any society's or individual's economic rationality. The thesis of this dissertation can be summarised as a consideration of whether a fuller understanding of decision making processes for environmental goods leads to a more appropriate analytical framework in which to aid policy design for complex environmental attributes?

In order to predict your behaviour a physicist will tell you they need unlimited intelligence and memory, knowledge of all the laws governing the universe and the properties of every particle at any point in time since the big bang (Bain, 2008). Many economists believe that they can predict the behaviour of individuals simply given full knowledge of the market and information about risk and risk preference (Kahneman and Thaler, 2006). In the absence of markets non market valuation techniques aim to fill this information gap by rigorous application of techniques grounded in the traditional welfare economic framework and are therefore reliant upon assumptions of economic rationality of individuals[1].

[1] That is choices are made based upon a rational (i.e. reasoned) process of weighting costs and benefits.

The rest of this dissertation aims to identify what we can do to better estimate policy makers' and individuals' preferences where no markets exist to make these clear to us. The setting for this investigation is preference and choice for the environment of the upland areas of the UK. The current chapter is dedicated to placing the research in context, the identification of some of the work of economic thinkers, how this relates to the valuation of environmental goods and the analysis of memory and experience in this context. Firstly the background of utility theory will be presented; then an analysis of environmental valuation in this context will be related to the context of ecosystem services of the uplands of the UK. Finally the nature of the analytical chapters will be outlined and a methodological framework developed.

The aims and objectives of this dissertation are to gain a better understanding of factors impacting on individuals' preferences using the valuation of the uplands of the UK as a baseline against which to measure this. Chapters 1 to 3 present a background to the research, the landscapes in question and the methodological approach adopted. Chapter 2 also introduces some analysis of how upland landscapes have developed through time (and indeed how they have been perceived to develop) and places the research which follows within a policy context. Chapters 4 to 6 relate to the identification of preferences and any underlying factors which may impact on preferences using a choice experiment approach. Finally chapter 7 provides a discussion of the research and aims to draw the outcomes of the research to some conclusions.

As discussed above this dissertation aims to identify what we can do to better estimate policy makers' and individuals' preferences where no markets exist to make these clear to us. The core analytical chapters each have aims and objectives,

presented in table 1.1, which are focused on gaining a greater understanding of the make up of preferences for non market environmental goods. Drawing the outcomes of these chapters together allows the identification of some of the issues of the suitability and appropriate use of non market values for policy analysis, this is further analysed in the concluding chapter.

Table 1.1 Aims and objectives of the core analytical chapters.

Chapter	Main Aim	Secondary aim
4	Investigation of the impacts of experience and memory on preferences for upland landscapes.	Identification of how useful each measure of preference is for policy analysis.
5	Investigation of the impacts of additional information on the preferences of individuals for upland landscapes.	Identification of the role of heuristics in valuation; and the nature of information presented.
6	Investigation of divergence in preference given different relationship to an environmental resource.	Analysis of the impacts of association with an environmental resource; and a further analysis of the impacts of experience and memory.

The main hypotheses tested in the research are:

- Decision, experienced and remembered utility will diverge for environmental goods in the same way as they have been found to for other goods.
- Factors which influence heuristics rules associated with an environmental good will in turn influence preference for that good.
- The preferences of groups with different associations with an environmental good will be divergent.

These hypotheses are tested using the choice experiment approach applied to a case study area of the Peak District National Park as outlined in table 1.1. If these

hypotheses are proven then the research aims to inform as to how this impacts upon the traditional use of valuation in policy evaluation. Further it aims to identify the implications for environmental goods with different characteristics. These aims and the extent to which they are achieved are given fuller consideration in the concluding chapter, in particular section 7.4, 7.5 and 7.6 are dedicated to consideration of the wider implications of the results from the core analytical chapters. The rest of this chapter goes on to identify the theoretical background for the rest of the research presented in this dissertation.

1.2 Utility Theory

Much of the basis for the examination of choices in the traditional economic literature has relied on utility theory. Jeremy Bentham, a moral philosopher, in his work "Introduction to the Principles of Morals and Legislation" published in 1789 first developed a principle of utility (utilitarianism). He identified that an action which elicits the greatest amount of happiness is optimal and sets out a "felicific calculus" identifying the probability, intensity, duration and extent of pleasures and pains as drivers of the utility associated with an event. He believed the amount of pleasure or pain associated with an event was both quantifiable and additive across individuals. In essence Bentham was identifying the term utility with what some now call 'experienced utility' (Kahneman and Sugden, 2005). He also advocated the democratic

process in that as people voted upon grounds of rational calculation of individual long term benefit a resulting increase in public "happiness" would occur[2].

The moment based approach to utility elicitation can be broken down into various elements; decision utility (including predicted utility), experienced utility (made up of a summation of instant utility) and remembered utility. Decision utility is a measure based upon anticipation of an event or the consumption of a good, experienced utility is a summation of utilities derived in the instant during an event or consumption of a good and remembered utility allows for the impacts of memory on experienced utility. The moment based approach aims to revitalise Benthamite principles of utilitarianism, predominantly due to perceived shortcomings with the commonly used sense of utility derived from a welfare economics background, and looks to measures of happiness, pleasure and pain to identify the utility for a given scenario. The current research aims to identify the impacts of experience and memory on utility but does not look to happiness as a means of calculating this due to shortcomings in the methodologies for identifying this "felicific calculus" (as Bentham would have identified it).

Due to their welfare economic background most environmental valuation exercises identify decision utility. However, there are certain circumstances in which traditional stated preference studies represent experienced utility. Basically the question here is when does money become a 'measuring rod' for hedonic experience?

[2] Note the use of "individual long term benefit". Bentham himself is not talking about instants of experience but of long term estimates (i.e. decision utility). Therefore from a policy point of view Bentham, regarded as the first and one of the greatest advocates of experienced utility suggests the use of decision utility.

Kahneman and Sugden (2005 pp163) identify the requirements for a Contingent Valuation study to represent experienced utility:

- Experienced utility must be measurable
- Individual's choices are rational
- Responses to contingent valuation questions are rational
- For any given individual the marginal utility of money is approximately constant over the range relevant to the study.

There are some objections to the use of a moment based approach, the first (to paraphrase Kahneman (2000) is that there is more to life than a good mood and the second is that the moment based view fails to take adequate account of the role of memory in the approach. Memory **is** impacted by the experience at singular moments (instants) with, it is suggested, the main impacts being at the most extreme moment and the final moment. This result developed through research on colonoscopy patients (Redelmeier and Kahneman, 1996) and by research involving intense noises (Kahneman, 1999) is known as the peak end rule. However, the level of impact can be drawn into question and is worthy of investigation.

1.3 How to Measure Moment-Based Utility

Here we suggest two groupings for available measures of experienced utility: retrospective and proactive. Proactive approaches such as the "experience sampling method" (Stone et al, 1999) use recording devices such as palmtop computers (or researchers) to measure happiness at intervals through time. These approaches tend

to be invasive and may themselves impact on the utility or happiness of individuals. Retrospective approaches such as the "day reconstruction method" (Kahneman et al 2004) asks individuals to reconstruct an event, identifying activities (and subsequently opinions of happiness) surrounding those activities. However, these retrospective approaches do not give true measures of experienced utility but rather of remembered utility. So major issues can be identified with even measuring utility based on a happiness measure in the instant but it is also important to question the policy relevance of measures of happiness. As is shown below the use of monetary values in order that non-market goods can be included in policy analysis is now standard practice. One method that can be adopted is to identify self reported happiness variation between income and an environmental good to determine a rate of substitution from which a value can be elicited (van Praag and Baarsma 2005).

In these distinctions of experienced and decision utility lies a critical aspect of the research which will be presented below. Decision utility relates to the anticipation (or indeed estimation based upon heuristic rules) of utility derived from a good prior to purchase. In the context of environmental goods this relates to the anticipation of utility from a good whilst disassociated with that good. That is during a period in which the good is not being experienced as during this period the utility derived can in essence be considered to be 'experienced utility'.

In theory (see Kahneman 2000) experienced utility is made up of a summation of instant utility, that is the utility derived at different stages of experience of a good. Behavioural psychologists would tend to advocate happiness based measures of utility for the analysis of experienced utility, given that purchase decisions and indeed

'valuation' tends to measure decision utility (being made before experience). However, as is shown below this is not necessary. One exception to this general 'rule' would be where people are able to sample a good prior to purchase, whilst the actual choice to make a purchase is decision based (i.e. reliant on expectations of future utility) it will be thoroughly grounded in experience.

In addition to decision and experienced utility the impacts of memory have also been given attention in the literature (see Kahneman and Tversky eds. 2000). Memory has been shown to impact upon utility, that is experienced utility can be seen to be temporal in its nature, it only holds in the instant of experience but may be seen to further impact over time on utility as the experience is remembered (Gonzalez and Leon (2003)).

These distinctions of utility lead to divergent measures of utility and therefore value (as will be shown in Chapter 4), which lead us to interesting consideration in terms of policy analysis. Which measure of utility is the appropriate one in a given context needs some careful consideration. Where one is purely interested in predicting choice, so the measure politicians will be most interested in in terms of winning votes, decision utility is the obvious choice of measure. However, in the context of measures of well being, in particular from the viewpoint of environmental managers aiming to maximise the utility associated with an environmental good, experienced utility would perhaps be the most appropriate. In the context of cost benefit analysis (that is a measure of aggregate well being) obviously a value in monetary units is required. Given that the value is likely to be based on a sample of the population the most fully informed utility, remembered utility, may be preferred.

However, decision based measures may be considered to be likely to yield more immediately popular policy outcomes and experienced based measures would yield policy which would maximise utility in the instant. Therefore the nature of the environmental good under consideration would be key to identifying which measure would be most appropriate in the context of cost benefit analysis in particular but may have relevance to the other contexts.

Take for example an isolated landscape where management is aimed at adjusting ecosystem functions to provide a 'traditional' (i.e. pre industrial) landscape; it might be suggested that experienced utility would be the obvious choice. That is, to value landscape changes, given landscapes which are distinct from others and are managed as individual sites, specific impacts of changes on the moment of experience may be preferred. However, in the context of landscapes of the uplands such as the rewilding of Ennerdale or moves to reinstate traditional common grazing on Danby Moor (see EFTEC Tinch et al 2009) the length of time (50 years as a conservative estimate) before management change fully impacts on landscape characteristics makes decision utility the only practicable measure available.

In the context of landscape restoration projects such as those taking place in the Peak District through Moors for the Future (op cit), where landscapes of similar characteristics to those desired currently exist, experienced or remembered measures of utility would seem to be preferable in calculating if the costs of restoration are met by the benefits of restoration (although a range of ecosystem services stemming from the landscapes must be considered not simply visual landscape preferences).

Bentham's work on utility did not gain much attention until many years after his death when classical economists began to look at concepts of utility (or pleasure and pain) as central to the Economy. Edgeworth (1881) believed that utility could be measured and suggested a 'hedonimiter' could be developed for just this purpose in order to develop a physiological underpinning to economics. Edgeworth (1881) additionally proposed that total utility was a function of an entire basket of goods which could be mapped with isolines associating all bundles of goods of equal utility, these he termed indifference curves.

At the beginning of the 20th century a positivist and behaviouralist revolution (Kahneman and Sugden, 2005) in economics occurred leading to a shift towards the use of objectively observable choices. For example, whilst Fisher (1927) agreed that a measure of utility was important he did not feel that a 'hedonimiter' was practicable instead suggesting that backwards induction from observed behaviour be adopted as an approach (Colander, 2007). As such Fisher was amongst the first economists to use the term 'utility' as it is now commonly used by economists, i.e. as a measure of 'decision' utility, a measure of preference which represents itself in an individual's choices (although as was noted above Bentham himself made arguments which suggested the use of decision utility for policy analysis).

However, many economists still did not consider utility to be quantifiable. Pareto (1906) rejected the need to quantify utility but identified that pairwise comparison of possible states, with no cardinal measure of utility, allowed the optimal states, i.e. those on the highest indifference curve achievable given a budget constraint, to be identified. By observing behaviour (so Pareto again is suggesting the

use of 'decision' utility) and assuming its economic rationality the state chosen is in turn assumed to be optimal, this revealed preference is now central to much economic thinking.

Marshall (1920) felt that quantification of desires or their outcomes was impossible; they were rather considered to be qualitatively identifiable processes, with some cardinal measurability at the margins, which drove economic decisions. Utility was still predominantly considered at the margin rather than considerations of total utility being made. In identifying both desires and realized satisfactions Marshall (op cit) was again identifying the concepts of decision utility and experienced utility which are key to the theoretical underpinnings of the experiments in Chapter 4 of this dissertation. By the 1930's "attempts to measure utility were abandoned" (Colander, 2007) as utility measurement and consideration of happiness were then considered to be out with the scope of economics.

1.4 Environmental Valuation of Decision Utility[3]

Valuation of non-market goods is routed in Welfare Economics a particular form of Utilitarianism which relies on a consequentialist and subjectivist approach (Perman et al 2003). Given this consequentialist background traditionally valuation techniques have measured decision utility.

We adopt the (noble) proposition that environmental valuation developed so that environmental goods (and bads) could be considered in the relevant decision

[3] Kahneman at times splits this concept into pure "decision utility" observed from behaviour and "predicted utility" which is a belief about future experienced utility (Kahneman, 2000), however, for the remainder to this dissertation a more traditional definition including both predicted and pure decision utility will be adopted.

making process (i.e. cost benefit analysis which has become increasingly important in recent years). As such one can easily say that the valuation of environmental goods is necessary and that the inaccuracies inherent in doing so must, therefore, be accepted. Our task as Environmental Economists, when occupied with environmental valuation, must therefore be to find ways in which these inaccuracies can be better understood and minimised.

In a seminal paper on the topic of non-use values and conservation policy in 1967 Krutilla identified that a shift had begun in the traditional focus of natural resource economics, represented by the work of Pigou, dealing with worries caused by a Malthusian thesis. It had become apparent that technological development mitigated the impacts of a growing population and denudation of high quality environmental resources leading to a seemingly ever increasing capacity to produce and consume. It should be noted that whilst Krutilla's work accurately represents the experience of the developed world it ignores the large disparity in social justice and breakdown of equitable distribution that has become a dominant trend in our world today.

Krutilla identified that, within the body of research showing a rejection of the Malthusian thesis, an important caveat existed in that work by Barnett and Morse (1963) identified this development had come at the expense of the physical environment (our "landscape, water and atmospheric quality" (Krutilla 1967 Pp778)) . Krutilla stated that the focus should now be on those things the markets fail to adequately provide for such as the "amenities associated with unspoiled natural environments" (op cit Pp778). He further showed that the problem, given the often

non market value of social returns, would only be exacerbated by the reliance of policy of the time on Pigouvian social time preference and net present values (NPVs), whereby land owners would choose the highest private NPV use for their land.

Krutilla also identified the probability of a large disparity between willingness to pay (WTP) and willingness to accept (WTA) given that the preservation and existence of "grand scenic wonder or a unique and fragile ecosystem" may make up a significant part of an individual's "real income" (op cit Pp 779). Whilst Krutilla does not identify the link it is apparent that this result has implications for many environmental management principles. For example the Coase Theorem (Coase, 1960) holds that full assignation of property rights in the absence of transaction costs achieves an efficient outcome in the face of externalities and that the allocation of these property rights is unimportant to the efficiency outcome.

Taking as an example the case of upland areas of the UK, management of landscapes externally impacts upon the utility functions of visitors and locals, for example through changing visual impacts. As such the Coase Theorem would hold that policy makers should concentrate on ensuring allocation of property rights and removal of transaction costs. However, this only holds true in the absence of loss aversion (Kahneman and Tversky 1984) and the endowment effect (Thaler 1980), that is a greater utility loss associated with losing goods than the gain from receiving the same goods. Value is, therefore, partially determined by one's endowments or the status quo. Given this loss aversion a socially efficient outcome is unlikely due to disparity in value between loss averse property rights owners and those wishing to secure some change in landuse or the level of externality. It is true that the 'efficient'

outcome (in terms of Pareto Efficiency[4]) will merely vary according to the initial allocation of rights. However, the allocation has major socio-ethical implications in that an alternative Pareto Efficiency with an overall higher level of societal utility[5] may be available given redistribution of the endowments. The initial endowment can, therefore, be considered to have a major impact on overall utility in term of loss aversion.

Krutilla (1967) goes on to suggest, what we would now understand to be, a precautionary approach to conservation policy suggesting "scientific preserves" (Krutilla 1967 Pp 785). Most interestingly for the current research (and our noble proposition) Krutilla identifies that significant research is required to allow the environment to be considered in 'benefit-cost' analysis. There has obviously been much research on the topic of the environmental resource since Krutilla wrote his article but the central tenet, that environmental goods should be considered in the decision making process as they have significant value, remains the same. However, the phraseology and jargon has moved on with concepts of Total Economic Value now reflecting this need for non market aspects of environmental goods to be considered. Given that decisions are often made on a cost-benefits basis, so that both market and non market elements can be considered in a consistent framework, there is a further requirement that environmental goods are quantified in such a way as to be included in this structure, i.e. a monetary value of the benefits be calculated. For these reasons

[4] In that no move to make an individual better off can be achieved without making someone else worse off.

[5] That is an aggregate of individuals' utility taking into account one allocation of property rights will be inferior to another allocation which takes into account the impacts of loss aversion, unless the initial allocation is both socially and Pareto efficient.

environmental valuation, whilst at times potentially flawed and inaccurate, has become central to the decision making process to the extent that major policy (e.g. The Water Framework Directive (Hanley et. al. 2006)) now require that social costs and benefits be considered.

1.5 Total Economic Value, Use and Non-use Value

The analysis presented below to answer the thesis focuses on particular functions of the upland landscapes of the UK: namely some aspects of the non-use and use values associated with landscape features and related biodiversity. However, this is clearly not the full extent of the value derived from upland ecosystems by the public; in order to identify this consideration of Total Economic Value is required. Total Economic Value (TEV) is the total benefit people perceive they receive from a system or good such as ecosystem services from upland landscapes. TEV is made up of both use and non use values. Use values are made up of: consumptive direct use values, non-consumptive direct use values and indirect values. Non-use values (Krutilla 1967) cover: existence, bequest, altruistic, option (Weisbrod 1964) and quasi-option (Hediger 1994) values. For the current research it is sufficient to say that for use values a range of revealed and stated preference valuation techniques exist, however, if you wish to measure non-use values there is a need to adopt stated preference techniques.

1947 was a relatively important year for the inception of environmental valuation as both the revealed preference (through travel cost) and stated preference (through contingent valuation) methods were first proposed. Harold Hotelling in a letter to the US park service in this year outlined the idea of travel costs (Perman et al

2003) whilst Ciriacy-Wantrup (1947) first outlined contingent valuation with the publication of the idea that one way to value public goods (in this case the siltation of streams) would be to ask the public (Cited in Portney 1994)[6]. However, it took over a decade before either approach began to be applied in academic research and the valuation of environmental goods was not common until the 1970's (Bateman and Willis 1999).

There has also been an increasing literature relating to the ways in which decisions are made and the implications for appropriate valuation techniques. In making decisions individuals often rely on heuristic principles in order to deal with complex or unfamiliar situations (Tversky and Kahneman 1982 in Kahneman, Slovic and Tversky pp 3). These rules of thumb can prove to be useful in many everyday decisions but can lead to "severe and systematic errors" (op cit). Tversky and Kahneman note that distance is one such example where heuristics can lead to bias. I found just this when a younger version of myself was travelling in the Australian outback where at night I consistently pulled into the side of the single track road several minutes before an approaching vehicle reached me. I was basing this decision on the heuristic rules of thumb developed whilst driving on the twisting roads of Scotland and Northumberland rather than the wide open spaces of Australia.

There has been an increased focus in the literature on the evaluability and comprehension of information presented in stated preference valuation exercises

[6] Although others (e.g. Hanley and Spash 1993) claim the theory was not developed until much later by Davis (1963) and Haneman (1992) claims it empirically stems from a 1958 US National Park Service funded study.

(Hsee 1996, Bateman et al. 2002, Mathews et al. 2006). In reference to environmental attributes Bateman et al. (2009) used 'virtual reality visualisation' in order to identify what role heuristics play in the evaluability of environmental attributes. Working on the topic of coastal landuse they used Choice Experiments to elicit student's willingness to pay for (virtual) changes in attributes such as reserve area and flooded area.

1.6 Ecosystem Services of Upland Landscapes

Total Economic Value estimates require that something is present which can be totalled across, in relation to the environment this can be based upon man made boundaries such as those demarking the edge of a protected area. However, generally these boundaries are, at the very least, significantly influenced by natural definition of landscapes; that is they tend to identify transition in ecosystems. As such the analysis of Total Economic Value is often associated with another concept of ecosystem service values. That is an analysis of the services an ecosystem provides. Ecosystems provide a range of 'services' which contribute either directly or indirectly to the economy, i.e. ecosystems provide inputs to the economy in a range of ways, including both market and non-market goods. The following section aims to place the current research into context in terms of the range of ecosystem services which upland landscapes provide.

The Total Economic Value of the uplands has a diverse base, however, the current research does not attempt to place a value on all aspects. It focuses on a limited set of these services.

Chapters 4 to 6 of this dissertation concentrate on the valuation of specific ecosystem services of the uplands of the UK; namely visual impact, accessibility and

biodiversity impacts of management changes (relating to, but not comprehensively analysing) the 'use and enjoyment' and 'biodiversity and wildlife' services presented below. However, this is by no means a comprehensive analysis of the value derived from the ecosystem services of this valuable national resource. In the setting of the uplands of the UK there are a range of ecosystem services which go to make up the Total Economic Value of the landscape. However, it is possible to construct a theoretical methodology by which a measure of the Total Economic Value could be derived which will place the research which follows into context.

The following section sets out a theoretical methodology for the valuation of key ecosystem services of the uplands as identified by Haines-Young et al (2008) using a Bayesian Belief Network. There are some doubts about the efficiency and theoretical background of this methodology, Barton et al (2008) found that the cost of achieving reliable probabilistic data and meta-model validation procedures offset the benefits of interdisciplinarity and integration of methodology. However, the results adopted here are from the initial stage of the research and can be considered in the context of expert witness testimony. Seven main ecosystem services were identified:

1. Use and enjoyment of the environment *(Non-use values should also be included in this heading)*
2. Downstream drinking water quality
3. Flood protection
4. Greenhouse gas storage
5. Food and fibre industry support
6. Renewable energy potential

7. Biodiversity and wildlife

There are obviously a range of techniques which can be used for the valuation of ecosystem services. In particular where non marketed goods (or indeed bads) are being considered there has been a significant body of research which has built up since the late 1940s, as was identified above. Coverage of these techniques can be found in any good environmental economics text (Hanley and Spash, 1993, Perman et al, 2003 etc.) as such a basic understanding of these methodologies is assumed. The information below gives details of upland ecosystem services and approaches which could be used in relation to the valuation of each and some of the associated drawbacks. As such it sets out a possible valuation framework with some notes on issues which would have to be considered for each of these ecosystem services. This is by no means a comprehensive list but is an initial starting point for the valuation of services derived from the uplands of the UK.

1. *Use and enjoyment of the environment :*

Stated preference methods, in particular Choice Experiments, are perhaps the best option. Alternative or complementary methods which have been adopted in the past include travel cost and hedonic pricing. Values are generally location specific but in some cases benefits transfer may be effective. The current research also investigates non use values which have not been appropriately included in Haines Young et al's summary of ecosystem services (unless you take a very holistic view of the meaning of enjoyment); the only approaches applicable to this group of values are stated preference techniques. Other factors of the use and enjoyment of the landscape are extractive recreational activities, hunting mainly for deer or grouse, given that these

activities are often marketed a value can be derived from this market good.

2. *Downstream drinking water quality*

The benefits of upland management changes can be identified in terms of a range of downstream impacts. Actual water treatment or dredging costs are measures of ecosystem service value which can be used (Sarker et al 2008) but there are many associated impacts from smell to increased biodiversity and recreational opportunities. Work is currently being carried out by various water utilities (e.g. a Yorkshire Water and the University of Leeds joint project and Northumbria Water see http://www.nwl.co.uk/Teeswatercolourproject.aspx). They hope to identify win win scenarios (net gains) where water utility companies can cost effectively impact on water quality (in particular water colour) and treatment costs through promoting changing land management practices in watersheds. Given EU water quality standards most drinking water in the UK is treated in the same way to reduce public health impacts[7] (either through ultraviolet or a fixed dose of chemicals such as chlorine) irrespective of purity, however, particulate load impacts upon water quality in terms of colour. Treatment with chemical coagulants is currently standard practice; however, altering land management practices may be a more cost effective approach. Choice Experiments have been applied to value potential changes in several catchments. Work on benefits transfer between catchments (see for example Hanley et al 2006a and Hanley et al 2006b) show that the transferability of benefits is likely to

[7] Although this is not always effective, the 2002 cryptosporidium outbreak in Glasgow, leaving 160,000 households requiring to boil all water for consumption, was thought to be caused by high runoff in uplands washing animal faeces into the water supply but the fact the Milngavie treatment works is the only one in the country which does not have a filtration stage as part of the treatment likely did not help (Willis 2002, http://www.scotland.gov.uk/Publications/2003/10/18341/27841).

be case specific but this can be improved by appropriate design and site selection (Colombo et al 2008).

3. *Flood protection*

The valuation of flood protection can be approached in different ways. Insurance markets are relevant but often incomplete as in expectation of major increases to flooding frequency, insurers can stop insuring. Norwich Union and the Environment Agency, amongst others make flood risk maps available for the calculation of insurance costs, these would also allow some hedonic analysis of house prices related to flood risk (e.g. Pope 2008 shows 4% lower house prices in flood zones in North Carolina). The "Multi-Coloured Manual" (FHRC 2003) describes how to calculate flooding losses to agriculture – ranging from one-off events to complete cessation of agriculture due to regular flooding. Another option (used by the Environment Agency and others) is to look at the reduction in capital and maintenance costs for flood defences – i.e. the opportunity cost of reducing "raw" flood risk is that they have to spend less to hold the actual flood risk constant (e.g. 1 in 100 years). As ever, stated preference methods could also be used (and may be the only method for some impacts, such as stress associated with flood risk). The methods are generic, but actual values will be highly location specific.

4. *Greenhouse gas storage*

There are three main options: use of official UK government figures, use of marginal damage estimates from meta-analysis, or use of market prices for carbon under the ETS. All are fairly straightforward in terms of valuation (except that forecasting future

carbon prices is harder). What's more of an issue here is the method for calculating GHG emissions/storage under management scenarios, and setting the baseline.

5. *Food and fibre industry support*

Food and fibre can be valued using market methods, but it is necessary to take account of market distortions, in particular agricultural subsidies. Guidelines exist for doing this in flood appraisal for example (Multi-Coloured Manual, FHRC 2003) and can be transferred to upland agriculture. Associated industry could include employment and local expenditures. The economic impacts can be valued using shadow values for employment and multipliers for local expenditure – although the social value of the activity, for example in terms of community cohesion, may be significant and would need separate assessment. There may also be secondary impacts to consider – for example transport emissions associated with food and fibre outputs and inputs. There is also a key interaction between climate change, suitability of different landuses and GHG storage in soils. This is perhaps not as pronounced in upland landscapes in the UK as much of the agricultural activity relies upon livestock rearing (although stocking density can impact on GHG storage through overgrazing or trampling). However, in the valley bottoms arable agriculture is present and this may expand under climatic change. Relationships are complex with a likely shift to new land uses and crop varieties (see for example Brown et al. 2000), meta analyses will be the most appropriate technique to identify likely changes to incomes to this sector to 2050. Impacts at the landscape scale can have social impacts, stated preference techniques could appropriately estimate the associated value.

6. *Renewable energy potential*

Market values can be used for energy, though there are traps to avoid; for example electricity should not be valued at the price to consumers, but at the much lower cost of displaced generation (DECC 2008).

7. *Biodiversity and wildlife*

Possible techniques range from methods based on agri-environment policy payments and methods based on particular indices of biodiversity (such as the Farmland Bird Index) to stated preference methods applied to habitats. Double-counting can be a problem – respondents in stated preference surveys, for example, may not be able to differentiate between the value of biodiversity/wildlife and the value of the general environmental quality supporting it.

This is obviously a simplified analytical framework drawn from a full analysis recently carried out for the UK's uplands (EFTEC Tinch et al 2009). The focus of the research presented in this dissertation is not the valuation of the uplands per se but rather to gain insights into some of the issues associated with valuation and policy development using the upland landscape as a case study.

This research also relates to the ecosystems approach to valuation. That is it can be seen to overlap with other efforts to place value on aspects of ecosystem services. Major research has been carried out in order to try to identify appropriate values to allow ecosystem services to enter the policy environment in an appropriately indexed manner. It can be identified that such an approach goes back to the work of Costanza (et al 1997) which aimed to place a value on the services of ecological systems (ecosystem services) and the natural capital stocks which underlie them

(ecosystem functions). Later the UN commissioned the Millennium Ecosystem Assessment (MA) initiated in 2001, aimed to "assess the consequences of ecosystem change for human well-being and the scientific basis for action needed to enhance the conservation and sustainable use of those systems and their contribution to human well-being" (www.millenniumassessment.org). Over 1360 experts from across the world were involved in the MA and the findings and outputs identify the 'condition and trends in the world's ecosystems and the services they provide (such as clean water, food, forest products, flood control, and natural resources).

Some proponents of the ecosystems approach to valuation suggested that the MA was too adventurous in attempting to identify global ecosystem services due to their diversity and that the level of focus was therefore lacking from a policy perspective. This argument in part led to the UK National Ecosystem Assessment for the UK, a piece of work which is currently underway (and that the outputs of the current research in part inform) is aimed at identifying trends in UK ecosystems and appropriate economic values to assign to the changes suggested by those trends (www.uknea.unep-wcmc.org). Other research such as The Economics of Ecosystems and Biodiversity (TEEB, www.teebweb.org) is attempting to again take a more global perspective to the issues.

Currently there is significant ongoing effort to place a value on the ecosystem services; the current research is already providing the potential to inform some of these efforts. The main aim of the research was to investigate divergence in preferences based on the outcomes of behavioural psychological analysis of said preferences. However, the values derived may have policy relevance (and have

already fed into the wider policy literature see Eftec Tinch et al 2009) as such, in appendix 4, some analysis of the policy relevance of the research is suggested.

1.7 Summary of Analytical Chapters

The section below identifies the analytical approaches adopted throughout the rest of this dissertation.

1.7.1 Decision Making in Multifunctional Landscapes

Chapter 2 investigates the issues addressed by the thesis from the perspective of decision makers. It diverges from the following chapters in that it does not attempt to value the environmental resource in question (UK uplands). Rather it aims to identify the perspectives of stakeholders and the way in which they consider historical processes to have impacted on a resource.

A grounded theory approach (Glaser and Strauss (1967)) was adopted which allowed the main impacts on the environmental resource to be identified, providing a useful background to the uplands of the UK, which the remainder of the dissertation focuses on. The grounded theory approach also allowed identification of where stakeholders' perceptions of drivers of environmental change diverge from true events. This, it is found, has implications for the appropriate application of policy to the uplands of the UK including possible implications for the valuation of these environmental resources. Chapter 2 additionally has implications for the understanding of the results derived in the subsequent chapters: given all are involved with the valuation of upland landscape features. This chapter is thought to be the first application of the grounded theory approach to an entire landscape using stakeholders.

The third chapter sets out the methodology which is adopted to continue answering the thesis. This methodology is adopted in Chapters 4, 5 and 6. Firstly the use of Discrete Choice Experiments as a tool for environmental valuation is discussed. Then more details of the specification adopted through the remainder of dissertation, the error component model, are given. Finally, tests of transfer error which are used to compare across willingness to pay (WTP) estimates from different treatments are discussed.

1.7.2 Decisions, Experience and Memory

Chapter 4 perhaps deserves a fuller explanation as it is an entirely novel approach[8] expanding on the work of Kahneman and Sugden (2005) who, as was discussed above, identified that there were major issues with the traditional welfare economic basis for environmental valuation.

> *"for most environmental goods experienced utility is surely a significant contributor to their social value."* (Kahneman and Sugden, 2005)

How to measure moment based utility as a snapshot of experiential impact on willingness to pay:

Firstly many of the critiques of stated preference valuation techniques identified by proponents of experienced utility (presented above and expand upon in Chapter 4 and Appendix 1) are based upon the contingent valuation technique. Choice Experiment

[8] It is thought that the research presented in chapter 4 is the first attempt to identify the impacts of experience and memory based measures of utility as identified in the behavioural psychology literature to environmental goods.

methods approach valuation in a different way; they do not have such issues with modulus[9], are related to multi-attribute utility theory and use a rate of substitution to elicit value. In designing the experiments reported in Chapter 4, where we begin to analyse the impact of experience, a site was chosen where an environmental composite could be constructed from visible landscapes matching each choice set. As such potential future changes to landscape characteristics could, in essence, be experienced. Brook (1998) describes how an observer can become immersed in the landscape and observe more than the aesthetic. Therefore, a comparison of Choice Experiment results before during and after visitation to the site gave a measure of the impact of experience and memory on utility, and can be seen as a measure of instant or moment based utility.

Whilst elicitation of pure happiness was not the goal of the research this can be seen to be central to Kahneman's approach to moment based utility. However, measurement of happiness is the major stumbling block to the practical assessment of moment based utility for environmental goods. The research presented in Chapter 4 aims to identify what, if any, impact experience and memory have on utility as measured through willingness to pay, whilst Kahneman and others may not be happy with this compromise, it is necessary to examine this subject in a reasonable cost and timeframe. It is thought that, due to the issues of identification of moment based utility through retrospective or proactive approaches, the approach adopted in

[9] That is a reference point against which to assign relative values to alternatives the absence of which is often considered a major drawback of open ended CV surveys.

Chapter 4 will not only yield interesting results but suggest whether fuller and further investigations of the issues of experience and the environment are required.

1.7.3 Heuristics, Bias and the Impact of Additional Information

Chapter 5 expands on the workshop / citizen's jury structures adopted to investigate the issues raised in Chapter 4. It was found that within this structure there was the potential to investigate further issues without additional cost. It was apparent that an appropriate way in which to maximise this potential was to investigate the impacts of information upon the heuristic processes of individuals'.

Like the research presented in both Chapter 4 and Chapter 5 Bateman et al (2009) identified that repeated Choice Experiment treatments including experience may impact upon willingness to pay estimates. However, they identified that the dominant cause would be the reduction in need to rely upon heuristics and did not actually analyse if experience itself was the cause of any change (i.e. if heuristics developed / adapted during experience continued to impact on willingness to pay afterwards).

In their research Bateman et al (2009) conveyed information virtually rather than the landscape matching approach adopted here. However, as was identified above, they assess heuristics and bias reduction as the key driver of any change in willingness to pay or indeed in the variability and level of asymmetries in willingness to accept, willingness to pay interactions. Whilst the design of the experiment in Chapter 4 does not allow for the testing of willingness to pay – willingness to accept anomalies (as there are insufficient levels over which to run such analysis) the additional treatments in the current research allow analysis of whether memory impacts on

preference for landscape attributes. If such impacts are found then it would seem apparent that any change is not the result of changes to heuristics developed as individuals gain a fuller and more representative knowledge of the environmental good being valued, but are instead a result of a divergence between decision, experienced and remembered utility.

However, it was considered that heuristic rules may be playing a role in the valuation process and that these rules were likely developed based upon the information which individuals had available to them. One issue of stated preference valuation approaches is that decisions are based on (necessarily) simplified information presented to participants. In Chapter 5 we more fully analyse the impacts of additional information on the values associated with environmental resources. This is carried out through expert witness testimony upon three aspects of the research which were simplified due to the complexity of information and the appropriate presentation of that information. By forcing heuristic rules on the participants of valuation exercises the results are in some way guaranteed to be biased. This chapter looks at how more complex information on ecosystem services impacts on the values derived from environmental valuation exercises.

1.7.4 Divergent Preferences and Association.

The final analysis presented in this dissertation (Chapter 6) is an analysis of divergence in preferences between groups with different association to an environmental resource, in this case again the uplands of the UK. There have been a number of previous studies which have identified differences in preference for example: Jones et al (2000) and Hanley et al (2003) for local residents and visitors; and Gomez-Limon and

Fernandez (1999) and van de Berg et al (1998) who also analyse the preferences of farmers. Given the evidence from the literature the current research also aimed to look at divergence in preference between locals, visitors and farmers, however, with certain extensions.

Based on the information presented above and the results of investigation into the impact of experience on utility for local residents presented in Chapter 4 we wished to analyse if experience appears to impact on visitors' willingness to pay, although the same workshop approach was not possible. In order to achieve this information on the stage of the visit was collected to identify if the preferences of individuals who had recently visited an environmental resource were divergent from those whose visit had not yet occurred. Also, we wished to identify if relationship (either physical or perceived) to an environmental resource influences preferences.

1.8 Discussion

The research presented in the next five chapters has various implications for policy. In particular there are messages which can be drawn out for environmental valuation in the future. Multifunctional landscapes by their nature have a range of ecosystem services associated with them which makes calculation of Total Economic Value complex. However, the findings of the research presented here suggest that even attempting to value a simplified set of the ecosystem services of multifunctional landscapes is not an easy option.

It is found that additional information on ecosystem service interactions impacts upon the values derived for individual services. Additionally it is found that experience and memory both have impacts upon values associated with ecosystem

services, this has implications for the way in which valuation is conducted, and indeed how previous valuation efforts are considered. Finally, individual association with an environmental resource is found to impact on the values associated with that resource. This is found to have implications for policy analysis, whose preference for environmental resources are we trying to optimise, in particular once socio-ethical considerations are taken into account. Finally in the discussion chapter we identify limitations of the current research and possible extensions to and future directions for research.

Chapter 2[10]: Historical Perspectives on the Development of Multifunctional Landscapes: a Case Study from the UK Uplands

2.1 Introduction

This chapter aims to firstly set out details of the case study area which provides the background to all of the analyses presented in this dissertation. However, in doing so it presents additional analysis of some work undertaken in the early stages of this PhD aimed at an analysis of the history and related processes which have influenced management in the National Park.

Identification of the most likely outcomes of policy alternatives is required to improve the management of multifunctional landscapes (and to suitably ground valuation attributes). Policy analysis is traditionally based upon assumptions of economic rationality in decision making. However, the concept of economic rationality is a simplifying assumption in neo-classical economics. Brueckner (2007) shows that an assumption of economic rationality in policy development for multifunctional landscapes limits the viability and acceptability of policy alternatives. A fuller understanding of 'matrices' of decision-making objectives of land managers is likely to significantly improve policy design.

Land managers' decisions will, in part, be based on their understanding of the history of the development of landscapes. In turn, the actual impacts of policy will be driven by how farmers and land managers react. That is, policy implications are

[10] This Chapter is based upon Tinch et al 2009, as discussed in the preface a number of the authors provided editorial input and a small amount of the text relating to the background of the Peak District study area was directly provided by Paul R Armsworth. As always all errors or emissions remain my own.

derived from the behaviour of the individuals involved in implementation, and those individuals' decisions will be formed, in part, based on the perceived history of the formation of landscapes.

This brings us to the aims of this chapter, which are threefold. First, we aim to gain insights into how multifunctional landscapes develop. Then we aim to explore how multifunctionality of landscapes is perceived to have developed by stakeholders. Finally, we investigate the impacts of those perceptions about landscape development for valuation and Cost Benefit Analysis studies.

We use the Peak District as a case study. We adopt a Grounded Theory Approach and present results from a workshop exercise involving key stakeholders in upland management. Grounded Theory Approaches do not give statistically testable results but allows tentative conclusions to be drawn. Applied to economics, perhaps the greatest weakness of the approach is that it does not 'fit' in the traditional underpinning in the logical deduction of experimental science. However, it is also a strength of the technique as it allows us to move away from the empirical description of economic phenomena towards the development of novel theory.

This chapter takes the following format; firstly we briefly summarise the Grounded Theory Approach, we then provide a background to the research being undertaken and introduce the case study in more detail. The later sections present the results of the research; firstly as an overview of the case study workshops, secondly as the outcomes of the research in terms of theory development and the implications for decision makers and finally we give our conclusions.

2.2 Methodology: The Grounded Theory Approach.

The Grounded Theory Approach was originally proposed as a technique by Glaser and Strauss (1967), from sociological research in the 1960s on dying in hospital. They felt that traditional research focused on theory verification rather than on the discovery of hypotheses for a research area. Grounded Theory has been extensively used in sociological research (LaRossa, 2005; Best, 2006), health economics (Walker and Myrick, 2006) and management science (Chernatony and Cottam, 2006; Binder and Clegg, 2007). The Post Keynesian School of economics, in so far as it follows the aims of critical realism, has argued for the use of the Grounded Theory Approach for the development of theories. Individuals' decisions in neo-classical economics are assumed to be based upon utility or profit maximizing behaviour. However, it can be argued that the decision making process is a more complex one based on anticipation of results, which are not always matched with experience (as will be discussed and shown in the Chapters 4 and 5). Anticipation is in turn based upon past experience, or – to put it more precisely – on perceptions of past experience.

In the case of the decisions of land managers in upland areas of the UK it is apparent that decisions will be based on expected outcomes rather than those which will actually occur. The Post Keynesian School holds that the 'real' economy is based in, and dependent upon, a historical process (Lee, 2002). Understanding how this process is perceived to operate is key to understanding how economic actors behave given "economic-social-political structures and institutions" (Lee, 2002, p790). Downward et al (2002) support this proposition by identifying that economic agents

are led to rely on structures and institutions in order to ease decision making by providing 'quasi-closure' of the decision system.

The research reported below aimed to identify which events, structures and institutions stakeholders perceive as having historical importance in the development of multifunctional upland landscapes. This allows us to posit theories of how stakeholders develop "causal relationships" (Downward et al, 2002, p493) and may lead to more accurate insight into stakeholders' potential reactions to future changes in policy. The Grounded Theory Approach is a predominantly inductive process where theory is based upon the results of data collection, rather than data being collected to support existing theory. Researchers must approach a problem with as little a priori bias as possible. This approach was adopted for the current research as it is useful for identifying the features and nature of processes of change. It is a predominantly qualitative approach, although some level of quantitative verification of posited theories is possible (however in the current study insufficient samples were held across which to more fully analyse correlations and the process adopted was an inductive one). It is intended to give researchers an understanding of meaning rather than statistically testable event regularities (Downward et al, 2002). It is an approach to research which allows the identification of possible processes where there is some uncertainty relating to exact nature of those processes. Given the uncertainties related to processes of management change in the uplands Grounded Theory was seen to have a relative advantage over other approaches which would have informed rather than been informed by the research.

Grounded Theory has previously been used in the identification of stakeholders' views of environmental features in rural England (Oreszczyn, 2000; Oreszczyn and Lane, 2000). This study focused on one element of the landscape, hedgerows, and people's opinions of their social and historical importance. Oreszczyn (2000) found that key stakeholders felt external to the process of change in regard to this single landscape feature. However, the current research is thought to be the first example of using Grounded Theory based on workshops of experts to analyse whole landscapes, and the history of the upland areas of the UK specifically.

Best's (2006) work on 'collective amnesia'[11] identifies that most of what happens is forgettable because it may go unnoticed, be judged unimportant, or be thought to only have significance in the short term. It is not possible that all events remain catalogued in everyone's mind as there is an ever expanding set of events. Time also has an important impact upon collective amnesia, with a significant 'recency effect'. Events in the recent past are most easily viewed within the full context of their impacts and are often thought to be of most importance in shaping current and future changes to a system. Collective memory can be considered as having a carrying capacity, i.e. a threshold of ability to support retention of information. Best (2006) identifies that this is particularly true as more and more events compete to be included in this capacity.

Lynam et al (2007, p3) identify three classes of approaches for involving stakeholder views and opinions in the decision making process:

[11] Best uses 'collective amnesia' as a useful phraseology rather than an attempt to medicalize the phenomenon.

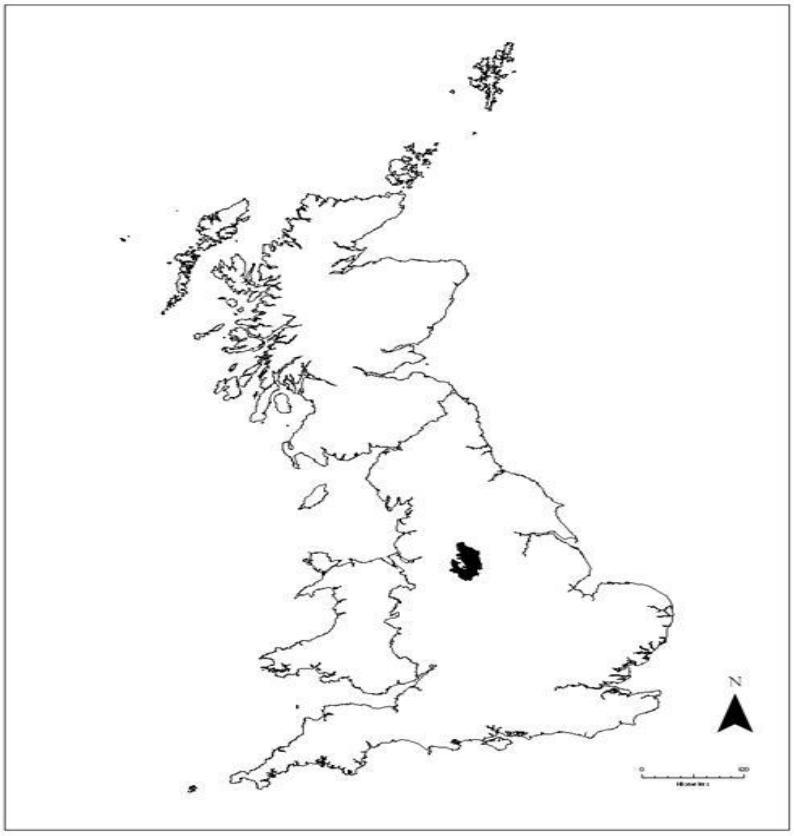
- Diagnostic and informing methods – aimed at the extraction of knowledge
- Co-learning methods – allowing perspectives to change as a result of the process
- Co-management methods – involving learning and inclusion in the decision making process.

The flexibility of the Grounded Theory Approach used in the current research allowed that the first two of these were achieved whilst, given that the participants of the workshops were chosen as key stakeholders involved in either the design or implementation of policy, the third was implied in this case.

2.3 Background

The moorlands of the Peak District National Park (see Figure 2.1) form the main focus for our research. The challenges in the Park are representative of those faced throughout the uplands of the UK. The dwarf shrub vegetation of moorlands is emblematic of the British uplands. Moorlands are semi-natural habitats shaped by centuries of human exploitation. The UK supports a large proportion of the global distribution of these habitats, including many unique community types (Ratcliffe and Thompson, 1988; Rodwell, 1991). Six heather moorland communities are virtually confined to the UK and Eire and seven more are better developed here than anywhere else (Ratcliffe and Thompson, 1988).

Figure 2.1 Location of the Peak District National Park in Great Britain



The ecological importance of the UK's uplands is reflected in their designation status: almost a quarter of the English uplands is designated as Sites of Special Scientific Interest (SSSI); seven of the eight National Parks in England and many Areas of Outstanding Natural Beauty cover upland areas; and the EU Birds and Habitats Directives and the Ramsar Convention also protect significant areas (English Nature, 2001). Despite their ecological value, large areas of upland habitat deteriorated throughout the last century (NCC, 1987; Tudor and Mackey, 1995). A recent government assessment of the ecological condition of SSSIs found that two thirds of the most valuable moorland areas in England are in an unfavourable condition (English Nature, 2005). An important policy requirement for upland management in the UK is therefore conservation of these semi-natural habitats.

National Parks in the UK are designated based on their multifunctional landscape characteristics. Housing and economic development continues within National Parks in the UK subject to restrictive zoning requirements. As a country where very few truly 'natural' ecosystems exist, active management is required to maintain the environmental quality of the semi-natural systems protected by the UK's National Parks. The Peak District epitomizes the multifunctional nature of the UK's National Parks providing services to a range of users, which place competing pressures on the landscape.

Production possibilities from agriculture in the uplands are tightly constrained by climate, topography and soil productivity. Livestocking, predominantly sheep farming, is the main farm enterprise. The local hill farmers in the Peak District constitute one of the most deprived farming communities in the country. Hill farms depend on subsidy support from the Single Farm Payment, agri-environment schemes and the Hill Farm Allowance (HFA), subsidy programmes that are undergoing major changes. Without subsidy support, net farm incomes would be negative (Peak District Rural Deprivation Forum, 2004; Acs et al 2010).

At the time of this research the CAP (Common Agricultural Policy) had recently seen a series of changes phasing out production linked support with a significant new emphasis being placed on environmental and rural development outcomes. 2005 saw the introduction of the Single Farm Payment scheme which replaced exiting livestock payments to upland farms, however, it is planned that this support scheme will be phased out by 2013. At the same time agri-environmental schemes and the Hill Farm Allowance are seeing a significant period of flux (Acs 2010). The form of the schemes

which will replace existing support to upland farmers is still unclear but is seems certain that they will be aimed at landscape and biodiversity enhancement (op cit).

Large areas of the Peak District moorlands are managed for shooting red grouse. Traditionally, this has been a somewhat exclusive recreational pastime. There is free public access to grouse moors for recreational purposes, such as walking. However, grouse shooting itself is only carried out by the land owner/the shooting rights owner. People then pay for a days shooting and the number of birds that they shoot. Management of moorlands to maximize the production of red grouse includes regular burning of heather, to ensure a supply of fresh shoots for grouse chicks, and predator control (such as foxes and crows) by game-keepers. Some grouse moors work alongside hill farmers as grazing tenants.

The Peak District is also highly valued for recreation more generally and lies within one hour's drive of a third of the UK's population. One of the main pressures on the countryside of the UK that has developed over the last century has been for increased recreational use. This has been driven by the additional free time and income available to the population of a developed economy along with improved travel opportunities. Tourism in upland areas is occasionally constrained by grouse moor management with restrictions and closures to encourage breeding or allow shooting during periods of the year.

In addition, the Peak District contains catchments and reservoirs providing water supply to a significant proportion of the UK population, including the cities of Sheffield and Manchester. The peat soils of the UK uplands also represent a significant carbon store (Worrall et al, 2003).

Upland areas of the UK are now identified as multifunctional landscapes in policy discussions. The focus for policy interventions has moved away from subsidisation of agricultural production to assign greater importance to the diversity of ecosystem services provided by upland areas.

Land managers' and policy makers' perceptions of the best way to 'preserve' the quality of upland areas are a key consideration in developing future policy. There has been significant debate regarding naturalness of systems when considering ecosystem management or restoration. Two main philosophies exist (Ridder, 2007): either naturalness should be based on no human intervention or it should be based on the system prior to a given date. The second of these assumes that human intervention and environmental restoration can improve upon naturalness and places an emphasis on the decision maker to determine the ideal previous state on which to base policy. Czech (2004) identifies a cut-off point of industrialisation for the definition of 'natural' for policy makers. Economic activity is the key driver in change away from natural systems, with industrialisation dominant in this process.

Policy makers must thus decide, given assessment of the feasibility, whether policy should be to preserve the current state, to return to a pre-industrial state or to return to a natural state without the impacts of humankind. The perceptions of key stakeholders of each of these states of nature may diverge. Perceptions of previous states of the upland systems of the UK have, therefore, started to take on an important element not just in the potential reaction to policy change but in policy design itself.

2.4 Case Study

The following sections of this chapter set out the results of research into how key stakeholders perceive the development of multifunctional upland systems[12] in the UK with particular reference to the moorlands of the Peak District National Park. The aim was not to identify 'actual' drivers of change to upland systems, but the perceptions of stakeholders regarding which drivers have been most important. The central tenet of the research is that any approach which, in considering the way future policy alternatives will impact, is likely to be inaccurate if it:

- Does not take a historical view of multifunctional landscapes; or
- Does not consider the perspectives of the individuals making management decisions.

The research involved experts from a range of backgrounds: farmers, gamekeepers, land owners and managers, conservation workers, local government and academics. This provided a rich resource of knowledge and experience from which the research hoped to gain insight. The Grounded Theory Approach used was based upon workshops in which participants were given a simple and flexible structure in which to operate. Three workshops were held with approximately 12 participants in each. These were held in the Peak District National Park where participants were drawn from those attending a conference. Responses were recorded and then the work of different groups was compared.

[12] Systems we include are physical, biological and social systems.

The workshop operated by splitting participants into groups and asking them to 'focus' on a key element of impact: agricultural, wildlife or social. This separation allowed that those events which had the widest influence upon upland systems would be identified by more than one (if not all) of the groups. That is, commonality of the identification of a particular phenomenon given different contexts gives a measure of the relative importance of phenomena (Downward et al, 2002). In addition, participants were asked to identify a historical timeline of impacts (a rough guide of post-1880 was given). This is because it is not possible to make 'ahistorical' statements about a historically contingent decision making process, since an understanding of the historical setting upon which decisions are based is essential (Lee, 2002).

Obviously this meant that much of the information given in the workshops relied upon knowledge built up over time and passed on through word of mouth or historical documents. Participants were asked to consider the reliability of sources. The nature of the sources was not always reported during the workshop, although secondary confirmation of accuracy has often been conducted. The approach relies on the assumption that individuals from different backgrounds will have divergent points of reference and relevance. By involving stakeholders from a range of backgrounds, alternate contexts could be raised in the workshops, recalling events which participants may have pigeonholed in their memory matrix as insignificant or of limited relevance.

It was also possible to identify where groups' responses diverged from each other and where areas of overlap fell. The 'collective amnesia' (Best, 2006) inherent in

any participatory approach looking at historical drivers of change in a bias towards the recent past was taken into account when considering the results of the workshops.

2.5 Summary of Workshop Activities[13]

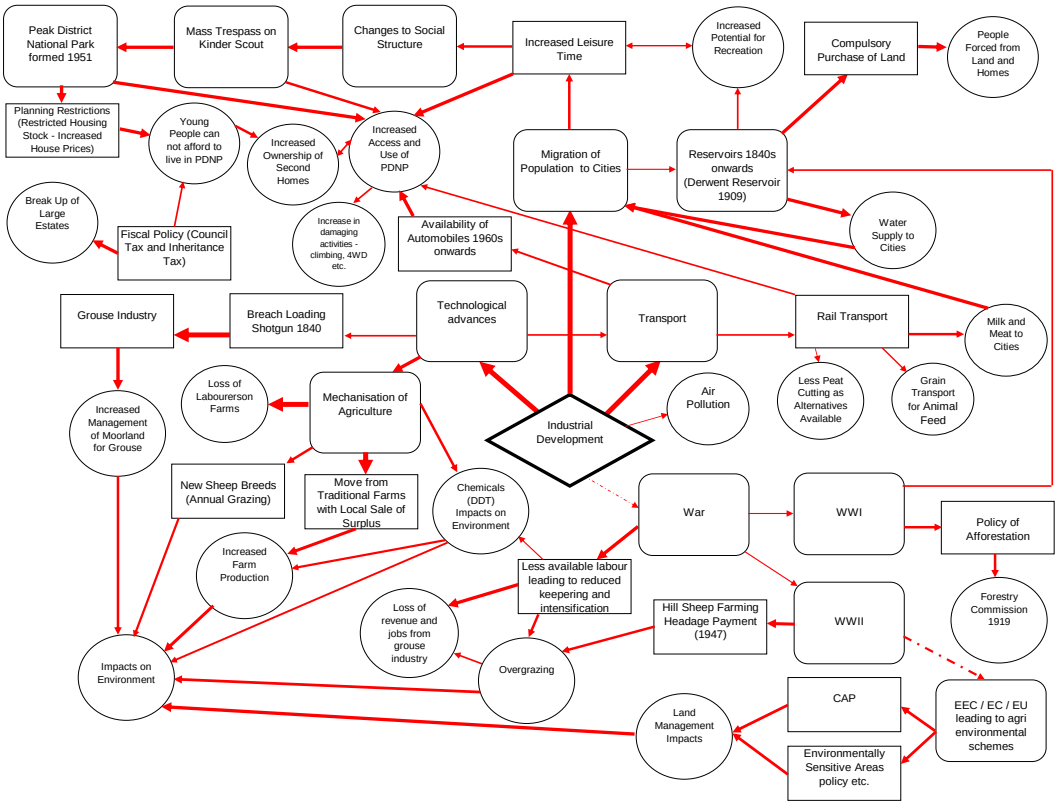
In analysing the results from the workshops, certain causal mechanisms and events stood out with other events clearly being triggered by these. This is particularly true of the changes brought about through industrialisation, which impacted both directly and indirectly on upland areas. The technological advances of the period such as the introduction of the breach loading shotgun and improved transportation directly impacted on upland management and usage. Industrialisation also triggered more general economic and social changes which brought about indirect impacts on upland areas.

Other key events identified include the two world wars, with the implications for increased production and reductions in available labour; changing social structure and leisure time; changes in agricultural policy, in particular the introduction of the Common Agricultural Policy (CAP), leading to incentives to intensify agricultural use of upland areas; and the formation of upland National Parks. Figure 2.2 below identifies a simplified diagrammatic representation of key events in the history of upland areas of the UK and the Peak District National Park. Figure 2.3 shows a timeline of the most important of these events.

[13] It should be noted that it has not always been possible to verify the information reported in this section. The intention of this exercise was to identify perceived impacts, and that is what is presented. This means that if the general consensus of land managers and those indirectly involved in policy development is not appropriately grounded in fact, then this 'common misperception' is a key result. The actions of these individuals will be based upon the information available to them and their perceptions of that information, not on a fully historically rigorous analysis.

It should be noted that the results presented in the sections and diagrams which follow represent the information derived from the workshops, that is stakeholders' opinions are being reported. Whilst much of this information is also "accepted scientific wisdom" and attempts to verify the information have been made the information presented reflects this stakeholder opinion. Divergence of these opinions from known fact is presented later in the chapter.

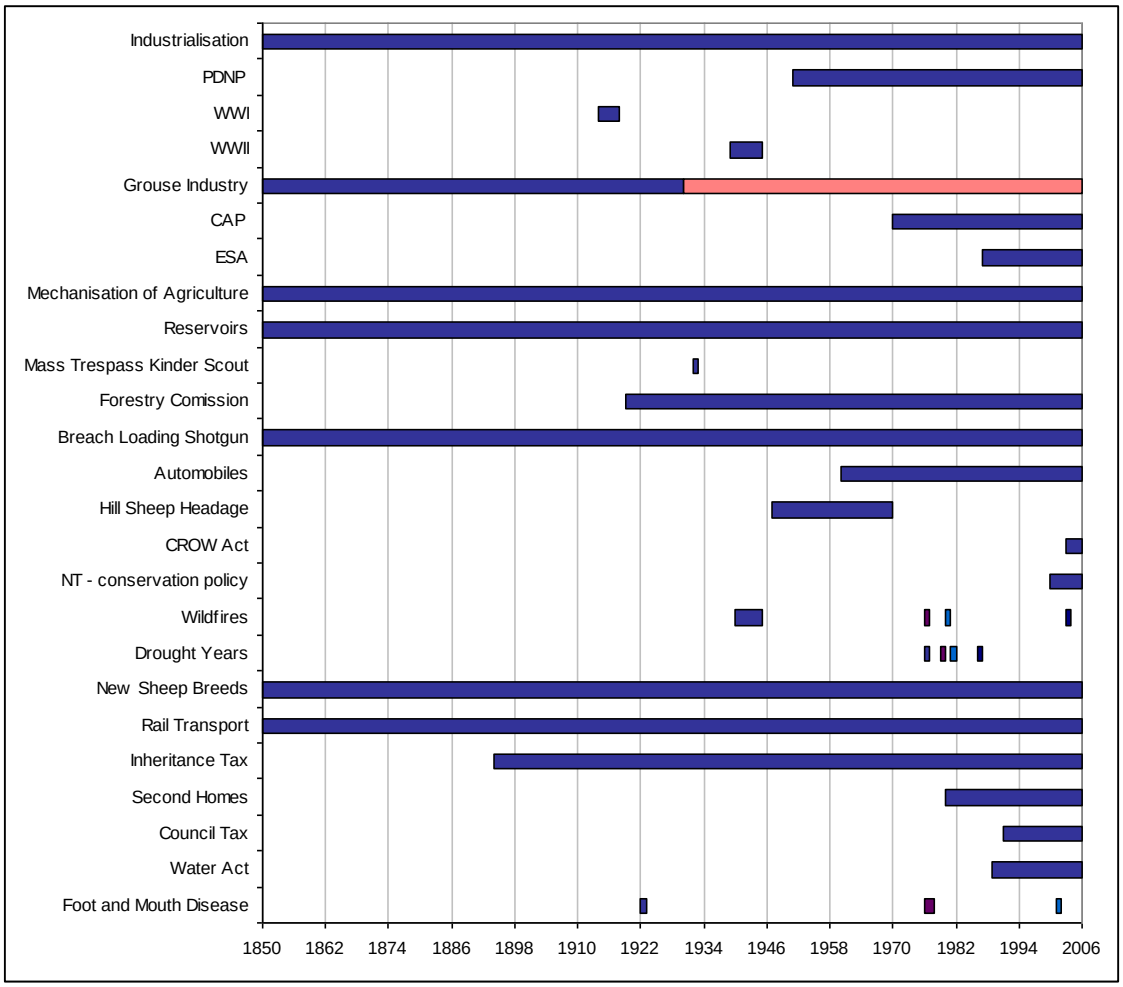
Figure 2.2 Events in the development of the multifunctional landscapes of the Peak District National Park and UK uplands



Notes:

Diamond: key driver; *Rectangular cells*: drivers of change; *Rounded Rectangle*: processes (elements of both drivers and impacts); *Round cells*: impacts. Size of arrow represents the researcher's opinions of relative importance.

Figure 2.3 Timeline of Key Impacts



Notes:

With the exception of the Mass Trespass on Kinder Scout (impact indeterminate) bars show the length of impact. The Y axis shows the relative importance of each event (researchers opinion based on overview of research).

Grouse Industry: blue increasing, red declining.

2.5.1 Industrialisation and Infrastructure Impacts

The process of industrialisation in the United Kingdom, by its very definition, brought about changes in social and economic structures in the country. This was particularly true for upland areas where much of the population lived a subsistence lifestyle from which industrialisation offered a potential release. This process continued throughout the time frame of this analysis, with increased intensity in agriculture reducing the need for labour inputs. This released potential labour for industrial processes whilst

agricultural output increased, providing the potential to support a growing urban population. Drivers also operated in the other direction, e.g. during the war years intensity of agricultural management (i.e. mechanization and chemical input) increased to compensate for labour shortages.

Key to the process of industrialisation were infrastructural developments. The increasing population in the cities was supported by: the development of transport infrastructure, which allowed food and milk to be transported to centres of population; by the construction of reservoirs to supply water; and by the mechanization of agriculture. Additionally, increased leisure time and the potential for recreation allowed tourism to develop as an industry.

Reservoirs built in upland areas are of great importance in the Peak District, and this is particularly true of the Derwent Valley, because of the area's high rainfall and the relative absence of settlement in the moorland landscape. These reservoirs were needed to allow the continuation of the development of the cities surrounding the Peak District National Park, in particular Derby, Sheffield, Nottingham, Manchester and Leicester. The various reservoirs acts around 1850 promoted development, particularly the Howden Reservoir in 1912, the Derwent Reservoir in 1916 and the Ladybower Reservoir in 1947 (which marked a policy to build one large rather than many small reservoirs).

2.5.2 Key Social Impacts

The dominant social impact upon the Peak District has been the process of industrial development in the United Kingdom. Much of the surrounding geographical area was at the centre of the industrial revolution, with shifts to heavy industrial production.

This process brought about changes to the social structure of the UK. Previously, the upland countryside was predominantly the preserve of the elite and their tenant farmers. However, the wider population sought political empowerment through action such as the Mass Trespass on Kinder Scout, over 75 years ago. Kinder Scout is one of the local summits, a gritstone plateau, upon which ramblers wilfully trespassed and clashed with game keepers in 1932. This single action was identified as key in the development of the National Park movement in the UK.

Changes to the agricultural sector, along with the increase in water provision brought about through the creation of reservoirs, allowed the population of the UK to increase. As greater workers' rights were achieved additional leisure time was available to this rapidly increasing population. This created increased pressure for use of the uplands of the UK. More recently the Countryside and Rights of Way (CRoW) act (2000) has further legislated for increased rights of access to upland areas (Mountain, Moorland, Grassland and Heath) for the population of England and Wales.[14] The act was wrongly identified as the CRoW act (2003) in the workshops. This inaccuracy in recall of events is likely to be due to the element of the 2000 Act of Parliament most relevant to the workshop participants, i.e. the right to roam on uncultivated land, which was only implemented in 2003.

The economic impacts of the National Park's designation were also considered to be important. The creation of the National Park restricted housing development, leading to increased house prices and a decline in the 'local' population. Key to this

[14] Scotland has a tradition of much greater access to outdoor resources, the 2003 Land Reform Act granted the right to total access to the countryside.

comment by workshop participants is how the local population is perceived. The overall population of the National Park has remained relatively constant for some time. Increases in the numbers of commuters and second home owners, however, have reduced the numbers of individuals whose livelihood, and resultant identity within the community, are locally generated.

World War II led to large areas of the Peaks being farmed more intensively, and various areas of the Park (e.g. around Broomhead and Langsett) were used as military training ranges and firing ranges. World War II was a particular driver of the decline in game keepers, witnessed between the 1930s and 1950s. Many estates were broken up post war and the number of gamekeepers halved from 1935 to 1971. This was contrasted to the late Victorian era when the numbers of keepers was at its highest ever level.[15] Game keepers play a key wildlife management role in upland shooting estates, and often this involves the removal of species that prey upon red grouse.

2.5.3 Key Agricultural Impacts

Agricultural developments were identified as being driven by the mechanization of agriculture, along with changes to grouse moor management. Before 1900 the development of agriculture was made possible through drainage of lower-lying land, allowing farming to move into the valley bottoms in upland areas. In addition, there were extensive common grazing lands, the areas of which subsequently declined across the UK and in the Peak District. The dominant process throughout the period since the 1930s has been an increase in sheep numbers (trebling between 1930 and

[15] The Victorian era lasted from 1837 until 1901 during queen Victoria's reign.

1976, Anderson and Yalden, 1981). Partially as a result of this increase the 1950s onwards saw a reduction of cattle on the moors which in turn led to an increase in bracken. There has been a general reduction in agricultural mix towards 'sheep ranches', especially with the introduction of new sheep breeds to upland areas. Wool production was significant until the 1950s and 1960s as mutton rather than lamb production was common.

The increased productivity from agriculture was permitted in part through additional chemical inputs. This contributed to a loss of wildflower meadows. Additionally, there was an increase in non-degradable pollutants, such as DDT, in the environment. This was referred to in the workshop as the 'Silent Spring'. This reference is based in US environmental terminology (Carson, 1962). The choice of language by UK stakeholders suggests that participants may be subject to moulding by cultural learning. Memory and decision matrices can be influenced by evocative language as well as by local events. Carson identified that the way in which chemicals were being used was impacting on the environment and in particular bird species. The title of the book refers to a *theoretical* outcome of chemical use where no birds remained to sing, the fact a 'silent spring' was identified in the workshops further supports this moulding of memory.

From the 1970s onwards EC agricultural policy had a major impact on how farming was undertaken, and on the value of production. Production and improvement grants through the CAP began to be reduced with the introduction of agri-environment schemes in 1986. The perspectives of workshop participants on the effectiveness of the Environmentally Sensitive Areas (ESA) scheme, introduced in

1987, were mixed. Some reported that ESA agreements had been the biggest driver for decreases in sheep production. However, these participants also commented that this reduction led to an increase in heather burning for red grouse shooting. It was not made clear by participants whether this was essentially a replacement of one economic activity with another or because burning is needed in the absence of a 'service' provided by sheep in maintaining the young shoots grouse prefer. Other participants remarked that there had actually been an increase in upland grazing intensity in the past 10-15 years, leading to vegetation loss and erosion. New agri-environmental (environmental stewardship) schemes such as Entry Level Stewardship (ELS) and Higher Level Stewardship (HLS) schemes, along with the Sustainable Catchment Management Programme, are considered by participants to have led to improvements in environmental management of the Peak District and more generally the upland areas of the UK.

2.5.4 Key Wildlife Impacts

The mechanization of agriculture had a major impact on wildlife, leading to shifts in species assemblages as landscapes were impacted. One such identified outcome, the almost total disappearance of small oat fields, was brought about by a fall in the number of horses and ponies in the upland areas of the UK. This led to the loss of habitat for a range of species. Equally, new habitats have been introduced, with reservoirs being identified as the key example, allowing greater infiltration of ducks and gulls to the area. DDT was also identified as having had a key impact on certain bird species, through thinning of egg shells, leading to huge decreases in numbers of birds. A combination of the banning of DDT and the 1981 Wildlife Countryside Act

(SSSIs) was thought to be responsible for the recovery of merlins, peregrines, buzzards and ravens in the last two decades.

Participants noted that black grouse have become extinct in the Peak District National Park due, in part, to shifts in landuse away from management solely for shooting of red grouse (a different species). Since the 1992 Protection of Badgers Act, unsurprisingly, badger numbers were noted to have increased significantly. Pollution reduction was related to the return of some mosses and lichens, and the removal of cattle from the moor to increases in bracken cover. The reduction of keepering effort outside grouse moors since the 1930s is perceived to have contributed to the impact on bird species, for example through the increase in magpies. Introduced species, in particular grey squirrels and red deer escaped from Chatsworth Estate[16], were also mentioned as having an impact.

Changing land management practices were brought about through ownership shifts to agencies such as the National Trust, Forestry Commission and water utility companies. A recent change to National Trust policy in particular was identified: tenant farmers were previously only expected to pay rent, but there was a policy shift to encourage environmental improvements on these lands.

2.5.5 Key Omissions

Perhaps as interesting as what was said in the workshop was what was not said. Should the researchers have approached the workshop activities with pre-existing

[16] Home to the Duke and Duchess of Devonshire in the Peak District, Chatsworth Estate had a policy of shooting escapees from the captive herd but some survived.

theories about key impacts, and used their roles as facilitators to lead the direction of the workshop discussion, a number of events which form existing theories may have seemed to be of some importance. By allowing the participants in the workshops free reign to identify those events they perceived to be most important it was made possible to avoid the strictures of existing theory. This subsection describes the events that were not, or those that were only marginally mentioned in the workshops, and which, as such, were outwith expected results from literature and theories.

Interestingly, the decline of heavy industry in the area, including the winter of discontent (1978-1979) and miners' strike of 1984-1985, was not mentioned in the workshops. From this we can conclude that the important impacts have arisen from the overall patterns of social change brought about through the process of industrialisation, rather than by individual events within this process.

Foot and mouth disease was specifically mentioned in the workshops as being insignificant in anything but the very short term. Indeed the significance, as identified by land owners and managers, was the effect on the local economy brought about by reductions in tourism, rather than through impacts on farmers. It should be noted whilst in the most recent outbreak there were no actual outbreaks of foot and mouth in the Peak District National Park some herds and flocks were culled in a suspected case and movement restrictions were put in place. Given the recency of foot and mouth, the fact a number of animals were culled and that this is an upland system where livestock movement restrictions impact on the feed requirements and costs of operations, we would have expected participants to have assigned greater significance to this event.

Possibly the most interesting omission in terms of the economics of multifunctional landscapes was the almost complete lack of mention of prices. The one exception was in relation to second home ownership and the resultant high house prices forcing local youngsters from the area. However, other than housing, no mention was made of agricultural prices or rents for agricultural holdings as being important drivers of change. Prices are obviously key to economists' perceptions of the determinants of the management of upland areas. This has been shown in work looking at long term drivers of biodiversity change in upland areas (Hanley et al, 2009). If agricultural prices are low, one would expect the least economic land uses to cease. One would also expect land managers to shift their enterprise mix towards relatively highly priced agricultural products.

Perhaps the lack of weight placed upon prices by participants is due to the disassociation of market prices and farm returns brought about by the CAP. Prior to decoupling (the replacement of direct subsidy based on livestock numbers by lump sum payment), the most important element of farm gate prices, which themselves drive landuse change, was the level of subsidy. If this is the case, it demonstrates the bias inherent in the workshop activity for the present status quo to overbear important impacts from the past (collective amnesia / recency effect). The CAP and other EU policies were, of course, identified as key in driving management change in the Peaks but perhaps their largest impact, the reduction of importance of market prices, was not identified.

Further research on the historical development of the Peak District National park and stakeholder perceptions based on this analysis has been carried out by

Dallimer et al (2009). The research focussed on analysis of the area of various ecosystem types across the park through the last century. Results show that; whilst stakeholders (and previous research e.g. Anderson and Yalden 1981) identified a reduction in the area of Dwarf Shrub Moorland, one of the key ecosystems of the uplands; this reduction was not reflected in the actual area of this ecosystem type across the region. Maps showing vegetation type and aerial photographs were digitised and samples of cells across the national park drawn to identify the extent of each vegetation type. Whilst a change in the distribution of Dwarf Shrub Moorland was identified the overall area was not seen to contract in any way across time. The fact that a contraction in dwarf shrub moor was almost universally expressed in the workshops suggests a significant divergence between stakeholder opinion and observed changes in the landscape.

The expertise of the workshop focused on upland managers and individuals involved in the study of upland management. The expertise was not, however, universal. Mineral extraction industries were not represented. These were mentioned in passing in one workshop and not considered in any depth. Participants from other sectors may have considered the impacts of these industries to be spatially limited, which would provide one reason that they were not given more prominence in workshop discussions. Afforestation was also mentioned in passing as being relatively unimportant for the Peak District National Park, but as having significant import in other upland areas of the UK.

2.5.6 Concluding Remarks

This research identified which events were key in arriving at the current multifunctional landscape configuration in the Peak District National Park, and most of these results are transferable to other UK upland areas. Figure 2.2 provides a pictorial representation of the interactions identified in the workshops as having driven shifts in landscape configuration.

In terms of perceptions of how multifunctional landscapes develop, the key results will be found where there is divergence between actual drivers of change, identified through factual certainty or empirically in work such as Hanley et al (2009), and the perceptions of key stakeholders. It is clear that cultural learning plays a part in the development of memory, and therefore in the decision matrix of key stakeholders. Evocative language can influence the perception of local events as demonstrated by observations regarding the 'Silent Spring' effect. Paradoxically, the memory matrix appears also to be shaped by a proximity effect. The implementation of components of the CRoW act (2000) relating to upland areas in 2003 meant that workshop participants considered the act to have only been passed in this year.

The omission of market price from perceived drivers of change is also an interesting divergence from what has traditionally been a key 'actual' driver. Within the timeframe of interest, prices have been important drivers of change to landscape form, but are not seen as such by participants. Assumptions of economic rationality regard decisions as based on profit or utility maximization. The lack of mention of market prices for either goods or inputs implies that management decisions are predominantly based on the level of subsidy or on non-economic factors. Where

policy has been implemented it appears that only those elements which directly impact on them are considered by stakeholders. It is possible that this focus means that general policy will be applied inappropriately on the ground.

Taking the example of the CRoW act, a number of aspects of the policy such as elements concerning Rights of Way will have impacted on the Peak District National Park prior to the date identified by stakeholders. The inaccuracy in recall of the act suggests that stakeholders concentrated on the right to roam on uncultivated land. If this was indeed identified as the only aspect of the act relevant to land management in the Peak District National Park then the policy will not have impacted entirely in the way policy makers intended.

2.6 Outcomes

The Grounded Theory Approach adopted allows us to develop a number of tentative theories, this does not imply that the theories are grounded in fact but that the approach taken was the one suggested by the "Grounded Theory Approach". The next stage of the process would be to collected more primary data with which to test these theories, however, given the relatively unique gathering of experience that was brought together when the approach was applied it is likely that this testing of the theories will be a costly and time consuming process. It is considered that the presentation of these tentative theories is relevant given that they may have implications for policy development and the valuation of environmental resources, some of which are presented below.

- The dominant trend identified in this exercise was that overall societal changes have had the greatest impact on the upland areas of the Peak District. Shifts to a more urban population have led to increased pressure on upland landscapes. It is therefore suggested that further increases in GDP (with resultant increases in leisure time) will lead to increased pressure on rural resources. This is particularly true of those resources close to centers of urban population, like the Peak District.
- One of the main social impacts has been through the breakdown of social structures, in National Parks in particular, with 'locals' being forced out of the area by restrictions on land use. Current policy concentrates on the protection of the natural quality of National Parks and this research suggests that more needs to be done to protect the social structures in these areas that are a key part of our upland systems.
- Market price has become less important in management decisions as a result of agricultural policy and subsidies, and any effort to influence the management of upland areas must take this into account. Whether this will continue to be the case with decoupling remains to be seen. But this relationship (or lack of relationship) is possibly most felt in areas such as the uplands where production possibilities are so constrained.
- Upland systems are fairly robust to temporary shocks, for example foot and mouth outbreaks, drought or wildfire (Figure 2.3). This suggests that governments need not react in extreme fashions to such one-off shocks. Policy would be better suited to identify suitable management responses given long term societal changes. Again this could be related to production constraints –

farmers continue to operate in the only way available to them as long as they are not forced by economic forces to stop.

- The upland ecosystems of the United Kingdom tend not to be natural ecosystems. As such, any policy which significantly changes management effort is likely to lead to major changes to upland landscapes, the merits and costs of which must be considered carefully. This result is extended throughout the rest of the research presented below.

2.6.1 Implications for Policy Makers

In designing policy aimed at improving multifunctional landscapes, policy makers must take into account the likely impacts of policy alternatives. Traditionally the analytical approach taken has assumed economic rationality amongst stakeholders. Given simple systems where subsidisation of production has been used to encourage one land use over another, this has often been sufficient. However, a more complex understanding of the decision matrices of stakeholders involved in multifunctional rural land management is required when multiple outcomes are sought from policies, outcomes such as nature conservation, catchment management, recreation and the maintenance of traditional landscape forms.

Economic rationality is only sufficient as a working assumption if stakeholders are able to take on board the multiple economic signals required to meet several outcomes. Their perceptions of the historical development of landscapes seem to be key to the way in which stakeholders will react to policy. For example, the Environmentally Sensitive Areas policy of the late 1980s onwards was successful in reducing the grazing density in upland areas. However, workshop participants also

commented that this had led to an increase in heather burning which had, potentially unexpected, environmental implications for upland areas.

Environmental valuation techniques and Cost Benefit Analysis are often adopted in policy identification for multifunctional landscapes. In designing the tools used to determine value it is imperative that the outcomes of policy presented are realistic. That is, they should take into account the decision matrices of key stakeholders, particularly in complex multifunctional landscapes. Based on a Grounded Theory Approach, it is possible to develop 'realistic' scenarios that subsequently can be valued using economic valuation methods. It is increasingly becoming recognized that outcomes are more likely to be valid and positive when the "attitudes, beliefs, or preferences of the people managing or depending on resources" are taken into account (Lynam et al 2007, p2). Valuation based on unrealistic policy outcomes is likely not only to give unrealistic results but to lead to a rejection of both the process and policies developed by individuals within society. Brueckner (2007) shows this to be the case for multifunctional forestry landscapes in Australia. He found that inappropriate assumption of economic rationality led to the collapse of forestry policy, in part, due to a rejection of the policy by members of the public and stakeholders involved in the valuation process.

2.7 Conclusions

In this chapter, we adopted a Grounded Theory Approach to identify how multifunctional landscapes develop and how key stakeholders perceive the process of development. In undertaking this work it became apparent that individuals' decision matrices are impacted both by the actual historical changes to a given landscape and

by their perceptions of those changes. Taking a historical perspective in designing policy for the optimal management of landscapes is essential in identifying the appropriately grounded policy aims. Where land managers frame decisions by basing them upon knowledge of previous outcomes from a given behaviour set or through adherence to land management practices that they have become used to, policies designed based on assumptions of economic rationality could fail to produce the desired policy outcomes. That is land managers may not behave in a way which policy makers can predict given the models currently available to make these predictions. This also has implications for the inputs and outcomes of environmental valuation studies, in that predictions of landscape change based upon new policy grounded in traditional models of behaviour may not accurately reflect the outcomes which will be seen. This leads to the risk; despite the fact that environmental valuation and cost benefit analysis of predicted changes identified that the policy would in theory be socially optimal; of public rejection of inappropriately grounded environmental policy as was shown by Brueckner (2007).

Part II

Evaluation of Preferences

Chapter 3: Methodological Approach

3.1 Chapter Summary

This chapter sets out the methodological approach and some of the econometric techniques used in the analysis of the remaining analytical chapters of this dissertation. Firstly it provides a summary of the discrete Choice Experiment techniques (referred to throughout this dissertation simply as Choice Experiments). Secondly it goes into further detail of the main analytical approach adopted for the analysis of the Choice Experiments, namely the error component model. Finally it gives details of test used to identify if the results of the various Choice Experiment treatments diverge from one another statistically. These tests are, the Complete Combinatorial Test (as outlined by Poe et al. (2005)) and the Johnston and Duke (2007) test, which provides an extension to the Poe et al. Test.

3.2 Methodological Approach

There is one consistent analytical approach, Choice Experiments, adopted in Chapters 4, 5 and 6. As such rather than repeating the information on this methodological approach on three occasions the opportunity is taken to present it here along with some further background and information on the approach.

Below we present a short summary of the Choice Experiment approach and the specific models adopted for the analyses presented in the following chapters. The Discrete Choice Experiment (Choice Experiment) approach draws upon Lancaster's economic theory of value (Lancaster, 1966) and Hedonic Price theory (Rosen 1974). As such Choice Experiments assume that the value of a good to an individual is a function of the underlying attributes of the good rather than the good itself. Choice

Experiments are therefore an attribute-based approach to the measurement of utility. When using Choice Experiments respondents are presented with possible scenarios (choice sets) drawn from all possible choice sets according to statistical design principles. These choice sets comprise two or more alternatives which the participant is asked to choose between. Characteristics or attributes of interest are varied across these choice sets. The inclusion of a price attribute allows a monetary value to be assigned to each of the various attributes of a commodity. When using a price attribute a zero cost alternative should be included (in addition to the two or more alternatives) as making a choice not to pay is a valid alternative. In order to determine the relative importance of each attribute complex probabilistic analysis of the choices made is required.

A range of approaches to "complex probabilistic analysis" exist but the most basic approach and the building block of most analyses is Multinomial Logit analysis. A brief summary of this approach and the general extension to the approach are presented below[17]. The multinomial logit (MNL) specification is the standard model for the analysis of discrete choices. It can be derived from utility maximisation as is shown by McFadden (1978) for choice of residential location.

Multinomial Logit Specification identifies the probability of individual n choosing alternative i:

$$Prob_{ni} = \frac{\exp(\mu Vni)}{\sum_{j=1}^{J} \exp(\mu Vni)}$$

[17] This information is in part based upon a workshop presented by Dr. Danny Campbell at the University of Stirling in September 2008

where V is the deterministic and observable part of the conventional utility function and μ is a strictly positive scale parameter, inversely proportional to the deviation of the error distribution:

$$var(\epsilon_{ni}) = \frac{\pi^2}{6\mu^2}$$

μ is usually normalised to one.

However the IID assumption inherent in the multinomial specification gives rise to a property of independence from irrelevant alternatives (IIA). That is the probabilities of choosing one alternative over another is unaffected by the presence or absence of any additional alternatives. This assumption is often found to be inappropriate when the alternatives are close substitutes. MNL models do not capture random taste variations and do not allow for correlation among alternatives. More relevantly to the current research nor do they account correctly for repeated observations from the same respondent (Haaijer and Weddal 2007).

3.3 Mixed Logit Specifications

Mixed logit specifications relax the IIA assumption of the Multinomial Logit specification. As such they provide a flexible and computationally practical econometric method for any discrete choice model derived from random utility maximisation. Mixed logit models can allow for random taste variation, unrestricted substitution patterns, panel effects and correlation in the unobserved factors. In mixed logit models the probabilities are the integrals of the standard logit probabilities over a density of parameters:

$$\text{Prob}_{\text{ni}} = \int L_{ni}\,(\beta) f(\beta) d\beta$$

where L_{ni} (β) is the logit probability evaluated for parameters β:

$$\text{L}_{\text{ni}}(\beta) = \frac{\exp(Vni(\beta))}{\sum_{j=1}^{J} \exp(Vnj(\beta))}$$

and f (β) is a density function.

A number of specifications were used in this dissertation. As a comparison across results is a major component of the analysis, one consistent methodological approach was adopted. Initial analysis relied on a multinomial logit model but it was found that properties of IIA were violated so an approach (mixed logit) which did not require the restrictive IID assumption associated with the multinomial model was sought. Of those investigated, the (mixed logit) error component and nested logit gave a better fit than random parameters estimates. The error component model was chosen as the level of fit and consistency across the range of experiments reported here were considered to give it some level of advantage over the other specifications. We considered that it was important to consider the role of unobserved factors which would alter the likelihood of participants making a particular choice. For instance, the sample identified in chapter 4 and 5 have chosen to live locally to the National Park and in Chapter 6 have chosen to visit the National Park but it is not clear what factors will influence their preference for management intensity in the Park . We therefore wished to allow for correlation of the unobservable portions of the utility of alternatives.

The error component model, introduced by Balestra and Nerlove (1966), allows flexible patterns of substitution via an induced correlation across utilities:

$$U_{ni} = \beta' x_{ni} + \varphi' \eta_{ni} + \epsilon_{ni}$$

where x_{ni} and η_{ni} are vectors of observed variables relating to alternative i, β is a vector of fixed parameters, $\boldsymbol{\varphi}$ is a vector of random terms with zero mean. That is η_{ni} are the error components that, along with ϵ_{ni}, make up the unobserved portion of utility. Various specifications to disaggregate the error component by socioeconomics characteristics were investigated. However (as is shown in table A3.1) the best fit occurred where we simply allowed for correlation in the unobserved effects of the alternatives with cost (no change and less intensive management) associated with them. In all cases (except for the analysis of farmers where the small sample size may provide an explanation) the error component is high and significant. This implies that there are unobserved effects influencing individuals to choose either option A or B over the zero cost option in the choice experiments. There are various potential explanations, individuals could simply wish to appear 'green', there may be a focussing effect or there could be other factors not included in the experiment which explain these preferences (e.g. an underlying knowledge of water pollution from more intensive management given changes to taste or colour of drinking water) of which the researchers were not aware.

3.3.1 Specifications Investigated

The main specifications investigated were the multinomial logit, nested logit (the same investigation into most appropriate nest was carried out as for the error component) and the error component model. Socioeconomic variables included but found to be

insignificant were: stated association, how often the national park was visited, if other members of the family visit more often, children in household, adults in household, income, age, sex and visitation of other outdoor resources. Finally specification of the error component investigated included: alternative groupings of A, B and Zero cost options and inclusion of socioeconomic factors indentified above in various combinations (the most commonly investigated cofactors were stated association and income). It was found that socio-economic variables were in general insignificant and through comparison of log likelihoods that the models presented were the best fitting of the simple models tested and that none of the factors discussed above altered the trends and relative values identified in any of the analytical chapters below.

3.4 Tests of Transfer Error

In order to test whether different treatments of the same experiment yielded divergent results we adopted tests of transfer error. Poe et al (2005) identify a 'Complete Combinatorial Test' of transfer errors (referred to as the Poe et al test in the following chapters). This test examines the relationship between distributions of two samples based upon an analysis of all possible combinations from a bootstrapped draw (i.e. the approach calculates every possible difference between two distributions Poe et al 2005 pp 357). In the current research a parametric bootstrapping was adopted to determine distributions based upon Krinsky and Robb (1986). Poe et al (2005) argue for the superiority of the complete combinatorial approach as it "provides an exact measure of the difference of two distributions" (op cit pp 363). The method assumes that the bootstrapping will generate independent empirical distributions that approximate those of the random variables. By testing based on the

measurable differences between empirical distributions, Poe et al. (2005) develop an approach which allows comparison across non-normal as well as normal distributions.

Johnston and Duke (2007) propose an equivalence testing approach which extends on the Poe et al test; both tests apply a stricter test of transferability than is usually found in the literature. However, like Poe et al., they also make use of an alternative test to the traditionally used 'two one sided t-test (TOST) equivalence'. They note that this traditionally adopted approach is invalid for non-normal welfare distributions and instead propose the use of a 'two one-sided convolutions' (TOSC) test as it allows valid inference from non-normal distributions. This seems appropriate given that mixed logit specifications are adopted in the research which follows and as such a non-normal distribution has been specified for model parameters upon which estimates of welfare are made. In essence the results presented offer a two tailed version of the Poe et al test.

The tests identified above are tests of transfer and they depend on the relative value of the attributes being tested (so reversing attribute order reverses the way in which the test is considered). As such this research actually adopts an inverse version of the tests. We aim to adopt a strict test of divergence in attributes. We are not stating that because comparison of two WTP estimates are not found to be transferable that they are necessarily divergent. We instead identify where there is over 90% confidence that the results are not transferable – this gives us our statistical measure of divergence.

Using these tests it is possible to determine if the results we calculate from the various treatments presented in the chapters which follow are divergent or not. That

is transferability across samples has been proven not to hold, again it is important to note that these are relatively strict tests of transferability. It is also perhaps worth mentioning that for the remainder to this dissertation where transferability is referred to this relates to between sample transfers and does not imply that the results are suitable for transfer to other sites or regions.

Chapter 4: Decision Versus Experienced Utility: An investigation Using the Choice Experiment Method[18].

4.1 Chapter Summary

Recent work by Kahneman and others has led to a new focus in economics on a wellbeing-based approach to utility elicitation suggesting that 'experienced utility' is an alternative and more appropriate basis for the measurement of economic value than 'decision utility'. In this chapter, we apply the Choice Experiment technique to the valuation of changes in upland landscapes in the UK, in order to identify if experience in the moment or in memory impacts on the value associated with changes in ecosystem services under different management regimes. A comparison is also made between decision-based and experience-based measures of willingness to pay for changes in ecosystem services in the Peak District National Park.

Four treatments were used. The first treatment was approached as with most other Choice Experiments, in that information was presented to participants and choices made based upon this information. The second treatment was aimed at the identification of the impact of experience on utility and was conducted on-site in the Peaks, by driving respondents to the area being studied. The third and fourth treatments were intended to identify the impacts of memory on utility: the former was completed just after the visit to the national park and the latter some four months later. Whilst identification of a moment based measure of utility is rife with

[18] This Chapter extends on a book Chapter, jointly authored by Tinch, Hanley and Colombo, submitted to the International Handbook on Environmental Valuation. Both Nick Hanley and Sergio Colombo provided extremely useful input into the Chapter, predominantly in editorial form and useful advice. As usual all errors or emissions remain my own.

difficulties, the approach taken allowed the identification of experiential impacts on utility and may have implications for the future use of experienced utility as a basis for the valuation of environmental goods. As identified in table 1.1 the aims of this chapter are two fold. Investigation of the impacts of experience and memory on preferences for upland landscapes. Identification of how useful each measure of preference is for policy analysis. The chapter tests the hypothesis that decision, experienced and remembered utility will diverge for environmental goods in the same way as they have been found to for other goods.

4.2 Background

The upland areas of the UK are replete with rich and varied landscapes. Few of these are "wild" landscapes; most are managed in some way, and can at best be described as semi-natural. Management is vital to maintain these semi-natural upland landscapes. However, many land management practices, and in particular agricultural activity, are currently un-economic, making a loss net of subsidy payments (Peak District Rural Deprivation Forum, 2004, Acs et al. 2010). Therefore, the maintenance of landscape quality is at least in part dependent upon funding from agri-environmental schemes. An analysis of preferences for upland management intensity is therefore indicated as it provides a useful tool for analysis of appropriate agri-environmental policies from an economic efficiency standpoint.

Current policy involves expenditure on the management of the uplands through existing agri-environmental schemes. Given the potential public benefit of changes to management intensity it seems appropriate that the public are asked to pay for this. DEFRA (2006) highlighted that changes in the manner in which the government

supports farming in the uplands are resulting in a new support regime which is related to the public benefits derived from upland landscapes (Hanley et al, 2007).

4.3 Decision versus Experienced Utility

In recent years, Daniel Kahneman (and others such as Amos Tversky) have called for the Benthamite (Bentham, 1789) approach to utility to become central to economics again (Read 2004). Kahneman and Sugden (2005) note that nineteenth century economics employed a concept of hedonic utility based on an absolute measure of pleasure and pain. Bentham argued that utility, which he identified as the amount of pleasure or pain associated with an event, was quantifiable and additive. He related the levels of utility to the drivers of probability, intensity, duration and extent. Edgeworth (1881) referred to absolute measures of pleasure and pain from which overall happiness measures could be calculated, over some time period. The idea of utility as a momentary measure of hedonic experience has become referred to as *experienced utility.* However, as Kahneman and Sugden (2005) point out, economics retreated from this concept of utility around the end of the nineteenth century. Later economists, such as Fisher, argued that utility could only be measured by backward induction from observed behaviour. Marshall (1920) also stated that quantification of desires or their outcomes was impossible (Book 3, Chapter 3, Paragraph 2). Utility could now be viewed as something which indexed the preferences of individuals and explained how they chose (hence the term *decision utility*), and thus could be interpreted in a positive manner, in contrast to the normative concept of experienced utility. That is decision utility is more quantifiable than experienced utility allowing positive statements (i.e. statements of **what is**) whilst experienced utility allows

predominantly normative statements (i.e. more judgment based statements of **what ought to be**) to be made. However, Kahneman and others have argued, based upon insights from behavioural economics and psychology that this (now traditional) Marshallian approach to utility is flawed, and that a return to the ideology of Bentham[19] was one approach to deal with the issues of a reliance upon decision utility which is not supported by observed behaviour (See for example Kahneman, Knetsch and Thaler 2000, Bateman et al 2000, Tversky, Sattath and Slovic 2000, Kahneman 2003, Kahneman and Sugden 2005, Loomes 2006 and Beshears et al 2008). Such an approach is called for, they argue, as "anomalies[20]" in individual behaviour mean that the idea of individual rationality within a decision utility context seems a shaky foundation on which to build public policy analysis through, for example, the use of stated preference methods.

Kahneman and others' normative approach to consideration of utility is that "instant utility" gives a measure of the utility (pleasure or pain) we are experiencing at any moment. A summation of instant utility gives us a measure of 'experienced utility' for a given period of time. Either concept may be measured in a number of ways, including the experience sampling method (Stone et al, 1999), and the day reconstruction method (Kahneman et al, 2004) (Proactive and retrospective approaches respectively as identified in Chapter 1).

The experience sampling methodology, developed by Larson and Csikszentmihalyi (1983) operates in real time and asks individuals to record their feelings or happiness

[19] See for example Kahneman, Sarin and Warker 1997
[20] Some of these anomalies are discussed in the following sections of this Chapter, a fuller analysis is presented in Appendix 1.

at certain times throughout an experience. Validity in these studies comes from repetition, and the main analytical techniques relate to the observation of correlation in results. The Day Reconstruction Method builds on the experience sampling method and time-budget management (Juster and Stafford, 1985; Robinson and Godbye, 1997). It aims to collect data to describe experiences through a systematic reconstruction conducted on the following day.

Most economic analysis of the past 100 years has made use of the concept of decision utility (Kahneman and Sugden, 2005), even through observed behaviour consumption choices are based upon the anticipation of utility gained. Any potential divergence between Decision Utility and Experienced Utility can be seen as an issue of timing, i.e. they are ex-ante and ex-post measures of utility respectively. For these measures of utility to be equivalent, individuals must be affective forecasters, accurately predicting the consequences of their actions in terms of the consequences for their well-being. A growing body of research would suggest this is not the case (Kahneman, Ritov and Schkade 2000, Gilbert and Ebert 2002 and Gilbert et al 2004). Reasons include a failure of affective forecasting (the ability of people to correctly anticipate the consequences of events on their well-being in future states), adaptation and focussing effects[21].

Kahneman and Sugden (2005) suggest that, given the evidence against accurate affective forecasting, experienced utility may be a more appropriate measure upon

[21] Simply by asking individuals about a particular issue you may bias results by bringing this issue to the forefront of their minds. Kemp and Maxwell (1993) showed this dramatically by invoking a value of $85 when the issue of oil spills of the coast of Alaska was valued alone whilst when considered in combination with other public goods the value assigned was only 29 cents.

which to base economic policy evaluation than the standard economic concept of decision utility. They, however, accept that measurement of experienced utility is not going to be a simple process.

Two particular issues arise from the literature which are relevant to distinctions between valuation exercises based on experienced rather than decision utility. These are the ideas of adaptation and representative moments (as mentioned above a fuller range of issues are discussed in Appendix 1).

The idea of an adaptation level was first proposed by Helson (1964) and extended by Scitovsky (1976). An alternative view point with similar implications is that of projection bias (Loewenstein et al 2003). In summary the issue is that the overall satisfaction individuals anticipate from a particular outcome or situation tends not to equate to the final satisfaction they report once a change has occurred. For instance, individuals get used to a new situation (such as higher disposable income), and factor this into their measures of well-being. Well-being increases due to rising incomes are thus temporary. This has been referred to as the Hedonic Treadmill (Brickman and Campbell, 1971). Several examples are provided in Kahneman and Sugden (2005).

However, not all goods or experiences are susceptible to similar degrees of adaptation. Scitovsky (1976) identified two types of goods, *pleasures and comforts.* Pleasures are goods to which individuals do not adapt, the suggestion being that consumption should concentrate on these pleasures as buying comforts is a waste of money. However, this leaves a question of how one goes about distinguishing between comforts and pleasures in making 'purchase' decisions. In the context of this paper, Kahneman and Sugden (2005) note that it is unlikely that individuals adapt to

beautiful landscapes[22] which may suggest that household expenditure on non market environmental resources is a valuable way to increase utility. However, the overall point remains that experienced utility may differ from decision utility, due to adaptation.

A second issue concerns possible differences between momentary measures of well-being and remembered measures. Redelmeier and Kahneman (1996) identified that there was a benefit associated with extending the length of colonoscopies since a period of lesser discomfort at the end of the treatment increased patients' willingness to undergo additional treatments. This was explained by individuals placing additional emphasis on the last moments of an experience when that experience is remembered, rather than on average or cumulative measures of experience. Work on pleasurable experiences reported in Do et al (2008) suggest that intensity of pleasure is more important than length of experience, and that addition of less positive (but still positive) experience could reduce overall utility even if it increased the 'total worth'[23] of the experience.

Given these factors it is likely that experienced utility will vary according to the timeframe in which it is measured. For example Dakin (2003) discusses how the experiences of the inhabitants impact on the ways in which they evaluate their

[22] Although the point of reference may be important e.g. as individuals become used to a landscape and this may determine the landscape they wish to see. Individuals expect to see a managed landscape and, whilst wild landscapes may be more species diverse and in time come to have a greater value for individuals they may show a preference for 'what they are used to' or as David Hume put it " Beauty is no quality in things themselves: It exists merely in the mind which contemplates them; and each mind perceives a different beauty." (Hume, 1742) (or for want of a less 'economical' way of saying it beauty is in the eye of the beholder). This argument provides a possible explanation of the Hedonic Treadmill.

[23] Total worth in terms of the summation of expected utility, the addition of a positive experience resulting in a reduction in total utility violates the transitive assumption of economic rationality.

surroundings. Also Gonzalez and Leon (2003) identify a divergence in preference between experience and memory, assessing individual's preference for landscapes in Gran Canaria whilst experiencing the landscape and at the airport before they left and found more positive responses during experience (albeit for different samples of individuals).

The above arguments suggest that experience should impact on preferences, and that measures of welfare based on experienced utility should differ from those based on decision utility. In this chapter, we attempt to compare decision utility-based (treatment 1) measures of economic value for upland landscapes with a number of measures of value based on experienced utility. These include (i) an "instant utility" treatment, where choices are made –and values thus revealed – in the act of consumption (treatment 2, Experienced Utility); and (ii) two follow-up treatments where memory is used to make the same choices (treatment 3 and 4, Remembered 1 and 2 respectively). Our interest is in whether decision utility-based measures are equivalent to experienced utility based measures, and also in how these experienced-based measures evolve over time. This relates to the main aims identified for this chapter in Table 1.1 and attempts to answer the hypothesis 'Decision, experienced and remembered utility will diverge for environmental goods in the same way as they have been found to for other goods'.

4.4 Study Area and Design

The Peak District National Park lies within an hour's drive of a third of the UK's population. As a multifunctional, semi-natural upland landscape it is valuable because

of the ecosystem services which it provides. A particular focus for this research are the recreational use, non-use and biodiversity values of the area. Management intensity can impact upon other ecosystem services, in particular water quality, flood protection and revenues from consumptive recreational use such as grouse hunting. However, these were specifically not included in the experimental design. We focussed on the values of changes in landscapes to individuals living near, but not within, the National Park itself (for reasons that will become apparent). The Choice Experiments were applied through a workshop approach (Alvarez-Farizo and Hanley, 2006) with three locations being chosen for sampling as representative of the local area.

Individuals were chosen who lived relatively close to the workshop locations through mail shots, telephone calls, leaflet drops and advertisements in local shops. The choice of locations was constrained by the need to be close to a site in the National Park which contained landscapes representative of the management intensities being considered. The communities chosen for recruiting participants were Stannington, a large village on the outskirts of Sheffield; Stocksbridge, a former steel and mining town; and Penistone, a market town. The site chosen for the second experimental treatment (experienced utility) was on the Strines Moor Road, selected as it gave views of all relevant representative land management regimes. The locations of these settlements and the site can be found on the map Figure 4.1.

Figure 4.1 Location of Survey Sites and Communities**.**

Participants were paid £25 for participation in the first workshop and £50 for participation in a second workshop. In total 52 participants took part. Workshops were run in October 2007 and February 2008. Each participant was given 16[24] choice cards in each experiment; this gave in the region of 800 choices for each experiment upon which to run analysis. Due to the large number of choice cards respondent fatigue[25] was identified as a possibility and participants were encouraged throughout to consider carefully every choice they were making. From observations at the time of

[24] Based upon orthogonal design (adopted to reduce the number of choice combinations required for a statistically valid analysis to be conducted) developed on SPSS which provided 32 profiles which in turn were blocked into two sets of 16 choice cards .

[25] Risk of invalid response due to excessive demands being placed upon the research participants.

the experiment it was clear that most if not all of the participants were paying attention to each choice and referencing the additional material provided at regular intervals.

The Choice Experiment was developed with colleagues from the Department of Animal and Plant Sciences Sheffield University who provided inputs upon the likely impacts of management change upon the Peak District National Park. This information was based upon data collected and experience developed through a wider project investigating the likely impacts of changes to agri-environmental schemes on management practices and the resultant impacts on bird species diversity.

In order to simplify the experiment a series of ranking exercises were run in a pilot study. The ranking exercise allowed three candidate attributes, sheep numbers, closures and employment, to be dropped as explicit factors of the experiment, although they were included in the information given to participants. All policies under consideration were changes to agri-environmental schemes to reduce or increase management intensity, but not to abandon farmland. In relation to biodiversity impacts it was posited to participants that less intensive management would lead to a greater variety of habitats and species. It was made clear to participants that more species did not mean a greater number of total birds, or any greater chance of seeing birds.

The survey structure involved the presentation of relevant information (a summary of which and a copy of the visual information can be found in appendix 2) after which the first set of 16 choice cards were completed. The participants were then taken by minibus to the chosen site (Strines Moor Road) and after reiteration of the pertinent

information a further 16 cards were completed (again the visual information posters were made available to the participants). Finally the minibus returned the participants to the workshop venue where again the information was covered and a further 16 cards completed (note on each occasion the card sets were identical). Finally a socio-economic questionnaire was completed (a copy of which can be found in appendix 2) participants were given diaries which they were asked to complete and payment of £25 was made. At the second workshop held some 4 months later the information was again presented and a further 16 choice cards completed (the subsequent activity at these workshop is presented in chapter 5). In total there were 8 workshops with the intention of 8 participants in each, however, as is discussed in the discussion, not all groups were fully attended and an average of 6.5 participants with a minimum of 4 and maximum of 8 attended each workshop.

4.5 Choice Experiment Attributes

The Choice Experiment included five attributes: intensity of management[26] in three habitat areas - moorland, moorland fringe and valley bottom farmland; footpath network quality; and annual household tax increases.

Moorland management intensity - was set at three possible levels (*More Intensive*, *No change in Intensity, Less Intensive*). The intensity of management on the moorland areas currently varies across the national park. More intensive moorland management was represented by increased numbers of sheep and moorland burning. Burning of moorland encourages young shoots to grow which also leads to increased

[26] Management intensity provides a measure to the amount of management effort and the levels of input employed on a given landscape.

numbers of grouse for shooting. Less intensive management was depicted as having the opposite impacts. Representative moorland bird species selected to be shown to respondents in the survey materials were: the golden plover (Pluvialis apricaria), merlin (Falco columbarius), dunlin (Calidris alpine) and short eared owl (Asio flammeus).

Moorland Fringe Management Intensity – this also took three levels (*More Intensive, No change in Intensity, Less Intensive*). More intensively managed moorland fringe can basically become resemblant of farmland, with sufficient fertiliser input producing lush green fields, additionally increased sheep numbers would be present. Less intensive management leads to more scrubby appearance with occasional shrub-like plants. The moorland fringe area is relatively important for biodiversity since it is a transitional zone providing resources to both moorland and farmland species in addition to habitat specific and generalist species. Representative moorland fringe bird species used were: the reed bunting (Emberiza schoeniclus), stone chat (Saxicola torquata), wheatear (Oenanthe oenanthe) and lapwing (Vanellus vanellus).

Valley Bottom Farmland Management Intensity – three levels were again used (*More Intensive, No change in Intensity, Less Intensive*). These valley bottom farmlands in the Peaks are the "traditional" green fields of the English countryside, found in the Peak District at lower altitudes bordered by dry stone walls. More intensive management results in greener fields with more sheep, with less intensive management having the opposite impact. It was made clear that field boundaries and buildings would continue to be maintained whatever the management regime adopted. Representative bird species used were the yellow hammer (Emberiza

citrinella), linnet (Carduelis cannabina), redstart (Phoenicurus phoenicurus) and pied flycatcher (Ficedula hypoleuca).

Footpath Network Quality – three levels (*Improved, No change, Degraded*). The quality of the footpath network with a degraded state was represented by a increase in the length of footpaths with more degraded sections (eroded and muddy) and an improvement represented by an increase in the number of paths managed to prevent degradation.

Tax – six levels selected based on average council tax in the areas, shown as additional tax burden to the household per year. Levels were selected based on a band B property whose annual council tax was approximately £1,100 p.a. and represented between a half percent and five percent increase in tax levels. These levels were chosen based upon levels individuals in the scoping study identified as credible in terms of the management changes planned.

A business as usual baseline based upon likely future levels was adopted. Assessments of the potential impacts on the park, if no additional money is made available, identified the likelihood of an increased management intensity in all areas and a degradation of the footpath network. As such the "do nothing" (zero cost) option available to participants for every choice set presented was increased management intensity of all landscape areas (moorland, moorland fringe and farmland), a worsened footpath network and zero additional tax cost. The choices this was set against were developed using a fractional factorial orthogonal design, with two alternative choices being presented on each choice card (see Table 4.1 for a sample choice card).

The visual information given to participants can be found in Appendix 2. Additional verbal information was given at the start of each workshop detailing the information presented above and individuals were encouraged to ask questions in order to clarify the information they had received. In order that participants were familiar with the process involved in making a choice, a series of practice sample choices were presented and explained prior to undertaking the first choice tasks.

Table 4.1: Sample choice card

	A	**B**	**Do Nothing**
Moorland – intensity of management	Less Intensive – less sheep and burning. More bird species	No Change in Intensity	More Intensive - more sheep and burning
Moorland Fringe – intensity of management	Less Intensive– less sheep and burning. More bird species	Less Intensive– less sheep and burning. More bird species	More Intensive – more sheep, fertiliser and drainage
Valley Bottom Farmland – intensity of management	No Change in Intensity	Less Intensive – less sheep and fertiliser. More bird species	More Intensive – more sheep and fertilizer.
Footpath Network	Improved	Degraded	Degraded
Tax Cost	£5	£55	£0
Please tick the option you prefer	□	□	□

4.6 Results

Initial analysis of results was conducted using a multi-nomial logit specification. Some models, however, failed the Hausman test for IIA, so an alternative specification was sought. It was found that the error component model provided good model fit. The error component model allows flexible patterns of substitution via an induced correlation across utilities which relaxes the IID assumption of the multinomial logit specification.

In the error component model estimated in this paper we allow for correlation between the unobserved effects of alternatives which have tax associated with them and include either no change or less intensive management intensity. In analysis presented in the robustness testing appendix (Appendix 3) we allowed for correlation between alternative error components and we observed that the model presented best explained the choices made by respondents. This indicates that there are unobserved random effects related to the maintenance of the status quo condition or the provision of less intensive landscape management which influences people's choice.

It is important to note that the results presented below are derived from the same participants responding to the same choices in repeated experiments. Standard theory would suggest that any differences in preference estimates which arise across sessions would be due either to increased information or learning with respect to task complexity. For a learning effect to exist, then a change in estimated preferences would be expected between treatment 1 and treatment 2, but not between treatment 2 and treatments 3 and 4 (as no additional information is provided between

treatments 2, 3 and 4). Changes in task complexity might also be mapped into changes in individual scale parameters. Further it was possible to test for the impact of learning by making use of information collected on the level of use of the national park made by participants. If trends in preference between treatments are found to be consistent between subsamples of high and low users it will be suggestive that the moment of experience is indeed the dominant impact being identified in any variation between experiments rather than learning per se.

Treatment 1 (*decision utility*) gives our baseline estimate of willingness to pay for different levels of management of the Peak District National Park; this experiment was run in a local hall prior to the visit to the national park. This treatment represents the value derived in most Choice Experiments (and other stated preference techniques), since it is based on information given to participants through description, visual images and aurally. It is not, however, provided at the "point of consumption".

Treatment 2 (*experienced utility*) aims to identify the impact of the moment of experience of landscape on values, and was conducted on site where a representative series of landscapes could be seen. Participants were driven to the Park and shown the landscape characteristics which they were valuing in the Choice Experiment. Individuals could identify the impacts of management changes without needing to rely on their own anticipation of changes and (to some extent) anticipation of adaptation to landscape changes. Participants were shown landscape features characteristic of each proposed level for each attribute, and were asked to identify those features relevant to the combinations presented in the choice before them. The only landscape type not visible at this stage was a freshly burnt heather moorland but this

landscape had been identified to participants one or two minutes prior to arrival on site and a second year[27] burnt area was visible from the selected site.

The two adjacent fields[28] to the site involved intensive and extensive moorland fringe management practices whilst areas of intensively and extensively managed moorland backed onto these fields. Below the site was a panorama showing intensive and extensive management of farmland rising across the valley to additional examples of moorland fringe and moorland management. There was a steep area adjacent to the site which displayed a dominance of bracken species which was used as an example of the possible management actions being required to prevent bracken dominance under certain management alternatives.

The third treatment (*Remembered 1*) was conducted upon return to the village hall on the same day as the site visit. The fourth treatment (*Remembered 2*) was administered during a second workshop held four months after the first. Diaries were kept between the first and second workshop although none identified any events which (in the researcher opinion) would significantly impact on overall knowledge of the park or resources. That is they noted occasional visits to walk around sites, mainly short circuitous routes such as paths around reservoirs, in the park or included cuttings about the national park in general but no additional information on management intensity or landscape features was apparent.

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[27] Assuming the burn took place in Autumn the previous year although it may have taken place in the same or previous year as an early season burn. However, it was clearly not a new burn.

[28] Whilst field seems the most appropriate term in respect to moorland fringe this is not agricultural land in the same way as the valley bottom area. However, boundaries are present – for ownership demarcation or stock management.

Table 4.2 shows estimate Coefficients for each treatment, Table 4.3 identifies the coding used and Table 4.4 identifies implicit prices calculated for each treatment. It should be noted that it is not possible to compare coefficient estimates across different choice models as they are scaled with an unknown scale parameter. To compare across coefficient estimates is equivalent to setting the scale parameter equal to 1 which assumes that all individuals have the same scale parameter. This is an inappropriate assumption given that experience may have affected the scale parameter. Although similarity in both tax and socio-economic coefficient estimates between treatments suggests a limited impact on the scale parameter in the current research. However, it is possible to compare across Willingness to Pay since the scale parameter cancels out of the implicit price calculations (Scarpa et al. 2008), as such this approach is adopted for model comparisons in the analysis which follows.

Table 4.2 Decision, Experienced and Remembered Utility: Error Component Logit Model Coefficients for each treatment.

Treatment	*Decision*		*Experienced*		*Remembered 1*		*Remembered 2*	
	Coef.	*S.e.*	*Coef.*	*S.e.*	*Coef.*	*S.e.*	*Coef.*	*S.e.*
Mean Values								
Const	**-1.604**	0.572	-0.893	0.660	-0.733	0.588	**-1.600**	0.704
MoorLI	-0.106	0.151	**-0.437**	0.172	-0.083	0.161	-0.137	0.256
MoorMI	**-0.887**	0.208	**-0.463**	0.191	**-0.590**	0.229	**-0.949**	0.302
FringeLI	**-0.530**	0.166	**-0.629**	0.193	-0.299	0.158	-0.428	0.237
FringeMI	-0.279	0.169	-0.163	0.171	-0.338	0.190	-0.248	0.243
FarmLI	**-0.784**	0.176	-0.335	0.198	**-0.480**	0.224	**-0.805**	0.243
FarmMI	**-1.168**	0.205	**-0.581**	0.254	**-0.761**	0.261	**-1.100**	0.325
PathD	**0.323**	0.132	0.222	0.149	**0.386**	0.138	0.093	0.162
PathI	**0.465**	0.209	-0.011	0.217	0.397	0.248	0.342	0.278
TAX	**-0.013**	0.001	**-0.012**	0.001	**-0.013**	0.001	**-0.014**	0.001
INCOME	-0.014	0.009	-0.002	0.008	-0.002	0.008	-0.001	0.009
FEMALE	**2.161**	0.372	**2.178**	0.372	**2.139**	0.374	**2.188**	0.371
AGE	**0.035**	0.008	**0.035**	0.007	**0.033**	0.007	**0.034**	0.008
Error component								
Sigma	**2.579**	0.185	**2.560**	0.184	**2.573**	0.187	**2.595**	0.190
Pseudo R^2	0.22		0.22		0.22		0.22	
Log Likelihood	-3733		-3750		-3747		-3738	
N	50		50		50		50	

Coefficients found to be statistically significant at the 5 percent level are indicated in bold. Where Sigma can be interpreted as an estimate of the impacts of unobserved random effects. N=50 as two participants did not reveal their age. The large and significant error component suggests correlation of the unobservable portion of the utility of alternatives A and B.

Table 4.3. Decision, Experienced and Remembered Utility: Explanation of Variable Abbreviations and Coding in Table 4.2

Const	Alternative specific constant term (ASC) (= 0 for baseline zero cost, = 1 for option A or B)
MoorLI	Shift to less intensive moorland management (dummy coded)
MoorMI	Shift to more intensive moorland management (dummy coded)
FringeLI	Shift to less intensive moorland fringe management (dummy coded)
FringeMI	Shift to more intensive moorland fringe management (dummy coded)
FarmLI	Shift to less intensive valley bottom farmland management (dummy coded)
FarmMI	Shift to more intensive valley bottom farmland management (dummy coded)
PathD	Degraded footpath network (dummy coded)
PathI	Improved footpath network (dummy coded)
TAX	Tax increase to the household indicated in pounds (absolute number)
INCOME	Household income (absolute number) (interacted with ASC)
FEMALE	Gender (Female = 1, Male = 0) (Interacted with ASC)
AGE	Respondent's age in years (Interacted with ASC)

Table 4.4: Decision, Experienced and Remembered Utility: WTP for a change from the current level of provision (n=50 in all cases).

Variable	Predicted	Experienced	Remembered 1	Remembered 2
Moor LI (From no change to less intensive)	-£8.01 (£11.38) (NS)	-£36.18 (£14.46)**	-£6.51 (£12.67) (NS)	-£10.01 (£18.67)(NS)
Moor MI (From no change to more intensive)	-£66.81 (£16.09)***	-£38.32 (£16.08)**	-£46.55 (£18.22)**	-£69.31 (£22.58)***
Fringe LI (From no change to less intensive)	-£39.97 (£12.75)***	-£51.99 (£16.46)***	-£23.60 (£12.53)*	-£31.24 (£17.28)*
Fringe MI (From no change to more intensive)	-£21.01 (£12.88) (NS)	-£13.45 (£14.22) (NS)	-£26.68 (£15.24)*	-£18.13 (£17.87)(NS)
Farm LI (From no change to less intensive)	-£59.04 (£14.29)***	-£27.68 (£16.78)*	-£37.87 (£18.21)**	-£58.80 (£18.39)***
Farm MI (From no change to more intensive)	-£88.01 (£16.38)***	-£48.03 (£21.27)**	-£60.06 (£21.07)***	-£80.33 (£23.79)***
Path Degraded (compared to current)	£24.32 (£10.44)**	£18.36 (£12.64) (NS)	£30.41 (£11.60)***	£6.81 (£11.88)(NS)
Path Improved (compared to current)	£35.02 (£15.99)**	-£0.94 (£17.92) (NS)	£31.34 (£19.70)(NS)	£24.95 (£20.28)(NS)

Figures in brackets are standard errors *** = significant at the 1% level. **= 5%. * = 10%.

Table 4.5 Decision, Experienced and Remembered Utility Poe et al. Complete Combinatorial Convolutions Test

Variable	Predicted vs Experienced	Predicted vs Remembered 1	Predicted vs Remembered 2	Experienced vs Remembered 1	Experienced vs Remembered 2
Moor LI	**0.94**	0.46	0.55	**0.06**	0.14
Moor MI	0.11	0.20	0.54	0.62	0.87
Fringe LI	0.72	0.18	0.35	**0.08**	0.19
Fringe MI	0.32	0.59	0.43	0.74	0.59
Farm LI	**0.07**	0.18	0.49	0.67	**0.90**
Farm MI	**0.08**	0.15	0.41	0.64	0.84
Path Deg.	0.63	0.33	0.87	0.24	0.75
Path Imp.	**0.93**	0.54	0.66	0.11	0.17

Table 4.6 Decision, Experienced and Remembered Utility: Johnson and Duke test for transfer error

Variable	Experiment 1 vs 2		Experiment 1 vs 3		Experiment 1 vs 4		Experiment 2 vs 3		Experiment 2 vs 4	
	Lower Bound	*Upper Bound*	*Lower Bound*	*Upper Bound*	*Lower Bound*	*Upper Bound*	*Lower Bound*	*Upper Bound*	*Lower Bound*	*Upper Bound*
Moor LI	**0.07**	**0.94**	0.56	0.48	0.47	0.56	**0.96**	**0.09**	0.89	0.18
Moor MI	**0.93**	0.17	0.87	0.29	0.56	0.64	0.44	0.68	0.16	**0.90**
Fringe LI	0.35	0.79	0.88	0.24	0.72	0.42	**0.96**	0.12	0.86	0.26
Fringe MI	0.72	0.37	0.45	0.63	0.61	0.47	0.28	0.76	0.43	0.61
Farm LI	**0.96**	0.12	0.88	0.26	0.61	0.59	0.37	0.71	0.13	**0.91**
Farm MI	**0.96**	0.13	**0.91**	0.24	0.71	0.53	0.42	0.70	0.20	0.87
Path Deg.	0.31	0.58	0.61	0.28	0.10	0.83	0.73	0.21	0.21	0.72
Path Imp.	**0.05**	**0.91**	0.40	0.49	0.29	0.60	0.89	0.11	0.83	0.17

It is interesting to note that all significant management change willingness to pays are negative. The analysis calculates a shift away from the current management system (no change in management intensity) however this was not the zero cost option presented to participants. As such a negative WTP reflects willingness to pay to avoid a situation, or put differently a negative willingness to pay in the current baseline could be considered to be a positive willingness to pay if the zero cost option was used as the baseline. This analysis, from the alternative zero cost baseline, has been carried out and is presented in Appendix 3. It should be noted that this model has identical R^2, log likelihood ratio, coefficient associated with the alternative specific constant, tax and socioeconomic factors to those presented here for the current baseline. It is therefore just an alternative way of presenting the data and is provided in the hope of providing clarity over how these results should be read. However, in terms of policy analysis it was considered that the current baseline was the appropriate one to adopt.

The results suggest that individuals are willing to pay in order to avoid a future level of management which is more intensive in character, except in the moorland fringe area where the estimate is never significant. This is perhaps down to the nature of fringe areas as transitional habitats which through more intensive management can be made to resemble farmland. Additionally individuals are willing to pay (in general) to avoid a less intensive management regime in the habitats, although this is not significant for moorland habitats with the exception of the second treatment. The implication for policy is that in the case of locals living close to the

National Park there appears to be a significant status quo preference[29]. Individuals living near the National Park would be willing to pay in order to maintain the current levels of management intensity. Also it is perhaps worth noting that the number of significant estimates is highest in the first treatment. Once experience of the landscape has occurred some attributes loose significance for the rest of the experiment. This may suggest a prominence effect or could be seen as an indicator of a focussing effect in the first experiment which was mitigated by experience.

It can be seen from the results that experience and memory appear to have an impact on the willingness to pay for landscape management change and the significance of variables. Due to a relatively low sample size and the resultant standard errors it is not clear in statistical terms from the raw results whether the change in estimates between experiments are significant. As was shown in Chapter 3 it is possible to test for the significance of the change in estimates by adopting approaches from the benefits transfer literature namely the Poe et al test and the Johnston and Duke test. There is a distinct trend in estimated coefficients between the treatments: willingness to pay is typically high in treatment 1, falls in treatment 2, and then rises again. The trend in means between experiment 1 and 2 does not continue into experiments 3 and 4 which shows that a learning effect (development of heuristic rules of thumb) is unlikely to be having a major impact on results, since otherwise we would expect the means in treatment 3 to be very close to those in treatment 2 (no new information was available between these treatments).

[29] The status quo has been found to exert significant influence on preferences – people tend to come to prefer what they have, for example Pichert and Katsikopoulos (2008) show a significant effect for green energy (see Chapter 5).

Treatment 1 - Decision Utility

Individuals have the highest willingness to pay to avoid more intensive management in the moorland areas and valley bottom farmland habitats. This is perhaps unsurprising as whilst valley bottom farmland makes up a relatively small proportion of the park (as opposed to moorland habitats) most roads in the park run through valley bottoms and this landscape is seen from representative images presented of the National Park on tourism websites to be archetypal of the Peak District National Park.

Treatment 2 - Experienced Utility

The results of the second treatment show the value associated with willingness to pay for maintenance of the current management level falling, with the exception of less intensive management of moorland and fringe habitats. Picking out the values associated with more intensive moorland and farmland habitats the mean willingness to pay values fell by 42% and 45% respectively. Table 4.5 and 4.6 give the results of the Johnson and Duke and Poe et al tests for comparison of model results (based on Krinsky Robb (Krinsky and Robb 1986) bootstrapping). Adopting a 10% level of significance for the Poe et al test we find that willingness to pay estimates for less intensive moorland and both more intensive and less intensive farmland diverge (and indeed improved footpath networks) between decision and experienced utility. The Johnson and Duke test supports the Poe et al test and identifies that more intensive moorland is also divergent (i.e. results are shown statistically not to be transferable between samples in a benefits transfer exercise). From these results there appears to be a trend: willingness to pay amounts are lowest when using the experienced utility concept to measure values.

Treatments 3 and 4 - Remembered Utility

So what of the impact of memory? With the exception of less intensive fringe management, all willingness to pay for management variables increase in terms of preference for current management levels in the third treatment, however, they only diverge significantly from the experience based measures of value in the case of less intensive moorland and less intensive fringe management. Perhaps more importantly is that the results of treatment 3 do not diverge from the results of decision utility when tested using the Poe et al test and only in more intensive farmland management when tested using the Johnson and Duke test. By the fourth treatment these mean willingness to pay estimates have returned to essentially the same level as in the first treatment as shown by both the Poe et al and Johnston and Duke tests.

Impacts of Learning

As was mentioned above one argument for the changes identified between decision based measures of willingness to pay and experience based measures would be learning. We would argue that this was not supported for two reasons. Firstly the variation in results between the moment of experience and memory based measures of willingness to pay suggest that the variation is not based on learning. Secondly the analysis presented in Table 4.7 shows that trends in willingness to pay variation (with the proviso that levels of significance are obviously lower for these smaller subsamples) between individuals with more and less experience of the park are essentially the same, although the absolute level of preference varies, as would be expected.

Table 4.7 Impacts of experience across individual with divergent knowledge.

Variable	Predicted High User (n=26)	Experienced High User (n=26)	Proportional Change	Predicted Low User (n=24)	Experienced Low User (n=24)	Proportional Change
Moor LI	-£14.20 (£26.70) (NS)	-£54.24 (£33.76)	0.26	-£3.58 (£16.39) (NS)	-£36.25 (£19.61)*	0.10
Moor MI	-£95.65 (£38.32)**	-£78.34 (£52.56)(NS)	1.22	-£62.79 (£22.59)***	-£24.03 (£20.62)(NS)	2.61
Fringe LI	-£66.75 (£31.05)**	-£85.83 (£48.09)*	0.77	-£31.94 (£20.56) (NS)	-£45.87 (£19.35)*	0.70
Fringe MI	-£14.92 (£26.12) (NS)	-£20.81 (£38.61) (NS)	0.71	-£30.27 (£18.28)*	-£15.91 (£16.89)(NS)	1.90
Farm LI	-£87.91 (£29.00)***	-£54.20 (£44.30)(NS)	1.62	-£52.23 (£30.47)*	-£15.08 (£20.79)(NS)	3.46
Farm MI	-£165.06 (£42.78)***	-£103.93 (£62.62)*	1.59	-£56.33 (£29.24)*	-£31.08 (£25.94)(NS)	1.81
Path Degraded	£6.30 (£19.63)(NS)	£37.52 (£41.86) (NS)	0.17	£34.47 (£21.50)(NS)	£11.02 (£13.91)(NS)	3.14
Path Improved	£52.18 (£36.17)(NS)	-£28.68 (£59.82) (NS)	1.82	£26.81 (£25.93)(NS)	£14.12 (£19.45)(NS)	1.90

Note: Two individuals responded in such a way as to invalidate their inclusion in this analysis.

As can be seen from Table 4.7 when identifying the proportional change in WTP given an experienced based measure of WTP operates in the same direction for high and low users of the park in all but two cases. These are more intensive fringe management and the degraded footpath network. Both of which have limited or no levels of significance in any of the treatments. We do observe that there is a relatively greater **proportional** reduction in willingness to pay to avoid more intensive moorland

management and less intensive farmland management from those who stated they rarely 'visited' the national park[30]. It may be considered that some level of learning is being observed here but again the levels of significance of the second treatment in particular brings this somewhat into doubt. However, generally the patterns are similar and are operating in the same direction (with the exception of relatively insignificant variables) which suggests that experience is having an impact upon WTP and that what we are observing is not a learning effect.

One unexpected result presented in Table 4.4 is the positive value associated with a degraded foot path network. At first it was difficult to determine why such a result would be found. However, upon re-analysis of the individuals involved in this survey it was noted that participants chosen were 'non users' (did not regularly use the park for recreational purposes) of the national park despite their close proximity. It could be concluded that these individuals see the footpath network, amongst other attributes, as what attracts visitors to the national park. Given that a relatively small area is one of the most visited national parks in the UK, indeed it is claimed to be the second most visited national park in the world, visitation rate must have a significant impact on those living in proximity to the park and reliant upon the trunk roads running through the park for daily access to resources.

Congestion in the park has been identified as significant during periods of peak visitation (the idea of the first rural congestion charge was put forward for the Peak

[30] The levels of visitation were drawn from a question: How often do you visit the Peak District National Park? Low users are identified as those who visit the park less than every 3 months. Note for the purposes of the research visitation included driving through the park as the sample was chosen to be relatively low recreational users of the park.

District in 2004). It is possible that those living on the boundaries of the park identify elements of park management which increase visitation (and that they make no or limited use of) as having a negative impact upon their own utility due to vehicular congestion caused by sightseeing tourists. The alternative explanation is that, despite significant effort on the part of the researchers, during the experimental design the dominance of management variables over footpath network variables was not avoided.

A range of socioeconomic factors were included in the analysis. Sex and age, however, were the only characteristics significant in any models (and were significant in all treatments). These suggest that women in particular, and to a somewhat lesser extent older individuals, are more likely to choose either option A or B over the status quo.

4.7 Conclusions

The proposition of the New Benthamites such as Kahneman is that the moment of experience impacts on utility for goods. They suggest that individuals are inefficient in determining utility maximising consumption behaviour ex ante, as they are poor at forecasting the utility that will be experienced from a decision. They propose that an analysis of experienced utility gives a better measure of happiness and therefore utility than one based on decision utility. Experienced utility has been put forward, by the New Benthamites, as a preferable basis for assessing the public values of changes in environmental goods (although not, it should be admitted, by asking people their willingness to pay for changes in experienced utility).

The current research aims to identify if the moment of experience impacts on individual's preferences for environmental goods, such that environmental values differ according to which concept or utility is used: ex ante decision utility, or "moment of consumption" experienced utility. Additionally, we examine the effects of memory on willingness to pay. There is no statistically significant divergence in the results found between an initial willingness to pay (first treatment) and a final (fourth treatment) willingness to pay which to all intents and purposes did not diverge. Upon visitation and experience of management in the National Park mean values fell by almost half for current levels of management intensity over a general shift to more OR less intensively managed landscapes.

This chapter tests the hypothesis that decision, experienced and remembered utility will diverge for environmental goods in the same way as they have been found to for other goods. The results at the very least suggest that further research on the topic is required and suggests that experience does indeed have an impact on the preference for environmental goods. Memory leads to a shift in mean willingness to pay to an intermediary level between the 2nd and 3rd treatments in the short term and between the 3rd and 4th treatments in the longer term. In our case, this seems to mitigate the impact of experience all together. The one exception is in the value associated with less intensive moorland fringe habitats (note that this is also the only landscape category to show a potential learning impact in the high and low user analysis presented in Table 4.7). These are probably the most unfamiliar habitats to the average person on the street. The implication is that where there is limited prior exposure to an environmental good, experience can alter long term preferences,

whilst familiar attributes are valued the same in both “decision utility” and “remembered utility” terms. This is an interesting result as it implies that for familiar goods decision and remembered utility yield very similar results so measures are relatively interchangeable. However, where there is a lack of familiarity with a resource then experience and memory of experience may impact on values derived and therefore the transferability of estimates.

In terms of identification of the best ‘point’ to undertake valuation of unfamiliar goods, it seems clear that the remembered utility value may be considered to be the most appropriate, giving time to become familiar with a good and to construct well ordered preferences. However, it is also accepted that this may not always be possible (in fact it is likely that this will often be the case). The nature of surveys of preference for the natural environment mean that use value surveys tend to take place on site and non use off site (e.g. through postal surveys). This dissertation does not argue that these approaches are inappropriate merely that an awareness of the timing / location of a survey has implications for the comparison of the results with surveys conducted differently.

Finally, we note that we have not controlled for changes in information which individuals hold between treatments 3 and 4: individuals may have been exposed to many more environmental “good causes” or learnt more about the Peak District in the period between the sessions, which caused them to revise their preferences or attitudes (although diaries kept by participants between the workshops suggest that this was not the case not all participants completed these diaries). Both additional information and “time to think” have been shown to change willingness to pay in

other workshop approaches to environmental valuation (MacMillan et al, 2003; MacMillan et al, 2006).

One question which is raised from the research is whether the fourth (remembered utility) and first (decision utility) treatments are relatively the same because the initial level is in fact based upon remembered experience prior to the workshop; whether over time the impact of experience is negated and an individual's preferences return to the same level; or whether the level with no experience of the landscape (in terms of the questions being asked) is by chance convergent with a fully informed remembered level of willingness to pay. We also note that whilst the values obtained in Treatment 2 are at the "point of consumption" in terms of the levels of each attribute in the Choice Experiment, they do not relate to real outcomes where individuals have paid a higher tax, and then waited for different environmental qualities to emerge. In this sense, our measures based on experienced utility are not really equivalent to what Kahneman advocates in his experience sampling (proactive approach) or day reconstruction (retrospective approach) approaches, since we are still dealing with hypothetical choices, even if the context is real. Behavioural psychologists might thus find problems with our approach.

In terms of policy implications, Loomes (2006) and Kahneman and Sugden (2005) note that experienced utility does not necessarily give results consistent with the dynamics of the decision making process. Decision at the landscape scale are made at a governmental level, and assuming that the government aims to provide socially optimal levels of public goods, then preferences of individuals (once identified) should inform policy. But the measure of utility which is most relevant in terms of

winning votes is decision utility. This will be the value in an individual's mind at the time of voting (a fuller consideration of the appropriateness of each measure for policy analysis can be found in chapter 7). Loomes (2006) suggests that this may lead to the policy which makes people better off in the long term not being implemented as it is not a "recipe for electoral success"(pp.734).

Chapter 5: Heuristics and Bias: Impacts of additional information

5.1 Chapter Summary

One aspect of the critiques of environmental valuation presented by behavioural psychologists is that analyses are reliant upon the information presented to individuals (Kahnemand and Sugden, 2005)[31]. Drawing on a parallel and closely related literature to that presented in Chapter 4, Prospect Theory (Kahneman and Tversky, 1979), proposed as an alternative to expected utility theory, identified that heuristic rules played an important role in decision making. Recent work by Bateman et al (2009) shows that in the absence of full information heuristic rules may impact on stated preferences for environmental goods.

The aim of this chapter is to identify if and how additional information impacts on willingness to pay for management in the national park. As identified in table 1.1 this is achieved by investigating the impacts of additional information on the preferences of individuals for upland landscapes and identification of the role of heuristics and the nature of information presented in valuation. This allows us to test the hypothesis that factors which influence heuristics rules associated with an environmental good will in turn influence preference for that good.

Firstly it should be pointed out that this chapter uses the same workshop participants and Choice Experiment as the research presented in Chapter 4, as such much of the background of the research and attributes used has already been covered. Again the Choice Experiment method is used, with the same experiment

[31] Although this also an old concern of environmental economics.

being applied to the same sample as was detailed in Chapter 4. Two further experiments were conducted following rounds of expert witness testimony.

The additional information was presented to the individuals at the second workshop outlined in Chapter 4 after they completed the Choice Experiment identified above as Remembered 2. As such this experiment became the baseline against which the impact of information could be gauged. The first experiment (Biodiversity + Farmer) was conducted following information presented by an expert in the impacts upon biodiversity of changed management regimes, and a farmer. The second experiment (Historical) was conducted following a further round of information on the history of management and landscape in the national park.

It is found that fuller information plays a role in determining willingness to pay, but that individuals' perceptions of the relative impact of information may not be reflected in changes to willingness to pay.

5.2 Introduction

The impact of information on preferences has recently become an increasingly investigated topic in the literature, and is often presented as a critique of stated preference techniques or in the way in which they are applied (Kahneman and Sugden 2005). Much of this research has focused on the use of novel techniques such as citizen's juries to mitigate the problems of a lack of information in the usual way in which stated preference techniques are applied (e.g. Alvarez-Farizo et al 2007, Robinson et al 2008).

Traditional economic theory suggests that individual's choices regarding trade off between goods will depend on the attributes of the goods (Lancaster (1966) and Rosen (1974)), a critical underpinning of Choice Experimentation. However, as Bateman et al (2009) identify, there are "virtually infinite" potential goods and provision changes which make it inefficient (or indeed impossible) for individuals to have comprehensive informed prior preferences. Of course economic theory does not require that such a priori preferences are held (Carson and Groves, 2007). Preferences are assumed to be formed as required based upon the information presented to an individual (Bateman et al 2009). Given the likelihood that we are dealing with unformed preferences in environmental valuation exercises information presented to individuals is critical to this process of developing preferences.

The normal approaches taken in the application of Choice Experiments are by mail shot, face to face interviews or, increasingly, internet based surveys. There are issues with each of these with monitoring uptake of information, whether the information presented in order that informed choices are made is actually referenced. Equally there tends to be a difficult balance to be struck between presenting information in a concise and understandable manner in sufficient detail not to deter all but the intrepid from ploughing through it to get to the stage of completing the experiment in a rationally informed way.

One approach adopted by Barkmann et al (2008) was to develop surveys based upon the perceived ecosystem services, i.e. based upon investigation into respondent perceptions rather than basing analysis on expert knowledge. Whilst this approach leads to easily understandable experiments which lay individuals can easily complete if

the results are not applicable in a policy framework this will draw the approach into serious doubt. Similar approaches have been undertaken by Gourlay and Slee (1998) and Palmer (2004) asking individuals about the landscape characteristics' they would like to see in specific areas. Vouligny et al (2009) show using an 'experiential approach[32], (i.e. one involving lay people) to inform the landscape planning process is necessary to identify appropriate policy.

Others such as Pichert and Katsikopoulos (2008) raise issues of inconsistency in environmental behaviour (for green energy) in that a stated willingness to pay is not reflected in actual purchasing patterns. They identify that information presentation can play a key role in the decision making process and in some cases mitigate against these inconsistencies. Also, interestingly for the current research, they identify that the default position (status quo as identified here) is key to actual behaviour and that the default position determines likely consumption behaviour. That is if green energy is the default supplier individuals tend not to accept a move to grey energy and if grey energy is the default they tend not to pay to move to a green energy supplier.

In the current research two methodologies were used, workshops (as presented in this Chapter and Chapter 4) and face to face onsite surveys (as presented in Chapter 6). A relatively general landscape impact was adopted in the appearance of the landscape of the Peak District National Park. If it is accepted that the policy of agri-environmental schemes can only encourage activity and uptake will not be universal this general trend of change was thought to be most relevant. But this

[32] This is the term Vouligny et al use and is not the same as the experience based measure of utility we identify in Chapter 4, it refers to design using input from lay people rather than experts.

raises a further issue in the application of stated preference techniques; where there is uncertainty about the outcomes of a potential policy how does one accurately reflect the outcomes to participants of an experiment.

Munro and Hanley (1999) identify that information plays a key role in the formation of value and show that this is important when considering the valuation of non-market goods where knowledge of the good may be limited. Indeed comprehension of the information provided in a valuation exercise upon which preferences are developed cannot be assumed (Green and Tunstall, 1999). Bateman et al (2009) use GIS applications to develop virtual landscapes displaying alternative landscape outcomes of changed management; this is similar to work being carried out at the Macaulay Land-use Research Institute with their virtual landscape theatre.

The research presented in Chapter 4 used landscape matching without reliance upon the virtual elements as, given the management outcomes identified in the development stage, this alternative was a possibility. Indeed the costs and the quality of virtual reality (and technological constraints) may impact on the applicability of these approaches, not least as they require a swathe of additional technical abilities, which mean the use of these virtual landscapes is likely to be limited to research specifically funded to adopt these approaches. However, they do have the advantage of identifying landscape change at the whole landscape level and provide the capacity to introduce landscape characteristics which are not currently present.

The Bateman et al (2009) research focussed on nature reserve area, flooding and flood management of the North Norfolk Coast and used “flight paths” to display alternative management outcomes. They displayed information in different ways to

different groups of participants and found that virtual representation of information was superior to numeric representation in that it reduces gain loss asymmetries[33]. This has some implications for the current research in that choice cards were presented with numeric data only but visual information was available to participants during the Choice Experiment. Bateman et al (2009) identify that heuristic rules are impacted by the way in which information is presented whilst the current research concludes that it is experience which impacts.

Which aspect (experience or alternative information presentation) is of greater importance is a question which should be further investigated as both studies include some aspects of each. The conclusion which seems apparent is that experience impacts on preference but so could the way in which information is presented and it is not possible to separate out the impacts as one is reliant on the other. However, the inclusion of the impact of memory in the current research suggests that experience itself is of greatest importance as heuristic rules of thumb do not fully carry over between treatments. That is, whilst no additional information is presented between treatments 2, 3 and 4 reported in the previous chapter, preferences clearly change: it would not be expected that heuristic rules would be as transient once formed.

Given the difficulties of full presentation of information, preferences elicited through stated preference techniques are likely to be a fairly shaky basis upon which to pin policy as they will be based upon imperfect information (Alvarez-Farizo & Hanley 2006 and Christie et al. 2006). Obviously, as was discussed, Cost Benefit

[33] That is it reduces the divergence between willingness to pay and willingness to accept based measures of value, thus providing more consistent (and by assumption more accurate) measures.

Analysis does not require fully informed individuals, but where limited information is held results will not reflect reality. Sugden (2007) indeed identifies Cost Benefit Analysis can be used as a market simulation, the requirement in his approach that utility is measured at the instant of consumption has implications for which of the values derived in the previous chapter are appropriate for policy analysis, a point which will be returned to in the concluding chapter. Whilst it is thought that the current research provided sufficient information upon which to identify preferences it was identified that in three ways it avoided certain levels of complexity.

Firstly the information about diversity impacts was somewhat simplified, the complexity of management, ecology and biodiversity interactions were considered too complex to get across to lay people by anyone other than an expert witness. The impacts on farmers were deliberately not included in the initial information[34] presented. The impacts of any policy are unclear and it was not an objective of the current research to identify preferences for land abandonment or farm incomes. However, agri-environmental policies could have significant impact upon these. Also it is extremely difficult to convey farmers' opinions of the potential impact of policy on landscape and farm diversity without the use of expert witness testimony.

Finally from the evidence gathered in the stakeholder workshops presented in Chapter 2 it is clear that there is uncertainty within this group of the historical landscape character and indeed drivers of this change, let alone within the general public. Historical information has been shown to impact on landscape preferences

[34] With the exception of the simplified underlying biodiversity information presented in the initial experiments.

(Hanley et al 2008); one of the authors of that paper Dr Althea Davis, currently working on the environmental history of the Peak District National Park, presented information on the historical landscape characteristics to participants.

All of the above can be considered in some way or another additional ecosystem services in the uplands in response to a shift towards changed management intensity (from the services identified in the introductory chapter these fall into the categories of biodiversity, food and fibre and cultural heritage respectively). As such they were not included in the initial analysis as most members of the public would not be aware of these elements and therefore they would not enter their utility functions in the absence of some form of public education (whether that would occur through the media given changes to management practice or a policy of education by public bodies). They would therefore be likely to only amend preference after the initial impacts of a policy in terms of landscape features were felt.

Again this brings us back to the question of which value is the relevant to policy analysis, the level of awareness of policy features will play a role in the development of public preferences. Whilst citizens juries may inform policies it is still no guarantee that policies developed based on this information will be popular with the public unless they are given and (perhaps more importantly) accept full information, in a world of cognitive overload of the carrying capacity for individual's decision making (see Chapter 2). That is which social good should we be promoting, the one the general public show greatest preference for or the one that we anticipate a fully informed public would prefer? And at what point do the existing techniques for

valuation become inefficient at informing policy given issues of complexity of information?

5.3 Expert Witnesses

The analysis below is based upon the same individuals as the previous chapter, using the same Choice Experiment design (indeed using identical choice cards) and results are analysed using the error component model in combination with the Poe et al and Johnston and Duke tests of transfer errors. Given this use of the same scenario, methodology, sample, experimental design and analytical techniques (as summarised in Chapter 3) this information has not been represented in this chapter. As such it seems relevant to move straight onto details of the information that was presented to participants.

5.3.1 Biodiversity Impacts

The first expert witness (Dr. Martin Dallimer, University of Sheffield) concentrated on the impacts of management on changes to vegetation and in particular the impacts on bird species numbers. He worked through the landscape types and drew out key messages for diversity in each.

Moorland Fringe

It was identified that moorland fringe habitats had suffered the greatest losses of species numbers and diversity. Threatened and extinct species from this habitat were discussed: Black grouse (Tetrao tetrix) – extinct in the Peak District[35]; Twite (Carduelis

[35] Black grouse, once widespread across Britain, is one of the most rapidly declining birds in the UK and populations have become fragmented. One of the main contributors is the loss of important food for

flavirostris) -down to a handful of sites and a few pairs[36]; and Grey Partridge (*Perdix perdix)* - numbers are low and falling[37].

It was identified that the scenarios presented as "no change to management intensity" or "more intensive management" on Moorland Fringe habitats will lead to further declines in twite (Carduelis flavirostris), lapwings (Vanellus vanellus) and snipe (Gallinago gallinago) in addition to the species already identified to participants in the earlier information.

Finally the loss of the rough, unkempt areas between the moor and the farmland that have largely disappeared in recent decades was discussed along with the observation that in many places bright green farmland simply butts onto moorland, with no fringe in between so no space for many of the birds to make a living. This information had already been presented to participants but the expert witness testimony acted as further reinforcement.

Farmland

A decrease in farmland management intensity was identified as likely to lead to more wild areas, woodland and scrub, and places for birds to use. This was related to an expectation of more redpolls (Carduelis cabaret), pied flycatchers (Ficedula hypoleuca), skylarks (Alauda arvensis), yellowhammers (Emberiza citronella), lapwings (Vanellus vanellus) and snipe (Gallinago gallinago).

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the grouse due to changed land management. It is now mostly confined to parts of the Scottish uplands. (www.ukbap.org.uk/UKPlans.aspx?ID=596/)

[36] A summer visitor, upland areas are of great importance to the species as most breeding takes place here. (www.rspb.org.uk/wildlife/birdguide)

[37] Declining due to loss of nest sites and cover as a result of increasing intensity of farming. (www.ukbap.org.uk/UKPlans.aspx?ID=506/)

More intensive management was identified as likely to lead to ever-increasing numbers of the common bird species you see everywhere such as crows, robins and chaffinches. This would lead to the loss of the local biodiversity character of the farmland in the Peak District.

Moorland

It was identified that increased levels of management might be good, to a certain extent for red grouse(Lagopus lagopus), meadow pipits (Anthus pratensis) and even golden plovers (Pluvialis apricaria), all of which flourish on a well-managed moor. However, if burning and grazing levels were too high, then there would be a loss of heather altogether and hence a loss of all moorland species. However, given the current levels of management, many moorland species, such as golden plover (Pluvialis apricaria) and curlew (Numenius arquata) are "not doing too badly".

Decreased management intentisy would lead to a moorland that is more shrubby and had deeper heather growth. This would favour species such as stonechats (Saxicola torquata), whinchats (Saxicola rubetra) and perhaps some of the upland species that like more wooded areas such as such as pied flycatchers (Ficedula hypoleuca) and redstarts (Phoenicurus phoenicurus) [38].

5.3.2 Agricultural Stakeholders

Much of the information presented by the representative of the farming community has already been covered earlier in this dissertation, see Chapter 2. In summary the

[38] Redpolls, Skylarks, Yellowhammers and Lapwings are on the Red List and Snipe, Red Grouse, Meadow Pipits, Golden Plovers, Curlew, Whinchats, Pied Flycatchers and Redstarts are on the Amber List after dramatic declines in recent years. (www.rspb.org.uk/wildlife/birdguide)

evidence revolved around the problems faced by upland farmers of low incomes and reliance upon subsidies. The issue of abandonment was raised given that the farmer felt that this would be a more likely outcome than an increase in management intensity if no further income was made available. It was assumed in the research that the zero cost option would lead to increased intensity, it should be noted (and was to participants in the initial information presented and again after the farmers presentation) that there is an existing level of public spending on agri-environmental schemes. The zero cost option is therefore to maintain current spending, but in order to allow farmers to survive (accepting that abandonment would not be a policy aim) given inflationary pressures it was assumed that increased intensity would have to be allowed.

The farmer also called into question the benefits of less intensive management, identifying that although some species would increase in numbers other species would likely decline. This had been covered in the information presented to participants, it was made clear that an absolute increase in bird numbers was not being considered but rather a change to a more diverse system, i.e. more species with sustainable populations, but no increased chance of seeing birds.

After these data were presented a further Choice Experiment was administered, this is identified as experiment 5 (Biodiversity and Farmer) in the results section below.

5.3.3 Historical Information

Information was presented by Dr. Althea Davis (School of Biology and Environmental Sciences, University of Stirling) on the historical appearance and management of the

National Park. The information presented related to how a historical perspective could inform about risks to and the future of landscapes in the National Park.

The information presented focussed on the visual impact on landscape but other factors were also discussed. Three time frames were identified, "pre-management", "pre-sheep" and "the present". Impacts of potential abandonment were also discussed. The lists below under each topic identify the main points raised (Note: Much of this text was provided by Dr. Althea Davis). Photographic information[39] supported the key points covered which are listed below:

Pre-management species differences:

- The "earliest" Peak District contained woods (alder, lime, ash lowland, pine, oak, elm upland with birch, hazel and willow scrub). This was scrubby woodland not closed woodland canopy.
- Peat formation started c. 9000 years Before Present[40] (BP), but took nearly 5000 years to spread. This process of peat formation was possibly accentuated by hunter-gatherers and grazers on higher and more exposed plateaux (i.e. they encouraged a change in species structures which promoted peat formation).
- Woodland began to be lost from c. 5500 BP, especially from c.2000 BP due to a combination of clearance (human removal of trees), climate change and soil

[39] However, all of these photographs are copyright protected (i.e. Whilst Dr Davis had permission to use these photos for the purpose of presentation at the workshops it has not been possible to organise permission to present them in a publically available publication – which this dissertation will be given the University of Stirling's Electronic Thesis Repository)

[40] The year 1950 is used in archaeology and geology as a baseline of the 'present'.

deterioration. This process led to the formation of predominantly open moorland by c.2000 BP

- The Peak District has a long history of farming, dating back to the Neolithic. The first farmers appeared around c. 6000 BP, epitomised by small field systems. More extensive agriculture was not present until the Bronze Age c. 4000 BP or the Iron Age c. 2000 BP
- Moorland landscapes were more diverse before this spread of more intensive management.
- Peat cutting has been present since at least the 13th C, and domestic peat-cutting has removed an estimated 40-50% of blanket peat surface areas in parts of the South Pennines.

<u>"Pre-sheep" landscape</u>:

- Sheep farms have been present under monastic control, on the limestone plateaux especially, since medieval period (12-14th C). These had associated valley-bottom villages and open fields on gritstone (e.g. Derwent valley). There were also scattered farms in Northern and Western parts of Peak District, which included areas of common grazing and peat cutting on open moors.
- The boundary between farm and moorland therefore fluctuated through time, depending on the fortunes of farming and need. Moorland fringe habitats have therefore varied in scope and locale over the centuries.
- In terms of "landscape character": drystone wall divisions formed from the 16th to the 19th century, related to shifts to sheep farming, especially c.1750-1850. This

process created the field patterns now visible. In addition this process involved the building of barns in fields away from farms/villages.

- At times there have been large private 'improvements' to land, e.g. the Chatsworth Estate, where earlier field systems were swept away to make way for a more open landscape. The modern road system started with 18th C turnpikes. Also in the 18th C grouse moors began to be formed. The 19th C saw the development of extensive mining and quarry workings.

<u>To present</u>:

- There has been a homogenisation of landscape over the last c.150-200 years, formerly there was a greater mosaic and diversity. This homogenisation has been caused by more intensified exploitation – including increases to the extent of burning and grazing, with implications for erosion. This increase in intensity has led to an exacerbation to the severity and scale of (peat) erosion on the moorland but also impacts on soil stability for farmland in the valley bottoms.
- The 20th C saw the building of reservoirs and increases in afforestation.
- Reductions in cattle grazing in the 20th C led to a spread of bracken: although additional climate contribution is likely with fewer frosts which help keep bracken in check.

<u>Potential abandonment impacts</u>:

- Abandonment may lead to increase scrub and wood growth in valleys, a loss of open ground/meadow species as many species are now dependent on conditions created by centuries of management leading to an absence of "natural" habitats. *This was also linked back to the biodiversity expert witness testimony.*

- Also abandonment may lead to potential scrub or scattered tree growth (birch) on moors due to lower grazing pressures.
- There would also likely be an increase in the risk of catastrophic wildfires – due to accumulated fuel loads, which leads to further risk of igniting peat, which would have severe erosion and water quality implications.

5.4 Results

In considering these results it is important to once more reiterate that (as in Chapter 4) the results presented are for the same people answering the same questions, the only difference between an experiment and the proceeding one is the information presented between them. Treatment 'Remembered 2' as was presented in Chapter 4 is the appropriate baseline against which to consider the impacts of information on preference. This was the experiment completed four months after the initial workshop was run. This Choice Experiment was completed at the beginning of the second workshop (after an explanation of how the workshop would be structured and background information had been represented). Immediately after the experiment had been completed the first and second information sets (biodiversity and farmer) were presented to the participants and a further experiment was administered (Experiment 5) and finally the third expert testimony (historical) was presented followed by the last Choice Experiment (Experiment 6). Table 5.1 shows estimate Coefficients for each treatment, Table 5.2 identifies the coding used, Table 5.3 identifies implicit prices calculated for each treatment and Table 5.4 gives the results of tests of variation between implicit price estimates (as the choices are identical to those presented in Chapter 4 the same sample choice card (Table 4.1) is relevant).

Table 5.1 Additional Information: Error component logit model Coefficients for each treatment.

Treatment	*Baseline (Remembered2)*		*Biodiversity and Farmer*		*Historical*	
	Coef.	*S.e.*	*Coef.*	*S.e.*	*Coef.*	*S.e.*
Mean Values						
Const	**-1.600**	0.704	-0.507	0.604	-0.185	0.620
MoorLI	-0.137	0.256	-0.087	0.171	-0.065	0.188
MoorMI	**-0.949**	0.302	**-0.514**	0.259	**-0.617**	0.205
FringeLI	-0.428	0.237	-0.252	0.214	-0.369	0.202
FringeMI	-0.248	0.243	**-0.388**	0.183	-0.094	0.292
FarmLI	**-0.805**	0.243	**-0.426**	0.210	**-0.460**	0.232
FarmMI	**-1.100**	0.325	**-0.964**	0.270	**-1.184**	0.324
PathD	0.093	0.162	0.206	0.124	0.191	0.181
PathI	0.342	0.278	0.518	0.201	0.478	0.278
TAX	**-0.014**	0.001	**-0.014**	0.001	**-0.014**	0.001
INCOME	-0.001	0.009	-0.003	0.009	-0.004	0.009
FEMALE	**2.188**	0.371	**2.146**	0.378	**2.133**	0.370
AGE	**0.034**	0.008	**0.032**	0.008	**0.031**	0.007
Error component						
Sigma	**2.595**	0.190	**2.601**	0.190	**2.591**	0.183
Pseudo R^2	0.22		0.22		0.22	
Log Likelihood	-3738		-3744		-3739	

Where Sigma can be interpreted as an estimate of the impacts of unobserved random effects. The large and significant error component suggests correlation of the unobservable portion of the utility of alternatives A and B. *Coefficients found to be statistically significant at the 5 percent level are indicated in bold).*
N=50 in all cases

Table 5.2 Additional Information: Explanation of variable abbreviations and coding in Table 5.1 and 5.3

Const	Constant term (= 0 for baseline zero cost, = 1 for option A or B)
MoorLI	Shift to less intensive moorland management (dummy coded)
MoorMI	Shift to more intensive moorland management (dummy coded)
FringeLI	Shift to less intensive moorland fringe management (dummy coded)
FringeMI	Shift to more intensive moorland fringe management (dummy coded)
FarmLI	Shift to less intensive valley bottom farmland management (dummy coded)
FarmMI	Shift to more intensive valley bottom farmland management (dummy coded)
PathD	Degraded footpath network (dummy coded)
PathI	Improved footpath network (dummy coded)
TAX	Tax increase to the household indicated in pounds (absolute number)
INCOME	Household income (absolute number) (Interacted with ASC)
FEMALE	Gender (Female = 1, Male = 0) (Interacted with ASC)
AGE	Respondent's age in years (Interacted with ASC)

Table 5.3 Additional Information: WTP for a change from the current level of provision.

Variable	Baseline (Remembered2)	Biodiversity and Farmer	Historical
Moor LI	-£10.01 (£18.67)(NS)	-£6.40 (£12.61)(NS)	£4.63 (£13.34) (NS)
Moor MI	-£69.31 (£22.58)***	-£37.92 (£19.36)*	-£43.67 (£14.58)***
Fringe LI	-£31.24 (£17.28)*	-£18.63 (£15.84)(NS)	-£26.17 (£14.37)*
Fringe MI	-£18.13 (£17.87)(NS)	-£28.68 (£13.83)**	-£6.66 (£20.67)(NS)
Farm LI	-£58.80 (£18.39)***	-£31.46 (£15.82)**	-£32.52 (£16.84)*
Farm MI	-£80.33 (£23.79)***	-£71.22 (£19.83)***	-£83.77 (£23.76)***
Path Degraded	£6.81 (£11.88)(NS)	£15.26 (£9.48) (NS)	£13.49 (£13.01)(NS)
Path Improved	£24.95 (£20.28)(NS)	£38.26 (£15.02) **	£33.85 (£19.82)*

Figures in brackets are standard errors *** = significant at the 1% level. **= 5%. * = 10%.

Table 5.4 Additional Information: Poe et al. Complete Combinatorial Convolutions Test

Variable	Remembered 2 vs Biodiversity and Farmer	Remembered 2 vs Historical	Biodiversity and Farmer vs Historical
Moor LI	0.42	0.24	0.26
Moor MI	0.14	0.16	0.57
Fringe LI	0.29	0.40	0.62
Fringe MI	0.71	0.33	0.16
Farm LI	0.14	0.15	0.50
Farm MI	0.39	0.52	0.64
Path Deg.	0.27	0.36	0.57
Path Imp.	0.28	0.39	0.61

Table 5.5 Additional Information: Johnson and Duke Test of Transfer Error

Variable	Remembered 2 vs Biodiversity and Farmer		Remembered 2 vs Historical		Biodiversity and Farmer vs Historical	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Moor LI	0.60	0.44	0.78	0.25	0.75	0.27
Moor MI	**0.91**	0.20	**0.90**	0.23	0.49	0.63
Fringe LI	0.75	0.34	0.66	0.45	0.41	0.66
Fringe MI	0.32	0.74	0.69	0.35	0.87	0.19
Farm LI	**0.91**	0.20	**0.90**	0.21	0.56	0.55
Farm MI	0.71	0.49	0.57	0.62	0.46	0.72
Path Deg.	0.71	0.26	0.63	0.35	0.39	0.53
Path Imp.	0.69	0.24	0.57	0.36	0.34	0.54

Again as was found in the experiments presented in Chapter 4 it is interesting to note that the signs attached to landscape features are negative for all significant estimates implying that the current levels of management are preferred over any change to more or less intensive management practices. Willingness to pay estimates associated with less intensive management of moorland landscapes are insignificant in all cases. And, unsurprisingly given that this is for the same sample and that little information was presented on access features between experiments, the same positive willingness to pay is associated with a degraded footpath network. The willingness to pay to avoid more intensive management on the moorland landscape falls significantly (see Table 5.3) between the analysis in experiment 4 and 5 and remains relatively constant into experiment 6. Indeed as can be seen in Table 5.4 and 5.5 no statistically significant differences are found between treatments 5 and 6 by either the Poe et al or Johnson and Duke tests. An almost identical relationship between experiments is found for less intensive management on farmland, the value almost halves between experiment 4 and experiments 5 and 6 (again a difference in one bound is shown by the Johnson and Duke test, although not by the Poe et al test).

Generally it can be seen that the information on biodiversity and agricultural impacts has a fairly large impact on willingness to pay for certain management regimes on some landscapes but that additional historical information does not appear to then impact on willingness to pay estimates in any significant way. The one exception is a higher willingness to pay to avoid more intensive management on farmland landscapes. However, this one exception of an increase in importance to individuals of farmland landscapes is not entirely unexpected. The topographic nature of the

landscape tends to lead to a dominance of farmland in photographs. In order to include all the habitats considered and in particular fringe habitats in images the photographer has the choice of placing farmland in the foreground or of it dominating the background due to the way it stretches away down the valleys. In the landscape matching activity presented in Chapter 4 individuals were immersed in the landscape but photographs don't offer the same opportunity.

The result that historical data does little to additionally influence willingness to pay (compared to experiments just informed by biodiversity and agricultural information), was somewhat unexpected. In the closing round table on the research where participants were asked to relate their experience and memories' of the research there was a general consensus amongst participants that they found the historical information extremely interesting and that it was one of the main things many of them considered they would take away from participation in the research as it would impact on the way they looked at the landscape. It should be noted that these individuals were not asked what was most interesting to them this result came from a general discussion about the research.

One possible explanation of the lack of impact of historical information compared to biodiversity and farmers information is the way in which the information impacts. Historical information may impact on the way the landscape is considered but does not necessarily impact on the understanding associated with the Choice Experiment. The data relating to biodiversity and farmers impacts on the value of the underlying impacts associated with management intensity change. That is the data presented in experiment 5 relates to outcomes of management intensity change

whereas the information on historical information provides an input to the way in which landscapes are considered.

5.4 Discussion

So it seems clear, as has been shown by others (Alvarez-Farazio and Hanley 2006, Munro and Hanley 1999, Green and Tunstall 1999, Bateman et al. 2009 etc.), that information can impact on willingness to pay for landscapes and that a better public understanding of ecosystem services (for example through the use of citizen juries) in particular could have a significant impact on preferences for different policies. However, it would appear that the information that people find most interesting is not necessarily going to have a significant impact on willingness to pay. Whilst others such as Hanley, Ready et al (2009 JEM) have shown historical information to have an impact on willingness to pay for landscape features we did not find the same in the all cases in the current experiment. However, Hanley et al's approach differed from ours significantly in that the historical information presented was based upon historic maps and literary references to landscapes rather than the expert witness testimony adopted here.

It should be noted that the nature of the information may play a role in this divergence between "interest" in information and impact on willingness to pay. The biological and farmer information relates specifically to the impacts of changing attribute levels. The historical information relates more to the overall context of these changes. These are obviously not the same; as such it may be that the context of decisions is relatively unimportant to the decision making process (or at least in terms of value formation) when compared to the actual impacts of potential policy change.

From the results presented in this and the previous chapter it is seen that experience, memory and additional information can all impact upon the heuristic rules which individuals use in making choices. As was discussed above this has also been shown recently by Bateman et al (2009) for environmental goods. However, it is interesting that individuals seem ill equipped to identify which information impacts most on their decision making process. This has implications for the use of analyses adopting novel methods of preference elicitation for example the approach suggested by Barkmann et al (2008) and others such as Gourlay and Slee (1998) and Palmer (2004) basing valuation upon individuals perceptions of ecosystem services. Given that identification of heuristic rules may have an impact upon the efficiency of valuation exercises this result gives pause for thought in relation to the ways in which heuristics are identified. For example in the current study initial scoping of preference based upon ranking exercises in the national park identified that two candidate attributes could be dropped, whether this is an appropriate methodology or not should perhaps be further investigated.

It was shown in Chapter 2, using a grounded theory approach, that stakeholder's perceptions did not necessarily reflect true events and processes in the uplands. The results here suggest that a similar bias may exist in the uptake of information by members of the public.

So what are the implications for those designing policy? As was identified in the introductory chapter the consideration of ecosystem services is coming to the forefront of policy analysis in the EU. However, from the research presented above we can see that consideration of wider ecosystem service impacts (such as biodiversity

and economic impacts on the food and fibre industry) in Choice Experiments has an impact on management intensity preferences. It is therefore suggested that valuation approaches should include information on a range of ecosystem services. This in turn has implications for the complexity of valuation exercises should this approach be adopted for policy analysis. Which brings us again to the dichotomy of valuation exercises, without full information the results may be inappropriate for use for policy analysis, but complex studies have significant issues with sample selection bias. As such workshop approaches and citizens juries would be suggested, by the results of the analysis in this chapter, to be superior to approaches such as postal, email or internet based surveys. But is it appropriate to base policy decisions on the opinions of relatively few individuals whose knowledge, by the end of the process, is very different to that of the general public whom they "represent"? And how much complexity and information (accuracy) is too much for even these approaches to start having difficulties?

Chapter 6: Who Wants What?

6.1 Chapter Summary

In this chapter we investigate how the preferences of individuals with different relationships to an environmental resource differ. The approach adopted is again Choice Experiments although on this occasion different samples are used. A raft of previous studies have attempted to identify how and why individuals who relate to an environmental resource value various attributes differently (see Kaltenborn and Bjerke, 2002). We compare the values for local residents identified in Chapter 4 and 5 with values for visitors to and stakeholders involved in agricultural enterprises in the same environmental resource, The Peak District National Park. Choice Experiments involving the same landscape parameters as were presented in Chapter 4 and 5 were used in order to allow this comparison. We identify that preferences for optimal landscape management diverge between these groups.

In addition we investigate the impacts of place attachment on values for local residents in terms of both physical (distance) and stated association with the park. We find that the preferences of those individuals with an association to an environmental resource diverge from those with less association. This result shows what has been described as an "insider/outsider dichotomy" as identified by Jones et al (2000). We are also able to discuss the differences found between those with a physical and stated association with the national park, although the differences are not found to be statistically significant.

Finally, given the results presented in Chapter 4, it was considered to be important to analyse the impacts of experience and memory wherever possible in the

subsequent research. In relation to the visitors survey it was apparent that some individuals surveyed would be at the start of their visit and others at the end (surveys were conducted in car park locations). These two groups allowed us to analyse the impact of having visited the park or not on the values derived. Whilst this was not a measure of the value at the time of experience per se it provided an interesting alternative analysis which yielded interesting results (albeit again with a low level of significance).

6.2 Introduction and Background

The Peak District National Park is (one of) the most visited national parks in the UK. Along with other national parks in the UK it is protected for the characteristics of the multifunctional landscape which exist within the boundaries of the park. A third of the UK's population live within an hour's drive of the national park, it attracts tourists from around the world. Whilst agricultural activity is crucial for the current landscape characteristics of the national park a relatively low number are employed in this sector, in 2002 they numbered 3,606 or 7% of the Park's residents (PDNP Undated). This chapter aims to identify the preferences of individuals with different relationships to the national park for different levels of management intensity, including the resulting biodiversity impacts.

The experimental technique used is essentially identical to that proposed in Chapter 4 with the one or two key exceptions. In relation to visitors to the park the payment vehicle adopted is parking cost rather than taxation. As such the willingness to pay relates to per person per visit to the national park rather than annual willingness to pay per household. However, other than this the same parameters are

included in the analysis so the signs and relative willingness to pay for various attributes can be compared with the results in Chapter 4 and 5 in order to identify any difference in preference for management between visitors and locals (although comparison of absolute 'worth' will not be as easy). In assessing the preferences of the farming community a simplified experiment was required due to time constraints, it was therefore decided not to include footpath network variables.

The visitors survey (face to face) was carried out in April 2008 in Castleton and Edale in the Peak District National Park (see figure 6.1). The PDNP adopts a system of 'honey pot' sites; that is they specifically encourage people to certain key sites by only providing infrastructure (such as parking facilities and visitor centres) at these sites. Castleton and Edale are two of these honey pot sites, surveys were conducted in the visitor centres' car parks. A payment of £1 was offered to participants in order to offset any additional parking costs incurred whilst completing the survey as during the ranking exercises in order to identify which candidate attributes should be used a number of individuals pointed out that taking time to complete a survey had a cost in terms of the parking fees paid.

A total of 305 individuals were surveyed and each responded to 8 choice cards. Additional information was collected about the stage of the visit (whether the park had been visited prior to completion of the survey or not). Of the total sample 140 individuals came from the local Counties which in some way adjoin the nation park, however only 65 individuals considered themselves to live locally to the national park. The impact of relationship to the national park will be tested to see if it has a significant effect on willingness to pay for conservation effort.

Figure 6.1 Location of Survey Sites for Visitors in the Peak District National Park

The farmer survey was carried out as part of a project meeting, held in July 2009, to report results of the wider research project to which this PhD is associated. It was carried out before any results of the Choice Experiments in Chapter 3 were presented to the assembled "stakeholders"; farmers, labourers, spouses and offspring. A total of 30 individuals responded to the experiment, whilst this is a low number of respondents it represents almost 1% of the total population employed in agriculture in the Peak District. There were issues with time constraints in this Choice Experiment. In order that full information could be presented, in the same manner as the experiments carried out for local residents (Chapters 4 and 5) and visitors (see below),

it was deemed necessary to simplify the experiment and to reduce the number of cards presented to each individual. As such each individual responded to 6 cards and footpath network variables were excluded from the experiment.

6.3 Divergent Preferences

In the current research we aim to identify if preferences of local residents, as outlined in the experiments reported in Chapters 4 and 5, differ from visitors to the national park. Also we investigate for visitors whether a physical association with an environmental resource, in terms of distance from that resource, leads to a divergent willingness to pay than that from a stated association with an environmental good, i.e. considering oneself a local of an environmental resource. In addition, in part due to the results found in the experiments reported in Chapter 4, we aim to identify if the stage during a visit (pre or post excursion) at which an experiment is administered impacts on willingness to pay measures of preference. Finally we aim to identify if the preferences of individuals with an association to the management of the landscape of the national park, namely farmers and their relatives, differ from those of either local residents or visitors to the national park.

A number of previous studies have aimed at the identification of divergent preferences for individuals more or less associated with an environmental resource. The complexity of the ways in which individuals interact with landscapes in particular leads to valuation from “aesthetic, ecological, social and subconscious perspectives ... in different ways by different people" (Bullock and Kay, 1997). Public preference is not a single measurable and observable concept but rather there are variances between different groups who use and interact with the landscape in different ways

(Kaltenborn and Bjerke, 2002). In regards to Bullock and Kay an interesting result from their 1997 study was that the general public had a higher willingness to pay for changed management in the Southern Uplands than visitors, one possible explanation is that this reflects the whole part bias (i.e. the general public were valuing uplands in general and the visitors a more specific area).

Most previous analyses have used either a distance or experience measure to estimate level of association. Jones et al (2000) describe for a national park, albeit an American one so designated on somewhat different criteria than those in the UK, an "insider/outsider dichotomy" between those who are familiar with a landscape and those who are merely visiting a landscape. Bonaiuto et al (2002) have shown a similar result for a national park in Italy.

Hanley et al 2003 show, for Grey Goose conservation on Islay, a significant difference in Choice Experiment models of preference between local residents, visitors and the general public. They identify issues with the ethical and political nature of the decision about whose preferences are most important in policy design. In particular they question whether it is appropriate to consider the preferences of those who actually pay for most conservation policy (tax paying non users) or those directly impacted by changes to an environmental resource (those who derive some level of use value). This is an important question which deserves (and will below be given) some consideration in the context of the current research.

Rambonilaza and Dachary-Bernard (2007) look at landscape preferences in Brittany using the Choice Experiment approach; they show that rural residents have similar preferences to tourists living in urban areas. However, they show that tourists

who live in rural areas have divergent preferences preferring a forested landscape over the mixture of scrub and forest preferred by urbanites and local residents. Like Hanley et al (2003) they also raise the issue of equity in decision making but predominantly focus on income rather than on purely spatial factors.

As was raised in the introductory Chapter and Chapter 4, environmental features enter individual's utility curves and may make up a significant part of their real income (Krutilla, 1967). This is likely to be truer of individuals with relatively low incomes so the impacts of environmental policy on low income households may deserve some level of additional weighting in the decision making process from a social equity view point. However, willingness to pay based estimates may be lower for individuals in low incomes due to tighter budget constraints. The question then becomes one of weighting relative preferences between groups by economic need (social equity) rather than actual willingness to pay. This issue will further be considered in the concluding chapter.

Gourlay (1996) for Loch Lomond and Stewarty adopt a similar approach to the one reported in the current chapter looking at preference between locals and visitors using different payment vehicles (tax and entrance fees respectively) albeit in a contingent valuation framework (Loch Lomond £26.67 residents; £2.56 per visit. Stewarty £16.83 residents, £3.28 per visit (2008 £)). The current research uses parking costs for analysis of visitor's preferences; these were preferred to entrance fees as they are already in place in Peak District. It was considered that raising the issue of entrance fees for a resource individuals may consider should be publically available could lead to protest behaviour. Hanley et al (2002 LUP) identify that access fees are

likely to be politically unpopular, particularly for Northern Europe where there is a tradition of 'free' access.

Several studies can be found in the literature which go further and analyse the preferences of farmers in addition to those of locals, visitors or both. Natori and Chenoweth (2008) show that (for Japan): farmers prefer agricultural landscape (rice paddies) aspects, openness and concepts of stewardship; and naturalists prefer more 'natural' woodland landscapes with associated concepts of biodiversity and naturalness, a perhaps unsurprising result given the possible bias inherent in the phraseology used. A similar result was found by Gomez-Limon and Fernandez (1999) who show for the Iberian Peninsula that livestock farmers prefer open landscapes whilst recreationalists and managers prefer denser vegetation. Van de Berg et al (1998) analysed farmers', residents' and (cycling) visitors' preference for agricultural landscapes in the Netherlands and again show a similar result with residents' and visitors' preference being for increased biodiversity and natural features and farmers' preference relating to agrarian features.

6.4 Are Our Samples Representative?

Unsurprisingly our samples were not entirely representative of visitors to the national park. Most visitors tend to come from Counties which have some area within the national park (e.g. Derbyshire (14%), South Yorkshire (13%), Cheshire (12%)), with a total of 60% of day visitors originating from these counties and 75% of overnight tourists either originating from these or neighbouring Counties (PDNP Undated (b)). Our sample included 45% from the Counties with some area within the national park, and 21% who considered themselves as living locally to the National Park. We say

unsurprisingly as given that our payment vehicle was parking costs it was only relevant to sample individuals who actually use the parking areas in the National Park. It is apparent that individuals who have more experience of the park tend to use 'free' parking (e.g. in lay-bys or on residential streets) and those living in the neighbouring counties may make use of the public transport system.

Also, as we were running the experiment during a holiday we would not expect the same sample as during a standard working weekday. In hindsight collection of supplementary information, such as if the individuals were staying in or near the National Park on holiday or were on a day trip, would have offered additional opportunities for analysis. The parking costs were chosen related to the existing cost for a half days parking ranging approximately from a 10% increase to a 100% increase in the costs.

6.5 Results of Visitor Survey

6.5.1 Comparison with Local Residents

The results of the workshop analysis presented in Chapter 4 and 5 provided a range of values for local resident preferences for management intensity in the national park. It is perhaps relevant to consider whether preferences of this sub sample of the population diverge significantly from those of visitors to the national park. The multifunctional nature of the National Parks of the UK mean that they are often placed under divergent pressures to produce differing ecosystem services. It is clear that the strict planning regulations in these areas are in place because of a perception of net social benefit at the Government level. However, as was shown in Chapter 2, the rigorous planning regulations along with the popularity of these protected areas for

second home and retirement home ownership have led to local issues with housing stock and forced emigration from the locality of many young people. This would tend to suggest that there may be a divergence in the attitudes of locals and visitors to potential development in or around the National Park, it also suggests that a similar divergence may be found for landscape and access features.

It should be noted that the results presented below use different payment vehicles hence the difference in scale of the values associated with the landscape features. In addition the results presented here are for relatively basic models with very few socioeconomic factors included, this is because we are comparing across a wide range of models and in terms of presentation of results and to some extent processing time more concise models were preferred. Analysis of socioeconomics were carried out but had very little impact on the willingness to pay estimates for each model and did not impact on the comparison across models, some of these results are presented for both locals and visitors in the robustness testing included in Appendix 3 where it can be seen that impact on willingness to pay estimates was limited.

In the results presented below, Table 6.1 shows a sample choice card, 6.2 the estimate coefficients for visitors[41] (results for local residents can be found in Table 4.2), Table 6.3 identifies the coding used and Table 6.4 identifies implicit prices calculated for each treatment)

[41] Coefficient estimates for local residents can be found in table 4.2.

Table 6.1: Visitors Survey: Sample choice card

	A	B	Do Nothing
Moorland – intensity of management	Less Intensive – less sheep and burning. More bird species	No Change in Intensity	More Intensive - more sheep and burning
Moorland Fringe – intensity of management	Less Intensive– less sheep and burning. More bird species	Less Intensive– less sheep and burning. More bird species	More Intensive – more sheep, fertiliser and drainage
Valley Bottom Farmland – intensity of management	No Change in Intensity	Less Intensive – less sheep and fertiliser. More bird species	More Intensive – more sheep and fertilizer.
Footpath Network	Improved	Degraded	Degraded
Parking cost	£0.50	£5.50	£0
Please tick the option you prefer.	□	□	□

Table 6.2 Visitors Survey: Error component logit model Coefficients for each treatment.

Treatment	*Visitors*	
	Coef.	*S.e.*
Mean Values		
Const	**1.765**	0.356
MoorLI	**0.637**	0.105
MoorMI	**-0.523**	0.890
FringeLI	**0.300**	0.093
FringeMI	**-0.605**	0.110
FarmLI	**0.269**	0.100
FarmMI	**-0.424**	0.083
PathD	**-0.247**	0.112
PathI	**0.347**	0.132
PC	**-0.193**	0.026
INCOME	-0.004	0.006
FEMALE	-0.049	0.309
AGE	0.008	0.006
Error component		
Sigma	**2.468**	0.205
Pseudo R^2	0.28	
Log Likelihood	-1847	

Where Sigma can be interpreted as an estimate of the impacts of unobserved random effects. The large and significant error component suggests correlation of the unobservable portion of the utility of alternatives A and B. *Coefficients found to be statistically significant at the 5 percent level are indicated in bold*
N = 305

Table 6.3 Visitors Survey: Explanation of variable abbreviations and coding in Table 5.2

Const	Constant term (= 0 for baseline zero cost, = 1 for option A or B)
MoorLI	Shift to less intensive moorland management (dummy coded)
MoorMI	Shift to more intensive moorland management (dummy coded)
FringeLI	Shift to less intensive moorland fringe management (dummy coded)
FringeMI	Shift to more intensive moorland fringe management (dummy coded)
FarmLI	Shift to less intensive valley bottom farmland management (dummy coded)
FarmMI	Shift to more intensive valley bottom farmland management (dummy coded)
PathD	Degraded footpath network (dummy coded)
PathI	Improved footpath network (dummy coded)
PC	Parking cost increase to the visitor indicated in pounds (absolute number)
INCOME	Household income (absolute number) (Interacted with ASC)
FEMALE	Gender (Female = 1, Male = 0) (Interacted with ASC)
AGE	Respondent's age in years (Interacted with ASC)

Table 6.4 Visitors Survey: WTP for a change from the current level of provision (N=305)

Variable	Predicted	Experienced	Remembered 1	Remembered 2	Visitor (NB Payment Vehicle)
Moor LI	-£8.01 (£11.38) (NS)	-£36.18 (£14.46)**	-£6.51 (£12.67) (NS)	-£10.01 (£18.67)(NS)	**£3.31 (57p)*** **
Moor MI	-£66.81 (£16.09)***	-£38.32 (£16.08)**	-£46.55 (£18.22)**	-£69.31 (£22.58)***	**-£2.71 (66p)*** **
Fringe LI	-£39.97 (£12.75)***	-£51.99 (£16.46)***	-£23.60 (£12.53)*	-£31.24 (£17.28)*	**£1.55 (50p)*** **
Fringe MI	-£21.01 (£12.88) (NS)	-£13.45 (£14.22) (NS)	-£26.68 (£15.24)*	-£18.13 (£17.87)(NS)	**-£3.14 (57p)*** **
Farm LI	-£59.04 (£14.29)***	-£27.68 (£16.78)*	-£37.87 (£18.21)**	-£58.80 (£18.39)***	**£1.40 (49p)*** **
Farm MI	-£88.01 (£16.38)***	-£48.03 (£21.27)**	-£60.06 (£21.07)***	-£80.33 (£23.79)***	**-£2.20 (54p)*** **
Path Degraded	£24.32 (£10.44)**	£18.36 (£12.64) (NS)	£30.41 (£11.60)***	£6.81 (£11.88)(NS)	**-£1.28 (51p)** **
Path Improved	£35.02 (£15.99)**	-£0.94 (£17.92) (NS)	£31.34 (£19.70)(NS)	£24.95 (£20.28)(NS)	**£1.80 (86p)** **

Figures in brackets are standard errors *** = significant at the 1% level. **= 5%. * = 10%.

As can be seen from Table 6.4 the results show that comparison of visitors and local residents show that the two populations have unequal and dissimilar preference orderings. The most apparent difference is a significant willingness to pay by visitors for less intensive management although they also show a willingness to pay to avoid

more intensive management. Positive willingness to pay for improved footpath networks and willingness to pay to avoid degraded footpaths are also the expected results from individuals who actually make use of the footpath network. Christie et al (2000) similarly show a positive willingness to pay for footpath maintenance and increased length in the Grampian region.

In comparing the results to those found for local residents perhaps the most striking result is that visitors to the national park are willing to pay for a shift to less intensive agricultural practices in all habitat types whilst local residents tend to be willing to pay to avoid this shift and maintain the current condition. Whilst this result may at first appear counterintuitive, that those with less association would value environmental protection more highly, this result has been supported by previous studies. Bonaiuto et al (2002) showed a similar result in local opposition and visitor support for protected areas in Gennargentu National Park in Italy.

In particular the results show visitors in the current study are willing to pay more for less intensively managed moorland than they are willing to pay for less intensive management on other landscape types. Local residents would appear to be relatively indifferent to less intensive management on this landscape type compared to other landscape types. Equally willingness to pay to avoid more intensive management is greatest, for visitors, on moorland and moorland fringe landscapes whilst local residents place relatively more weight of valley bottom farmland landscapes.

These results, given that they predominantly rely on a difference in the sign associated with willingness to pay estimates, are not particularly dependent upon

which of the estimates for local residents, identified in Chapters 4 and 5, are used. However, it is perhaps appropriate at this junction to consider which estimate it is most appropriate to compare estimates for alternative samples to.

The simplest approach is to compare to treatment 1 (decision utility) as in this treatment individuals had access to the same data as was presented to both the visitor and farmer samples. However, treatment 4 (remembered 2) has some merits which should be considered as does treatment 6 (historical) as these can be considered to be the more fully informed values. However, the additional experience, impacts of memory or information upon which these values are based is not shared by these alternative samples so comparison is not across the same underlying attributes in terms of the capacity for the development of heuristic rules. The one possible exception, which is considered below, is where visitors have recently completed their visit to the park. Here it is either most appropriate to compare to treatment 3 (remembered 1) or treatment 2 (experienced). However, as treatment 2 was based upon actual experience occurring at the time of administration it is suggested here that the relationship between treatment 1 and 3 are the appropriate baseline against which to compare before and after visit estimates for visitors to the park (these results are presented following the analysis of place attachment).

6.5.2 Analysis of Place Attachment[42]

Given that visitors can be local, regional, national and global in origin, at this junction it seems appropriate to look at subsamples of the individuals who took part in the survey on this basis. Is there, for example, a divergence between visitors from the Counties bordering the national park and those from further afield? And what about individuals who state an association with the (i.e. consider themselves as local to the) National Park? In order to identify any differences in willingness to pay models were run separately for each of these subsets. Again, as in Chapter 4 and 5, due to issues of scale it is not possible to compare directly between coefficient estimates so willingness to pay comparisons are made (Table 6.5 gives details of the coefficient estimates and 6.6 the implicit prices).

Table 6.6 gives results for the comparison of those individuals who stated they considered themselves as local to the National Park[43] showing they have a lower relative willingness to pay for less intensive moorland management compared to other landscape types than those individuals who do not consider themselves as local. They do, however, have similar willingness to pay to avoid more intensive management although non locals have a greater willingness to pay to avoid intensive management of moorland fringe habitats. These tables also present results for those individuals who are physically associated (by distance) to the national park.

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[42] It would have been possible to test for these relationships using dummy coding, however, it was considered that it was easier to account for variation across attributes by running separate models and a 'pooled' model using dummies would have assumed constant scale.

[43] I.e. those who answered yes to the question: "Do you consider yourself to be a local of the Peak District National Park?"

Table 6.5 Stated Association: Error Component Logit Model Coefficients for each treatment.

Treatment	*Stated Association*		*NO Stated Association*		*Physical Association*		*NO Physical Association*		*Phys. Ass. NO Stated Ass.*	
	Coef.	*S.e.*	*Coef.*	*S.e.*	*Coef.*	*S.e.*	*Coef.*	*S.e.*	*Coef.*	*S.e*
Mean Values										
Const	**2.687**	1.024	**1.529**	0.392	**1.716**	0.808	**-1.773**	0.494	0.941	0.645
MoorLI	0.425	0.253	**0.686**	0.118	**0.540**	0.158	**0.717**	0.155	**0.609**	0.234
MoorMI	**-0.671**	0.205	**-0.439**	0.099	**-0.592**	0.137	**-0.464**	0.125	-0.366	0.209
FringeLI	**0.406**	0.201	**0.226**	0.107	**0.449**	0.144	0.181	0.143	0.348	0.193
FringeMI	-0.474	0.250	**-0.649**	0.124	**-0.435**	0.154	**-0.737**	0.163	**-0.452**	0.218
FarmLI	0.004	0.215	**0.325**	0.112	-0.103	0.155	**0.400**	0.140	0.142	0.225
FarmMI	**-0.522**	0.198	**-0.377**	0.093	**-0.544**	0.117	**-0.327**	0.115	**-0.502**	0.168
PathD	0.205	0.269	**-0.293**	0.126	0.176	0.148	**-0.306**	0.151	-0.244	0.247
PathI	0.288	0.308	0.282	0.146	**0.604**	0.202	0.143	0.183	**0.566**	0.265
PC	**-0.193**	0.065	**-0.186**	0.028	**-0.204**	0.040	**-0.184**	0.034	**-0.205**	0.054
INCOME	-0.002	0.019	-0.007	0.007	0.000	0.009	-0.004	0.009	-0.003	0.165
FEMALE	-0.175	1.193	0.166	0.326	-0.165	0.425	0.182	0.415	-0.250	0.687
AGE	0.008	0.015	0.009	0.007	0.011	0.008	0.004	0.007	0.021	0.147
Error component										
Sigma	**3.424**	0.708	**2.339**	0.184	**2.579**	0.244	**2.495**	0.311	**1.820**	0.291
Pseudo R^2	0.32		0.26		0.30		0.27		0.26	
Log Likelihood	-409		-1490		-818		-1024		-464	
Respondents	65		240		140		165		75	

Where Sigma can be interpreted as an estimate of the impacts of unobserved random effects. The large and significant error component suggests correlation of the unobservable portion of the utility of alternatives A and B. *Coefficients found to be statistically significant at the 5 percent level are indicated in bold.*

Table 6.6 Stated Association: WTP for a change from the current level of provision

Variable	Stated Association	NO Stated Association	Physical Association	NO Physical Association	Physical Association with NO Stated Association
Moor LI	£2.20 (£1.22)*	£3.68 (£0.69)***	£2.65 (£0.81)***	£3.89 (£0.90)***	£2.97 (£1.18)**
Moor MI	-£3.48 (£1.78)*	-£2.36 (£0.70)***	-£2.91 (£0.98)***	-£2.52 (£0.92)***	-£1.79 (£1.17)(NS)
Fringe LI	£2.11 (£1.32)(NS)	£1.21 (£0. 57)**	£2.20 (£0.80)***	£0.98 (£0.76)(NS)	£1.70 (£1.01)*
Fringe MI	-£2.46 (£1.12)**	-£3.49 (£0.79)***	-£2.14 (£0.73)***	-£4.00 (£0.98)***	-£2.20 (£0.97)**
Farm LI	£0.02 (£1.11)(NS)	£1.74 (£0.57)***	£0.51 (£0.73)(NS)	£2.17 (£0.75)***	£0.69 (£1.04)(NS)
Farm MI	-£2.71 (£1.31)**	-£2.02 (£0.61)***	-£2.67 (£0.77)***	-£1.78 (£0.72)**	-£2.45 (£1.14)**
Path Degraded	-£1.07 (£1.19)(NS)	-£1.58 (£0.60)***	-£0.86 (£0.69)(NS)	-£1.66 (£0.73)**	-£1.19 (£1.09)(NS)
Path Improved	£1.50 (£2.00)(NS)	£1.51 (£0.94)(NS)	£2.97 (£1.37)***	£0.78 (£1.08)(NS)	£2.76 (£1.83)(NS)

*Figures in brackets are standard errors *** = significant at the 1% level. **= 5%. * = 10%.*

Table 6.6 gives results for the comparison of those individuals who stated they considered themselves as local to the national park (Stated Association), those who didn't (NO Stated Association), those who reside in the counties surrounding the national park (Physical Association) and those who didn't (NO Physical Association). Firstly it is important to note the relative sample sizes, as was discussed above our sample was not entirely representative of user data for the park reported by the National Park body itself. This led to relatively low samples for individuals with a

physical association to the park in terms of proximity and, in particular, those stating an association with the park. These models tend to have less significant estimates associated with them (although they have less negative log likelihood and higher R^2 results). Finally it is clear that there is an overlap between individuals who state an association with the park and those living in proximity, analysis of those living in proximity who do not state an association has also been conducted in the final column of Table 6.6, the sample is again small so levels of significance are not as high as for the larger samples (and on this occasion the R^2 was relatively low, although again the log likelihood was less negative).

It is clear that for comparison of results with those with no physical association the larger sample is the appropriate one (Physical Association) but in terms of comparison between those with a stated association and those with a physical association the smaller sample (Physical Association with NO Stated Association) is appropriate as otherwise a comparison is being made between samples which share individuals. Originally it was planned to use postcode data in a different way, to identify actual distance from the park and use this as an absolute number rather than the dummy coding adopted. However, it was found that rural postcodes often cover a large area so identification of actual distance was not possible.

As can be seen in Table 6.6 in general those with a closer relationship (either stated or physical) have a lower relative willingness to pay for less intensive management than those individuals who do not have as close a relationship. In particular less intensive farmland management would appear to be more important for those with less of relationship to the landscape, although the estimates for those

with an association do not significantly differ from zero they are lower and are shown to be different by both the Poe et al and Johnston and Duke tests as can be seen in Tables 6.7 and 6.8.

Table 6.7 Visitor Survey Complete Combinatorial Convolutions Test

Variable	Stated vs Physical	Stated vs NO Stated	Physical vs NO Physical	Before Visit vs After Visit
Moor LI	0.40	0.17	0.16	0.69
Moor MI	0.30	0.21	0.47	0.20
Fringe LI	0.58	0.80	0.82	0.74
Fringe MI	0.39	0.75	**0.94**	0.31
Farm LI	0.37	**0.08**	**0.05**	0.88
Farm MI	0.43	0.26	0.20	0.36
Path Degraded	0.51	0.67	0.69	0.57
Path Improved	0.36	0.54	0.85	0.88

Table 6.8 Visitor Survey: Johnson and Duke test for transfer error

Variable	Stated vs Physical		Stated vs NO Stated		Physical vs NO Physical		Before Visit vs After Visit	
	Lower Bound	*Upper Bound*	*Lower Bound*	*Upper Bound*	*Lower Bound*	*Upper Bound*	*Lower Bound*	*Upper Bound*
Moor LI	0.55	0.35	0.80	0.14	0.78	0.11	0.21	0.57
Moor MI	0.77	0.38	0.85	0.29	0.62	0.56	0.87	0.28
Fringe LI	0.36	0.52	0.15	0.74	0.14	0.77	0.20	0.68
Fringe MI	0.67	0.46	0.31	0.80	**0.08**	**0.96**	0.79	0.42
Farm LI	0.63	0.36	**0.92**	**0.08**	**0.95**	**0.04**	**0.08**	0.84
Farm MI	0.65	0.50	0.80	0.34	0.86	0.28	0.72	0.45
Path Deg.	0.52	0.54	0.36	0.70	0.35	0.72	0.47	0.61
Path Imp.	0.62	0.34	0.43	0.52	0.12	0.81	**0.08**	0.84

Those with an association either physical or stated do, however, have higher willingness to pay to avoid more intensive management on moorland and farmland landscapes. Conversely, those with less association have a greater willingness to pay to avoid intensive management of moorland fringe habitats. Given that this habitat is the least well known habitat type it is not expected that those with less association to,

and by assumption less knowledge of, the national park should value avoidance of increased management intensity on this relatively obscure landscape most.

One aspect of the research was an analysis of any divergence between a stated and physical association with an environmental good. For those estimated willingness to pays which are significant different from zero (i.e. those identifying a significant willingness to pay) it can be seen that a physical relationship seems to relate to marginally higher estimates for less intensive and to avoid more intensive management except in the case of less intensive moorland landscapes. Equally a lack of physical association tends to result in marginally higher willingness to pay than a lack of stated association. These results suggest that those individuals who report an association with the National Park are in general happier with the current levels of management, but the difference is only slight and there is no statistical difference found between estimates by the inverse Poe et al or Johnston and Duke tests.

The similarity in these estimates is comforting for proponents of valuation of environmental goods as it suggest that either approach yields results which do not significantly diverge (across samples) and would be appropriate for analysis. Given that many previous studies have used already available data in terms of postcodes to assess association the current research suggests that this will yield similar results to those studies which specifically identify a stated association.

Taking into account estimates which do not differ from zero in a statistically significant way it appears that a stated association leads to indifference to less intensive management, again showing these individuals appear to be happier with the current levels of management. The apparent explanation of this result is that those

individuals who feel an association to the resource prefer the current level of management (somewhat similar to the resident results in Chapter 4). This result suggests that those individuals who have a stated association have preferences for management more similar to those for local residents (identified in Chapter 4 and 5). However, there is an alternative explanation in that the individuals who are happiest with current levels of management will naturally feel the closest association to the National Park. This may indeed lead to selection effects in terms of who chooses to live near a National Park may be doing so because the current management intensity gives them a comparatively greater utility, thus in a free housing market those with the largest hedonic gains from the current level of management are likely to bid more for houses than those less happy with the current management.

6.5.3 Analysis of Visitation

Given the results which were found for local residents in Chapter 4 it is suggested that the act of experiencing an environmental resource may impact upon willingness to pay. In order to test if this is the case for visitors data was collected regarding the stage in the visit at which the Choice Experiment was completed. As surveys were carried out in car parks within the National Park most were carried out at the very beginning or end of the individual's visit. As such the Choice Experiments could be considered to be measuring decision or recently remembered utility depending on whether they were conducted before or after a visit respectively.

As can be seen in Table 6.10 (Table 6.9 gives details of the coefficient estimates and 6.10 the implicit prices) there appears to be a similar result as was found in Chapter 4 in that the process of experience seems to generally reduce willingness to

pay to avoid a move away from the dominant current management intensity. However, relative preference across landscape types appear to be constant across both samples with the avoidance of more intensive moor and fringe habitats being associated with the highest willingness to pay. Less intensive moorland fringe and agricultural landscapes relatively have the lowest willingness to pay. This is supported by the results of the comparison of estimates found in Table 6.7 and 6.8, although the only significant variation is between estimates of less intensive farmland management and improved footpath networks.

Table 6.9 Analysis of visitation: Error component logit model Coefficients for each treatment.

Treatment	*Before Visit*		*After Visit*	
	Coef.	*S.e.*	*Coef.*	*S.e.*
Mean Values				
Const	**1.616**	0.570	**1.877**	0.486
MoorLI	**0.605**	0.175	**0.673**	0.132
MoorMI	**-0.548**	0.148	**-0.497**	0.114
FringeLI	**0.303**	0.142	**0.294**	0.127
FringeMI	**-0.584**	0.178	**-0.632**	0.145
FarmLI	**0.370**	0.159	0.175	0.134
FarmMI	**-0.373**	0.144	**-0.478**	0.104
PathD	-0.200	0.182	**-0.287**	0.144
PathI	**0.499**	0.217	0.230	0.174
PC	**-0.160**	0.039	**-0.221**	0.037
INCOME	-0.005	0.008	-0.001	0.011
FEMALE	-0.055	0.467	0.000	0.467
AGE	0.010	0.007	0.003	0.011
Error component				
Sigma	**2.20**	0.335	**2.780**	0.289
Pseudo R^2	0.28		0.28	
Log Likelihood	-767		-1084	
Respondents	179		126	

Where Sigma can be interpreted as an estimate of the impacts of unobserved random effects. The large and significant error component suggests correlation of the unobservable portion of the utility of alternatives A and B. *Coefficients found to be statistically significant at the 5 percent level are indicated in bold.*

Table 6.10 Analysis of Visitation: WTP for a change from the current level of provision

Variable	Before Visit	After Visit
Moor LI	£3.77 (£1.11)***	£3.05 (£0.65)***
Moor MI	-£3.42 (£1.43)**	-£2.26 (£0.68)***
Fringe LI	£1.89 (£0.94)**	£1.33 (£0. 59)**
Fringe MI	-£3.64 (£1.18)***	-£2.86 (£0.64)***
Farm LI	£2.31 (£0.99)**	£0.79 (£0.57)(NS)
Farm MI	-£2.32 (£1.11)**	-£2.17 (£0.61)***
Path Degraded	-£1.25 (£1.01)(NS)	-£1.30 (£0.68)**
Path Improved	£3.11 (£1.89)*	£1.04 (£0.92)(NS)

*Figures in brackets are standard errors *** = significant at the1% level. **=5%. * = 10%.*

So although a similar pattern appears to occur as was found in the Chapter 4 this pattern is not statistically supported (by either the Poe et al or Johnston and Duke tests). It should be noted that, whilst the results of Chapter 4 show that utility is impacted by both experience and memory, remembered 1, which most similarly matches the after visit treatment presented here, did not statistically vary from

decision utility (before visit treatment). If the same trends based on experience as were found in Chapter 4 were assumed for the current visitor sample it might be expected that should analysis be conducted during individuals visit to the landscape implicit prices might be more divergent from the values prior to a visit. Again it is important to stress that the baseline presented is the current management intensity in the national park. The negative values reported here can be considered to be willingness to pay to shift to the current management intensity from more intensive management.

6.6 Farmer's Survey

As should be apparent from the discussion above; this section does not refer solely to farm owners and workers but also their family. However, given that upland farms tend to be as close to subsistence farming as is found in the UK it is not just common but almost universal that family members contribute to the work of the farm. Socioeconomic differences between farms may have an impact upon this, however, given the restrictive time frame since the experiments were run and that separate collection of socioeconomics was not possible during the meeting at which the data was collected no analysis of socioeconomics was possible. This data is held for the wider project to which this PhD is associated but further analysis has not yet been possible.

From the results presented in Table 6.11 and 6.12 (sample choice cards and coding can be found in Chapter 4 the current analysis does not include footpath network variables) it appears that farmers' preferences are more similar to those of local residents' than visitors' to the national park. As with all other groups sampled

farmers have a negative willingness to pay (willingness to pay to avoid) associated with more intensive management in all landscape types. Whilst less intensive moorland and moorland fringe habitats also having negative signs associated with them these coefficients do not significantly differ from zero.

Table 6.11 Farmers: Error Component Logit Model Coefficients for each treatment

Treatment	*Farmers*	
	Coef.	*S.e.*
Mean Values		
MoorLI	- 0.008	0.234
MoorMI	**-0.937**	0.336
FringeLI	-0.273	0.336
FringeMI	**-0.642**	0.261
FarmLI	0.024	0.320
FarmMI	-0.594	0.311
Tax	**-0.025**	0.008
Error component		
Sigma	1.432	0.715
Pseudo R^2	0.15	
Log Likelihood	-162	

Coefficients found to be statistically significant at the 5 percent level are indicated in bold.

Table 6.12 Farmers: WTP for a change from the current level of provision.

Variable	Farmers
Moor LI	-£0.32 (£9.26)(NS)
Moor MI	-£37.02 (£14.27)***
Fringe LI	-£10.80 (£13.42)(NS)
Fringe MI	-£25.37 (£11.64)**
Farm LI	£0.95 (£12.72)(NS)
Farm MI	-£23.48 (£11.12)**

Figures in brackets are standard errors *** = significant at the 1% level. **= 5%. * = 10%.

From analysis of the data it appears that levels of willingness to pay are most similar to the second experiment reported in Chapter 4 (local residents experiencing the environment) and the results once additional information has been presented in Chapter 5. However, as it has not been possible to analyse socioeconomic information for farmers, and as many farms are loss making net of subsidy and have relatively low incomes even when off farm income and subsidy are taken into account, analysis of income effects in particular may be of importance to the results.

6.7 Conclusions

Firstly it is interesting to note that association with the national park impacts on willingness to pay whether this is a stated association or one based upon distance from the national park. It is also interesting to note that stated association has a generally greater impact than a purely distance based approach which may have implications for the way in which future analyses identify association with an environmental resource. However, this impact of association does not reverse the preference to the extent that the current level of management is preferred over less intensive management as was found for the local resident sample analysed in Chapter 4. This implies that it is actual use of the national park that impacts upon the preference for less intensive management, local residents would appear to prefer the current landscape features of the park whilst individuals directly involved at the time with use would prefer to see less intensive management practices become the norm in the park.

It is also apparent that the results presented here tend to support the idea that experience has an impact on value given that the stage in the visit impacts on willingness to pay, however, the result is not as strong an evidence base as was presented in Chapter 4. It is important to note that there will be other factors influencing divergence in willingness to pay, the most obvious from the analysis presented here is that there is a divergence based upon distance from the national park. Given that distance to the park may influence the time that the park is reached and departed from there is a possibility that this in part explains the divergence. That

is there may be some correlation between the distance from the park an individual resides and the stage at which they were surveyed.

It is clear that farmers have similar preferences to those of local residents with the current levels of management being seen as of greatest worth to both groups. However, there is a divergence between the preferences of these two groups and visitors to the park who prefer less intensive management across all landscape types in the National Park.

Given these results what can we say of the policy implications? Whilst maintenance of the current level of management could appropriately be funded from the public purse (council taxes for example) it is suggested that any shift to a less intensive system will require funds to be raised directly from visitors to the park. Whether this comes in the form of user charges, parking charges etc is a more political and ethical question. As was mentioned above user charges are unlikely to be politically popular (Hanley et al 2002) and for the study area this may be particularly true due to the cultural aspects of free access to the Peak District National Park stemming back to social action such as the mass trespass on Kinder Scout (see Chapter 2). Hanley et al (2002) also identify that parking fees where it is made clear that the revenues are being spent on a particular aspect of a management of an environmental resource are likely to be more popular with visitors. However, there is a question of the levels of charges and their relative impacts on different income groups.

Part III

Discussion and Policy Implications

Chapter 7: Discussion

Upland Landscapes: What do people want, who wants it and can they have it all? Or indeed can they all have it?

7.1 Chapter Summary

This chapter firstly summarises the research and identifies key outcomes. In the first two sections we outline these for Part I and Part II of the dissertation. Particular attention is paid to a consideration of the suitability of the techniques adopted in this research for the measurement of "instant utility". In the next section some consideration of the policy implications of the research is made. The chapter then goes on to attempt to identify how well the thesis has been answered by the research presented above. After this the headline results, limitations and future research potential are all identified in separate sections. Finally some concluding comments and discussion of some of the key issues raised by the research are considered.

7.2 Summary and Outcomes of Part I

The moorlands of the Peak District National Park form the main focus for our research. The challenges in the Park are representative of those faced throughout the uplands of the UK. The associated landscapes and ecosystems are of international importance as is revealed by their designation status (Ratcliffe and Thompson, 1988). However, large areas of the UK uplands are now degraded due to agricultural overuse, pollution; in particular for moorland landscapes where pollution impacts on the delicate soil chemistry, wild fire risk and related soil losses. Upland landscapes (moorland and moorland fringe habitats in particular) form over millennia but can be lost in a decade.

This is a multifunctional landscape and in order to maintain the high levels of ecosystem services derived from them it is now imperative that these key habitats are maintained. The Peak District was chosen as a case study as it epitomises the multifunctional nature of the UK's upland National Parks.

Agriculture in the uplands is reliant on subsidy support and is tightly constrained by climatic and topographic features. Without subsidy support, net farm incomes would be negative (Peak District Rural Deprivation Forum, 2004). The Peak District lies within one hour's drive of a third of the UK's population, has a historical culture of free access since the mass trespass on Kinder Scout and is therefore also highly valued for recreation. Policy for the uplands is no longer solely focused on subsidisation of agricultural production with greater emphasis now placed on the ecosystem services of these landscapes. For example it is only in recent years that the National Trust started emphasising environmental management of its estates in these landscapes rather than the simple economic bottom line.

The multifunctional nature of upland landscapes relate to the diverse and valuable ecosystem functions / services from which the population benefit. These landscapes contribute in a number of ways to the benefit of the society of the UK as was identified in the introductory chapter. Perhaps only coastal ecosystems rival the uplands for the general ecosystem services and associated use and non-use values which are provided. However, the services of most multifunctional landscapes tend not to be apparent given traditional economic analysis being hidden in terms of the diversity and non market status of the services provided. The very multifunctional nature of these landscapes (see EFTEC Tinch et al 2009 and Tinch et al 2009) makes

valuation a complex process and this dissertation limited itself to further analysis of some aspects of the value derived from these landscapes.

To answer this thesis the research firstly aimed to identify how the uplands of the UK had developed over time? In answering this question the research aimed to both tap into the knowledge base of stakeholders in upland management and to identify how these perceptions differed from what could be shown to actually have contributed to the formation of these valuable environmental resources in the UK. However, as was identified in Chapter 2 and further by Dallimer et al (2009) even stakeholders (some of the most informed proponents of the value of the UK uplands) struggle to identify how the multifunctional nature of the upland landscapes have developed over time. Given this finding it places into question both how accurate the perceptions of individuals and how policy will be applied to the uplands.

Policy relies upon both accurate identification of preferences for optimal management from the general public and (possibly more importantly) how the policy will be applied and accepted on the ground by those responsible for application. Where there is a divergence from fact by opinions of the key stakeholders it is difficult to imagine how lay people could understand the complexity of the issues presented to them. As such it seems apparent that complex issues must be simplified to a level which can accurately enter a potential preference matrix for the lay person. However, as was presented in Chapter 5, there is an issue with complexity of ecosystem services, presentation of those services and information uptake by those lay people.

Environmental valuation techniques and Cost Benefit Analysis are becoming increasingly important (and indeed required, Hanley et al. (2006)) in policy

identification for multifunctional landscapes. Without taking into account the decision matrices of key stakeholders and members of the public the results derived will be unrealistic. That is not to say that individuals cannot have preferences over outcomes in terms of ecosystem services when faced with an inability to understand the complexities of ecosystems. However, in some cases this could lead to a rejection of the process and policy by members of the public and stakeholders involved in the valuation process and policy implementation (Brueckner 2007).

From the work presented in Chapter 2 it is clear that in order to value aspects of the ecosystem services of upland (or indeed any landscapes) it is important to ensure both that information is presented in a clear concise manner and that the outcomes of policy are suitably grounded in fact. This result was carried over into the valuation activities presented in Chapters 4, 5 and 6 and every attempt was made to present information in a clear way.

In particular the research had implications for the way in which the Choice Experiment approaches used were framed. It is not possible to determine precise outcomes from policy in terms of exact units of land upon which management intensity would change or indeed to place a figure on the way this would impact on biodiversity of the landscape. It is, however, clear that certain policies would impact in a general way leading to a generally more or less intensive management intensities and this would have some level of impact on the biodiversity of the National Park, as such this was what was presented to participants. The upland landscapes of the UK and the Peak District are not a homogeneous entity, landscape policy may have succeeded in causing general shifts in management but the way in which policy

impacts at a landscape level is extremely complex and to claim a specific change could be fully understood and identified was unrealistic to say the least.

7.3 Summary and Outcomes of Part II: Evaluation of Preferences.

As set out in the first chapter this dissertation set out to test three main hypotheses namely:

- Decision, experienced and remembered utility will diverge for environmental goods in the same way as they have been found to for other goods.
- Factors which influence heuristics rules associated with an environmental good will in turn influence preference for that good.
- The preferences of groups with different associations with an environmental good will be divergent.

On the while these were tested in Part II of the dissertation. The analysis of the rest of the dissertation therefore did not solely aim to place a specific value on aspects of the ecosystem services of the landscapes of the UK uplands (although this was achieved). Rather it aimed to identify the extent to which values are context specific and how this impacts upon the values derived from valuation exercises. One of the key analyses presented here looked at the impacts of accepting a more Benthamite perspective of utility (Kahneman and Sugden 2005). Most economic analysis relies on the concept of decision utility. The research in Chapter 4 aimed to identify if taking into account more felicific concepts of utility development would lead to any differences in the outcomes of valuation studies. The analysis focussed on decision, experience and

memory based notions of utility using a workshop / citizen's jury (Alvarez-Farazio and Hanley 2006) approach to the valuation activities.

The Benthamite origins and behavioural psychological underpinnings of moment based approach to value elicitation bring a new perspective to the valuation of environmental goods. Moment based approaches do have an impact on the values associated with environmental goods as was proposed by Kahneman and Sugden (2005). They provide an alternative way to investigate utility but have serious problems in terms of actual measurement. Proactive and retrospective approaches both have problems associated with them (Stone et al 1999, Kahneman 2000, Kahneman et al 2004), as outlined in Chapter 4, and the costs of mitigating against these problems are restrictive. Therefore an alternative approach was sought; by accepting the issues raised with traditional valuation approaches we were able to identify if experience and memory impact upon the utility associated with an environmental good. Again the aim was not to place a specific value on ecosystem services but rather to adopt a consistent approach with which to investigate the impacts of experience and memory. Whilst the compromise may not be one which behavioural psychologists are happy to accept (see Kahneman and Tversky eds. 2000) the very adherence to the concept of happiness, related to issues with its measurement, is what has restricted the development of an approach which is applicable in a reasonable time and cost framework (Kahneman and Sugden 2005).

It is clear that from the origins of the concept of the moment based approach proposed by Kahneman and Tversky (see the various references to these individuals work below) the appropriate way in which to adopt the results into policy has been an

issue. Bentham himself proposed voting as the best way to achieve a socially optimal outcome (Bentham 1789); however, voting is a decision utility based measure. Even the founding father of happiness based measures of utility accepted that decision utility was the appropriate foundation for socially optimal policy albeit that Bentham was perhaps suggesting that individuals were able to accurately predict and represent their happiness (utility in the moment) in their decision making process (decision utility).

From the findings of the research presented in Chapter 4 it seems apparent that experience and memory both have an impact on the 'value' associated with environmental goods. As was identified in the introductory chapter there are four requirements for a valuation survey to represent experienced utility (Khaneman and Sugden 2005):

- **"Experienced utility must be measurable"**: *The divergence of our results between decision and experience based measures of utility (and indeed memory based measures) suggest this is the case.*

- **"Individual's choices are rational"**: *We can be less certain about this, but if individuals are being irrational they are doing so in a consistent manner. The findings of the before and after visit analysis for visitors presented in Chapter 5 would tend to support an assumption of rationality as they were consistent with the results found in Chapter 3. Rational choice is also supported by a 'logical' statistical model of choice.*

- **"Responses to contingent valuation questions are rational"**: *Obviously in our case we are looking at response to Choice Experiments and the multi attribute nature of this technique tends to be more facilitating to rational decisions. It is true that as payments are theoretical individuals may therefore be making less than rational decisions. It was, however, made clear that the research may feed into policy and as such decisions made may result in actual payment.*

- **"For any given individual the marginal utility of money is approximately constant over the range relevant to the study"**: *Which is found to be certainly true for the visitor survey and hopefully the same could be said for the local resident and farmer surveys. Again it should be reiterated that for the analyses presented in Chapter 4 and 5 the same individuals were answering the same questions which in some way mitigates the issue. Our parameter estimate for income is found to be (roughly) constant across treatments for local residents which further supports this assumption. However, as was mentioned in Chapter 6, there is a potential that those with lower incomes would find the costs involved constituted a significant proportion of their household income. As such it is suggested that policy analysis should include some form of social equity framework.*

So from the point of view of the research presented in this dissertation it would appear that the major stumbling block to the acceptance of the methodology adopted is a consideration of whether the responses to valuation exercises are rational. Whilst we certainly agree that issues have been raised with the techniques adopted for valuation we also believe that these issues do not preclude their use for comparative

analysis. However, we leave it to the reader to decide if this necessary compromise to the behavioural psychologist preferred methodology is one they consider to be acceptable.

The findings of the research presented in Chapter 4 show that both experience and memory impact upon willingness to pay for landscape attributes of the uplands of the UK. This suggests that further investigation is required and that adopting a system using a 'felicific calculus', as Bentham (1789) called it, would be a useful extension to the literature. It also has implications for valuation of environmental goods generally in that when and where preferences are elicited may impact upon the value derived for a good. For example, surveys carried out on site may yield divergent results from those carried out off site or through citizen juries, postal or internet based surveys. As such the research suggests that the time and place at which preferences are elicited should, at least, be considered for future research, or indeed any analysis of past research.

The role of heuristics provides an important link between Chapters 4 and 5 in that it has previously been found that information can play an important role in the development of preference (e.g. Bateman et al. 2002 and Mathews et al. 2006). However, recent research by Bateman et al (2009) follows a similar approach as that adopted in Chapter 4 but does not analyse the impact of memory so therefore concludes that heuristics are the main driver of value change given some level of experience (albeit virtual). We would argue that the results of the memory treatments in Chapter 4 suggest that this argument does not apply to the current research.

However, we did attempt to take heuristics into account in Chapter 5 where we analysed the impacts of expert witness testimony on preference.

So in Chapter 5 the research returned to what could be considered a somewhat better trodden path (Bateman et al 2009, Alvarez-Farizo and Hanley 2006, Green and Tunstall 1999 and Munro and Hanley 1999) but the analyses yield equally interesting results for policy as those in Chapter 4. Given the impacts of heuristics identified above and the importance of information for the development of such heuristic rules of thumb we aimed to identify if fuller and more complex information about ecosystem service interactions in the uplands led to any changes in preference. Many previous studies have focused on individual services such as landscape attributes. Indeed this may be the preferred option given the issues of double counting inherent in the valuation of certain ecosystem services (for example individuals may struggle to separate out impacts on biodiversity from the underlying landscape which supports it). However, it is clear that where complex ecosystem service interactions exist it is always possible to increase the level of information presented to individuals by recourse to expert witness testimony.

It was found that additional information does indeed impact upon preference for upland landscape features; that is, in the terms of the example above, reducing the level of separation of ecosystem services yields an impact upon preference. However, it was found that the information which participants identified as most likely to impact on the way in which landscapes were considered only marginally impacted on preference. One explanation of this is that individuals are ill equipped to identify what is most likely to enter their decision matrix. A second explanation is that the two sets

of information presented tended to suggest a similar level of preference variance, i.e. historical information would have yielded the same results in the absence of presentation of the biodiversity and farmer treatment (a proposition which would be supported by the analysis of frequencies of choice presented in Appendix 5). However, a final explanation may exist in that the information which appears to have the largest impact directly related to the understanding of ecosystem service interactions. The information which produced only a further marginal impact, on the other hand, related to the context within which the landscape features and ecosystem interactions were placed.

A novel approach in the literature is to allow respondents the opportunity to identify the features which should be included in the study (see Barkmann et al 2008, Gourlay and Slee 1998, Palmer 2004 and Vouligny 2009). This goes beyond the traditional approach of using scoping studies to identify appropriate candidate attributes and more similarly adopts an approach akin to the grounded theory (Glaser and Straus 1967) proposed in Chapter 2. The results of Chapter 5 (and indeed Chapter 4) suggest that such approaches are likely to yield results which are not as relevant to policy analysis as those based in expert assessment of likely impacts.

In the final analytical chapter of this dissertation we aimed to identify if preferences diverge between groups with different relationships to the park. We found that those involved in active use of the national park (visitors) had unequal and dissimilar preference orderings to local residents and farmers (a result supported by Jones et al 2000, Kaltenborn and Bjerke 2002, Bullock and Kay 1997, Bonaiuto et al 2002, Hanley et al 2003, Rambonilaxa and Dachary-Bernard 2007 and Gourlay 1996).

In finding that those visitors with a physical association to the park in terms of distance preferred less intensive management over the current level, unlike local residents who make limited recreational use of the park, we identify that use and non-use characteristics have an impact on management intensity preference for the uplands. However, those with a stated association with the national park appear to be happier with the current level of management (with increased willingness to pay to avoid more intensive management and reduced willingness to pay for less intensive management). This can be considered in two ways: firstly those with a greater association with this environmental good are more generally happy with the current management; alternatively it suggests a causal relationship in that those who are happiest with the current level of management of an environmental resource will feel a closer attachment to that resource. Given that there was little difference found in the preferences of those with a physical and stated association and that there could be bias associated with stated association and the status quo one could consider that this would suggest that distance based estimates of association be used in the future.

The final analysis has already been discussed above in terms the support it gave to the findings in Chapter 4. Given that experience was found to impact upon preferences; the stage at which the Choice Experiments were applied in an individual's visit was analysed. Whilst results were not found to be statistically significantly different between the treatments the general trend mirrors those found between treatments 1 (decision) and 3 (remembered 1) in Chapter 4. If this comparability in trends is accepted then it suggests that experience may impact on preference of visitors' in the same way it does for local residents.

7.4 Overall aims of the research

The findings above support the hypotheses presented in chapter 1 (table 1.1), as was identified there the main aims of the research were to identify what we can do to better estimate policy makers' and individuals' preferences for upland landscapes where no markets exist to make these clear to us. Further we aimed to indentify the policy implications and outcomes for differing attributes of environmental goods.

Firstly the policy implications of the research are that policy makers', those stakeholders applying policy on the ground and the academics' whose input informs policy may not be as well informed as might be expected. That is not to say that they are inefficient in applying policy but rather that where policy relies on an understanding of processes underlying change in environmental goods the outcomes of the policy will only be as good as that understanding (Brueckner 2007). The findings reiterate that ecosystem services and processes in multifunctional landscapes are incredibly diverse and complex. As a result the valuation of these services is not an easy task (EFTEC Tinch et al 2009). During the 1960's, 70's and 80's land management decisions tended to be based upon expert opinion, albeit increasingly used in conjunction with rules / checklists to identify the relative merit of landscapes or changes to landscapes (see for example Dearden (1980) and Kane (1981)). These approaches are obviously still available but there has been an increasing focus on the identification of public preference in making land management decisions, with policy increasingly requiring the use of these techniques (see Hanley et al 2006b).

It should be noted that, unless we are making decisions by referenda, valuation provides a useful measuring rod against which to compare potential policies (Krutilla,

1967). However policy should not be informed solely by the valuations applied to environmental goods – the policy maker should make decisions to maximise public benefit, and must not assume that given limited information the choices made in environmental valuation are fully informed. It was shown in the current analysis that relatively minor changes in the way in which valuation exercises are applied (whether that be in terms of location / experiential impact or complexity of information provided) can have impacts on the results of valuation exercises.

In finding that experience, memory and information can impact on preference gives rise to a potentially more difficult answer to be found. Which of an individual's potential preferences should be used to inform policy? Is it possible for the measuring rod of valuation to be given an accurate scale? We can say one thing is preferred to another BUT to state that it is preferred by X pounds given the uncertainties associated with valuation activities is a strong statement. The question becomes do we use money in valuation because we feel that we can generate a valid pounds and pence value for something or do we use it because it is a familiar concept to people which makes it easier to relatively weight their preferences as determined by the experiment?[44] It is proposed that many environmental economists would have strong misgivings about values derived being used to promote nature conservation over spending on schools, hospitals or libraries because alternative studies have shown a lower willingness to pay for them. However, being used to decide how a budget for nature conservation is distributed is likely to be more palatable. This relates back to the issues raised by Rambonilaza and Dachary-Bernard (2007) about the weighting

[44] That is it provides a consistent modulus across space and time (given index linking).

placed on individuals in differing income groups (see Chapter 6 Visitor Preferences). Overall spending budgets for the country are perhaps better decided at governmental levels than based upon the results of a Choice Experiment as full socio-ethical considerations can be made.

So the question remains which of the values derived in chapter 4 and 5 are appropriate for policy analysis? Where the use proposed above, i.e. comparison of values from different studies to identify optimal resource distribution for environmental goods, is adopted then the decision utility value or the value informed by expert witnesses is the most appropriate whichever is most similar to the comparative studies. Equally for most policy analysis decision utility seems the most appropriate value except in certain key circumstances which are outlined below. In the case of landscape managers the experience based measure is the most appropriate. For example all National Parks, the National Trust and the Forestry Commission collect on site data to elicit visitor preferences[45]; these represent experienced based measures of utility (as is relevant to those wishing to improve experience in the instant) and as such comparison with the experienced based estimates would be most appropriate. The National Trust also makes use of take home surveys which would elicit remembered utility so there is also a role for this value.

[45] This information is derived from phone interviews carried out with the Forestry Comission Access recreation and Health Policy Advisor, National Trust Segmentation Manager and ENPA Policy Officer in February 2010.

7.5 What Do People Want, Who Wants It and Can They Have It All?

Where different groups associate different values with particular levels of an environmental good there is a question of how policy should react? In the uplands, as with many other landscapes of environmental merit, visitors may be considered to be the dominant users in terms of the numbers involved. Farmers on the other hand constitute a tiny proportion of the population making use of a landscape, but are reliant on that landscape if for nothing else than their economic well being. They are also an incredibly important group for the application of policy on the ground and should this group reject a policy it will be almost impossible to implement. This relates to the distribution of property rights relevant to the upland landscapes of the UK. The large estate owners may be an even more important group for the implementation of policy but in the Peak District this only relates to a handful of individuals and it would be a difficult task to convince them to take part in a study of preferences for management. Equally, local residents are an important group and their preferences should be considered. The research presented above suggests a compromise of any payment for a move to less intensive management coming from visitors as the only group generally preferring this intensity of management. However, other groups prefer the current level of management over less intensive management so careful consideration is still required. Of course given adaptation and status quo bias there is no guarantee that the move to a less intensive system would be a politically unpopular one in the long run but, at least in the short run, there is a predicted reduction in utility derived from the landscapes for local residents. The recent CAP health check agreed on the 20 November 2008 by the EU agriculture abolished arable set-aside, increased payments to Rural Development Funds rather than direct to farmers. They

also increased the focus of payments towards climate change, water management, biodiversity, and green energy. All of these measures may be considered to reduce the intensity of management, the current research suggests that this change in policy will be less popular with farmers and locals of agricultural landscapes than with those using these landscapes for recreational pursuits.

In order to identify a socially optimal policy from the results presented here one could calculate the compensating surplus for each of the groups, calculate an aggregate of this for all individuals in that group (taking into account some annual basis for visitation) and compare across policies with different mixes of management intensities and footpath network quality. However, given the range of values held for each of the user groups the identification of which should be used will be a complex one and it is thought that full presentation of results would require a significant number of additional pages of tables for very little gain given the levels of uncertainty involved (a few key results are presented in Appendix 4). In real terms it is sufficient to answer the thesis that different groups have different preferences for management and that within the groups there are factors which cause divergence in preference. If the insider outsider dichotomy and status quo preference are accepted to be consistent across all national parks in the UK and are assumed to operate in the same direction for each the results presented above have many management implications. The main implication is that any shifts to less intensive management should be funded by visitors and that local residents may need to be compensated for the changes. This could be through increased spending on infrastructure to improve community cohesion another aspect of National Park status, identified in chapter 2, as of great

importance to local communities (and an integral part of the sustainable communities objective outlined in all National Park Plans in the UK).

7.6 Headline Results

This section is dedicated to drawing out the main results of the analysis of this thesis. Nine main points are listed below:

1. Those implementing policy on the ground may not be basing decisions upon a fully informed decision matrix for complex ecosystems. The implication of unsuitable grounding is a possible rejection of policy.
2. Where valuation exercises have been used in an attempt to internalise the externalities' of multifunctional landscape ecosystem services for the decision making process a lack of understanding could lead to errors in this process. As such policy may be based upon inappropriate analyses which will not reflect true preference for the actual changes which occur.
3. Experience in the moment impacts on utility for environmental goods as measured by WTP (derived from Discrete Choice Experiments).
4. Memory also has an impact and (in terms of the current research) seems to mitigate the impact of experience over time.
5. The one possible exception to this is for unfamiliar habitats / landscape features where it might be felt there is a learning effect (although issues of sample size and resulting significance impact on our ability to make a definitive statement to this effect).
6. Additional information and heuristic rules are also shown to impact on utility, although this is not necessarily a new result it confirms that the set up of an

experiment and the level of information presented has implications for the result derived.

7. A divergence is found for visitor, local and farmer preferences. Farmers appear to have preference most similar to local residents during experience of the landscape upon which the farmers operate (or when they have been presented information by a farmer). There, potentially, is a significant status quo bias inherent for landscape management in the local and farmer populations.
8. Similar patterns are observed for local residents and visitors regarding experience and memory, although these results were not significant they suggest that further research on the topic for visitors may be required.
9. Analysis of stated and physical association with an environmental resource show results which don't statistically diverge which suggests that either measure is suitable for analysis. However, due to causality between stated association and preference for the current level of management the use of physical association may be preferred.

7.7 Limitations of the Research

This section provides a critique of the approaches and research adopted in answering this thesis. It runs through each of the chapters in turn and identifies key issues and limitations. It is clear that there are a number of ways in which the research could have been improved, but it certainly proved to be an interesting learning experience and it is considered that none of these limitations prevent inferences being made from the results of the research.

The main drawback of the adoption of a grounded theory approach (as in Chapter 2) is that it does not yield testable results, as such theories developed are tentative and further confirmation is required (Glaser and Straus 1967). The stakeholders involved in the process were the individuals responsible not just for the implementation of policy on the ground but were also those upon whose opinion valuation exercises would traditionally be based. The failure lies in that it was not possible to further test the divergence between opinion and fact as workshops were a one off and given constraints of taking notes it was not possible to identify 'who said what' so it was not possible to approach individuals after divergence had been identified. If conducting the research again recording equipment would be used in order to prevent such issues with a 'one shot deal'.

In the analysis presented in Chapter 4 the major stumbling block is the use of DDiscrete Choice Experiments to develop an experienced based measure of utility. Although results demonstrate a divergence it would have been interesting to also include some happiness based measure in the analysis and it is probably a significant limitation that such a measure was not implemented (it was considered prior to the research but time constraints did not allow the development of such a measure). This would have provided the potential to further investigate the relative merits of a Choice Experiment based measure of utility against a happiness based measure which may have had implications for the suitability of the approach we present for future analyses.

Again in Chapter 4 another limitation can be indentified in terms of the analysis of the impacts of memory and the time between observations. Ideally the impact

would be monitored over less distinct divisions of time i.e. more observations could have been taken to find how quickly values derived returned to similar levels as the levels seen in the decision based treatment.

Perhaps the biggest point identified in the organisation of the workshops was that timing can be everything. One of the biggest failings of the research is that the sample of 52 is a relatively small sample so levels of significance of analysis can be lacking. It was originally intended to have a sample of 64 but at the first workshop there was a loss of participants – and annoyingly this was relatively foreseeable. The first workshops took place on the 13th and 14th of October 2007. On the 13th of October the English team beat France to reach the finals of the rugby world cup and in football the English team beat Estonia to keep their hopes of qualifying for Euro 2008 alive, England celebrated. This was not the best time to be attempting to conduct research in England – on the 14th of October a significant proportion of the workshop participants failed to appear, in particular for the first two workshops where only 50% of participants attended. It is of little consolation that within 2 weeks the English national sides had been comprehensively beaten in both competitions.

This loss of participants in particular impacted on the research presented in Chapter 5. Originally it had been intended to investigate the impacts of information presentation using two distinct treatments – namely by presenting information in alternative orders to different groups. However, given the now reduced sample size it was decided that a single treatment was more appropriate (given that the impacts of additional information was the primary aim of this research).

Turning to Chapter 6 whilst taking a sample of almost 1% of the total population is a good basis for any analysis when there is a small population, such as for farmers employed in the Peak District National Park, sample size remains an issue. In terms of visitors the collection of further information in terms of socio-economics (in particular the length of visit) would have been extremely useful. Also had the opportunity existed to survey on site whilst visitation took place this would have had the potential to significantly add to the results. However, in such a large and open landscape[46] how to go about this is a significant question?

7.8 Future Work

Firstly it is intended that a further analysis of the impacts of taking relative scale into account in choice modelling should be carried out for all comparative analyses presented above. This will allow comparison across coefficients rather than the willingness to pay space only. At this stage fuller analysis of socioeconomic factors will also be possible, although from the results found in the current analysis and those presented in Appendix 3 dealing with robustness testing socioeconomics appear to play a limited role for the current research.

Perhaps the key result to be drawn out from the research presented above is the analysis of the impact of experience on preference for environmental goods. The results suggest that this aspect is worthy of significantly more research. Firstly the identification of a system of felicific calculus which is applicable to environmental goods in a reasonable cost and time frame would be useful. An investigation of the use

[46] This is considered to be a wild landscape in part because of its extreme nature – it is not necessarily conducive to field research.

of revealed preference methods with input from behavioural psychologists in order to identify if such a calculus can be applied in this setting is also suggested.

A fuller analysis of the preferences for individuals from the different groups identified in Chapter 6 in terms of experience would also be interesting. One issue for visitors to the National Park is the need for more than one workshop in order to identify the impacts of memory which may limit the research to groups living within a certain distance from the park. Also encouraging individuals to give up their time for the research would likely be costly.

Obviously a further extension would be to see if similar results are found for other multifunctional landscapes. A more topographically constrained environment would allow greater opportunities to test visitors' preference during experience which could make a further significant contribution to the literature on this topic. In particular landscapes where there are varying levels of familiarity might be worthy of investigation, for example beach, dune landscapes and near shore coastal seascapes with major developments in onshore and offshore wind energy being proposed for many coastal parts of the UK and Europe.

Finally, in a recent workshop for proponents of upland valuation and assessment of ecosystem services an interesting point occurred to me. Valuation exercises are by their nature based upon change, however, given the topographical and climatic constraints in the uplands change is by no means instantly occurring. It could be said of most valuation exercises in the literature that the time frame within which an impact is felt or indeed the certainty with which that impact will occur is not normally discussed within the valuation framework. The impacts of this sort of

information and the implications of the appropriate discount rate to be applied to ecosystem service changes in multifunctional landscapes would be of considerable interest. Given these valuation approaches have been suggested for the investigation of management efforts such as those proposed at Wild Ennerdale where final landscape impacts will not be felt for 50 years at least raising the point of discounting in the literature would seem to be apparent. It was clear at the stakeholder workshop and additional work with key stakeholders that very few practitioners have taken this into account!

7.9 Conclusions

At this juncture it seems appropriate to return to the main aims and hypotheses of the research and investigate to what extent these have been achieved and proven respectively. As was discussed above section 7.4 identifies how the overall aims of the thesis have been achieved, here we focus on the core analytical chapters. Chapter 4 set out to investigate the impacts of experience and memory on preferences for upland landscapes, this was achieved albeit using the choice experiment technique, a necessary compromise to an ideal behavioural pshychological happiness based approach. Secondly is set out to identify how useful each measure of preference is for policy analysis. It was found that given the diverse range of policy settings relevant to the uplands each value would have merit and the main finding was that consideration of the variation was required when considering einvironmental goods. Chapter 5 set out to investigate the impacts of additional information and the role of heuristics in valuation, whilst this was achieved the nature of the sample meant that it could not be investigated in as detailed a manner as may have been prefered. However, the results

are indicative of an interesting impact of the nature of information on the formation of preferences as set out in the headline results. Finally chapter 6 set out to investigate the divergence in preferences given differing relationships to a good and analyse the impacts of association with a resource. This was achieved with the finding of different preference orderings between different groups, however, the need to employ different payment vehicles did, in part, limit the ability to directly compare across different groups.

The main hypotheses tested in the research were:

1. *Decision, experienced and remembered utility will diverge for environmental goods in the same way as they have been found to for other goods.* Results indicate that this is the case, although further testing with a larger sample is likely to strengthen the proof of this hypothesis.
2. *Factors which influence heuristics rules associated with an environmental good will in turn influence preference for that good.* Again the research provided some proof of this hypothesis in support of others such as Bateman (2009) although further investigation with a larger sample is indicated.
3. *The preferences of groups with different associations with an environmental good will be divergent.* This hypothsesis has previously been shown to hold true by a range of research (e.g. Bullock and Kay 1997, Jones et al 2000, Bonaiuto et al 2002, Kaltenborn and Bjerke 2002, Hanley et al 2003 and Rambonilaza and Dachary-Bernard 2007) the current research supports this body of evidence and relates it to the upland landscapes of the UK.

In answering this thesis and testing the hypotheses set out above a number of key results have been shown. In particular that the analysis of experience and memory for complex environmental resources is achievable. However, some compromise to the happiness based approach suggested by behavioural psychologist (Kahneman and Sugden 2005) was required to allow this. Equally it was shown that a range of aspects can impact upon preference for environmental goods.

It is thought that these results can potentially provide a significant contribution to the literature. But the research also raises some questions and draws some issues out as worthy of further consideration. Particular amongst these is the question of which value it is appropriate to use for policy analysis when the moment of experience, memory, heuristics and information, and association with an environmental resource are all shown to impact on the utility associated with an environmental good. As was proposed in the introductory chapter the solution may lie in the method of policy analysis and the nature of the resource.

A simple prediction of choice, which will provide a better 'recipe for electoral success' lends itself to the use of the decision / predicted utility assessment. For management of specific resources and for the identification of a measure of well being associated with a resource then experienced utility may provide the most appropriate measure. When considering the identification of ecosystem service values experienced utility is likely to be the best measure for 'use' values, however, non-use and cultural values may be better represented by decision (or indeed remembered) utility. Finally when trying to gain an aggregate measure of well being a more fully informed value from remembered utility may be preferred but the argument made for

ecosystem service values could equally apply when considering the use of CBA to identify this aggregate measure. Which measure should be adopted probably warrants significantly more research effort, indeed further analysis of the impacts of experience and memory would be required to confirm the results of the current research prior to identifying the best suited measure for a given scenario.

Also raised in the research is the importance of social equity considerations when making land management decisions. The landscape may make up a significant proportion of low income households real income. However, due to budget constraints, the stated willingness to pay may be relatively low for these groups. In the current research it was found that income did not have a significant impact in terms of the local population or for visitors to the park. Rather than suggesting that income is unimportant and does not deserve consideration it is likely that the opposite holds. Low income households are willing to pay a larger proportion of their income to maintain the current management regimes in the national park (in the case of local residents). This result supports the proposition that landscape quality makes up a larger proportion of these households real income.

Perhaps the main message which should be drawn from this research is that careful consideration is required in the implementation and development of valuation exercises. The finding that the stakeholders upon whose opinion valuation studies are developed may not accurately reflect findings on the ground suggests that there may be a divergence between the impacts of a policy and the analysis upon which the decision to implement the policy are made. In the extreme this could lead to the rejection of the policy by the public. Given recent events in climate change research it

appears that public confidence in the science behind environmental policy may be key to the success of environmental policy. Equally consideration of the impacts of experience and memory on utility estimates is a requirement of future studies both in terms of the generation of primary value or in terms of benefits transfer or meta analyses. Finally it was shown that association with a resource could be an important determinant of willingness to pay and in particular that a consideration of association could identify how future policy should be funded.

Bibliography

Acs S., Hanley N., Dallimer M., Robertson P., Wilson P., Gaston K.J. and Armsworth P.R. (2010) The effect of decoupling on marginal agricultural systems: implications for farm incomes, land use and upland ecology. Land Use Policy. 27(2): 550-563

Alvarez-Farizo B. and Hanley N. (2006) Improving the process of valuing non-market benefits: combining citizens' juries with choice modelling. Land Economics. 82 (3): 465-478.

Alvarez-Farizo B., Hanley N., Barberán R., and Lázaro A. (2007) Choice modeling at the 'market stall': individual versus collective interest in environmental valuation. Ecological Economics. 60: 743–751.

Anderson P. and Yalden D.W. (1981) Increased sheep numbers and the loss of heather moorland in the Peak District, England. Biological Conservation. 20(3): 195-213

Bain D. (2008) Four philosophical questions to make your brain hurt. BBC News Magazine. http://news.bbc.co.uk/1/hi/magazine/7739493.stm Last accessed October 2009.

Balestra P. and Nerlove M. (1966) Pooling cross-section and time series data in the estimation of dynamic models: the demand for natural gas. Econometrica. 34: 585-612.

Barkmann J., deVries K., Dietrich N., Glenk K., Gerold G., Keil A., Leemhuis C. and Marggraf R. (2008). Confronting unfamiliarity with ecosystem functions: The case for

an ecosystem service approach to environmental valuation with stated preference methods. Ecological Economics. 65: 48–62.

Barnett H.J. and Morse C. (1963) *Scarcity and Growth: The Economics of Natural Resource Availability.* Johns Hopkins Press, Baltimore, MD.

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

Bateman I., Munro A., Rhodes B., Starmer C. and Sugden R. (2000) A Test of the Theory of Reference-Dependent Preferences. In: Kahneman D. and Tversky A. (eds.) *Choices, Values and Frames,* Cambridge: Cambridge University Press.

Bateman I. and Willis K.G. (1999) (eds.) *Valuing Environmental Preferences: theory and practice of the contingent valuation method in the US, EU and developing countries.* OUP Oxford.

Bateman I.J., Day B.H., Jones A. P. and Jude S. (2009) Reducing gains/loss asymmetry: A virtual reality Choice Experiment (VRCE) valuing land use change. *Journal of Environmental Economics and Management. 58(1): 106-118*

Bentham J. (1789) *An Introduction to the Principles of Morals and Legislation (http://www.econlib.org/library/Bentham/bnthPML2.htm)*

Beshears J., Choi J.J., Laibson D. and Madrian B.C. (2008) How are preferences revealed? Journal of Public Economics. 92: 1787-1794.

Best J. (2006) What, we worry? The pleasures and costs of defective memory for qualitative sociologists. Journal of Contemporary Ethnography. 35(4): 466-478

Binder M. and Clegg B. (2007) Enterprise management: A new frontier for organizations. International Journal of Production Economics. 106(2): 409-430

Bonaiuto M., Carrus G., Martorella H., and Bonnes M. (2002) Local identity processes and environmental attitudes in land use changes: the case of natural protected areas. Journal of Economic Psychology. 23: 631-653.

Brickman P. and Campbell D.T. (1971) Hedonic Relativism and Planning the Good Society. In: M.H. Apley (ed.) *Adaptation Level Theory: A Symposium.* New York: Academic Press, pp 287–302.

Brown R.A., Rosenberg N.J., Hays C.J., Easterling W.E. and Mearns L.O. (2000) Potential production and environmental effects of switchgrass and traditional crops under current and greenhouse-altered climate in the central United States: a simulation study. Agriculture, Ecosystems & Environment. 78: 31–47.

Brook I. (1998) Goethean Science as a way to read landscape, Landscape Research, 23: 51-69.

Brueckner M. (2007) The Western Australian Regional Forest Agreement: Economic rationalism and the normalisation of political closure. The Australian Journal of Public Administration. 66(2): 148-158

Bullock C. H. and Kay J. (1997) Preservation and change in the upland landscape: the public benefits of grazing management. Journal of Environmental Planning and Management 40(3): 315-334.

Carson R. (1962) *Silent Spring*, Riverside Press, Cambridge, Massachusetts

Carson R.T. and Groves T. (2007) Incentive and informational properties of preference questions. Environmental and Resource Economics. 37(1): 181–210.

Chernatony L. and Cottam S. (2006) Internal brand factors driving successful financial services brands. European Journal of Marketing. 40(5/6): 611-633

Christie M., Crabtree B. and Slee B. (2000) An economic assessment of informal recreation policy in the Scottish countryside. Scottish Geographical Journal. 116 (2): 125-142

Christie M., Hanley N., Warren J., Murphy K., Wrigt R., and Hyde T. (2006) Valuing the diversity of biodiversity. Ecological Economics. 58 (2): 304-317

Ciriacy-Wantrup S. (1947) Capital returns from soil-conservation practices. Journal of Farm Economics 29: 1181.

Clark A.E., Frijters P. and Sheilds M.A. (2008) Relative Income, Happiness and Utility: An explanation for the Easterlin paradox and other puzzles. Journal of Economic Literature. 46(1): 95-144

Coase R.H. (1960) The problem of social costs. Journal of Law and Economics 3(1): 1-44.

Colander D. (2007) Retrospectives: Edgeworth's Hedonimeter and the Quest to Measure Utility. Journal of Economic Perspectives. 21(2): 215–226

Colombo S. and Hanley N. (2008) How Can We Reduce the Errors from Benefits Transfer? An Investigation Using the Choice Experiment Method. Land Economics. 84(1): 128-147.

Czech B. (2004) 'A chronological frame of reference for ecological integrity and natural conditions', Natural Resources Journal. 44(4): 1113-1136

Dakin S. (2003), There's more to landscape than meets the eye: towards inclusive landscape assessment in resource and environmental management. Canadian Geographer-Geographe Canadien. 47: 185-200.

Dallimer M., Tinch D., Acs S., Hanley N., Southall H.R., Gaston K.J., Armsworth P.R. (2009) 100 years of change: examining agricultural trends, habitat change and stakeholder perceptions through the 20th century. Journal of Applied Ecology. 46(2): 334 – 343

Davis R. (1963) *The Value of Outdoor Recreation: An Economic Study of the Maine Woods*, Doctoral Dissertation in Economics, Harvard University.

Dearden P. (1980) A statistical technique for the evaluation of the visual quality of the landscape for land-use planning purposes. Journal of Environmental Management. 10: 51-68.

DECC (2008) *Greenhouse Gas Policy Evaluation and Appraisal in Government Departments.* DECC

DEFRA (2006) *Rural Development Programme for England 2007-2013: Uplands Rewards Structure Consultation Document.* Defra

DeShazo J.R. (1999) The effect of supply and demand shocks on the non-market valuation of public goods. Environment and Development Economics. 4: 471-492

Di Tella R. and MacCulloch R. (2008) Gross national happiness as an answer to the Easterlin Paradox? Journal of Development Economics. 86(1): 22-42

Do A.M., Rupert A.V. and Wolford G. (2008). Evaluation of pleasurable experiences: The peak – end rule. Psychonomic Bulletin and review. 15(1)

Downward P., Finch J.H. and Ramsay J. (2002) Critical realism, empirical methods and inference: a critical discussion. Cambridge Journal of Economics. 26(4): 481-500

Edgeworth F.Y. (1881) *Mathematical Psychics: An essay on the application of mathematics to the moral sciences.* C Kegan Paul & Co, London (1881) http://socserv2.mcmaster.ca/~econ/ugcm/3ll3/edgeworth/mathpsychics.pdf Last accessed October 2009.

EFTEC: Tinch R., Tinch D., Provins A. and Ozdemiroglu E. (2009) Economic valuation of upland ecosystem services Natural England Commissioned Report NECR029

English Nature (2001) *State of Nature: The Upland Challenge*, English Nature, Peterborough

English Nature (2005) *Sites of Special Scientific Interest*, www.english-nature.org.uk/special/sssi/, accessed December 2007

FHRC (2003) The benefits of flood and costal defence: techniques and data for 2003, Flood Hazard Research Centre, Middlesex University.

Fisher I. (1927) A Statistical Method for Measuring 'Marginal Utility' and Testing the Justice of a Progressive Income Tax. In: *Bates C.* ed. *Economic Essays Contributed in Honor of John* Jacob Hollander. New York: Macmillan

Gilbert D. T. and Ebert J. E. J. (2002) Decisions and revisions: The affective forecasting of changeable outcomes. Journal of Personality and Social Psychology. 82: 503-514.

Gilbert D. T., Lieberman M. D., Morewedge C. K. and Wilson T. D. (2004). The peculiar longevity of things not so bad. Psychological Science. 15: 14-19.

Glaser B.G and Strauss A.L. (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*, Aldine de Gruyter, New York

Gomez-Limon J., and Fernandez J. V. D. (1999) Changes in use and landscape preferences on the agricultural-livestock landscapes of the central Iberian Peninsula (Madrid, Spain). Landscape and Urban Planning. 44: 165-175.

Gonzalez M. and Leon C.J. (2003) Consumption process and multiple valuation of landscape attributes. Ecological Economics. 45(2): 159-169

Gourlay D., and Slee B. (1998) Public preferences for landscape features: A case study of two Scottish environmentally sensitive areas. Journal of Rural Studies. 14: 249-263.

Green C.H. and Tunstall S.M. (1999) A Physchological Perspective. In: Bateman I. and Willis K.G. (eds.) *Valuing Environmental Preferences: theory and practice of the contingent valuation method in the US, EU and developing countries*. Oxford: OUP

Haaijer R. and Wedel M. (2007) Conjoint Choice Experiments: General characteristics and alternative model specifications. In: A. Gustafsson et al. (eds.), *Conjoint Measurement (pp.199-229), Berlin: Springer*.

Haines-Young R., Potschin M. and Rollett A. (2008) England's Upland Ecosystem Services: Phase 1, Report to Natural England, Project code FST20/79/023. www.terra-consult.co.uk/ne_docs/ne_uplands_final_10_09-08.pdf Last accessed October 2009.

Hanemann W.M. (1991) Willingness to Pay and Willingness to Accept: How much can they differ? The American Economic Review. 81(3): 635-647

Hanemann W.M (1992) Preface. In: Stale Navrud (ed), *Pricing the European Environment*, Scandinavian University Press pp 9-14.

Hanley N., Alvarez-Farizo B. and Shaw W.D. (2002) Rationing an open-access resource: mountaineering in Scotland. Land Use Policy 19: 167–176

Hanley N. and Barbier E. (2009) *Pricing Nature: Cost-Benefit Analysis and Environmental Policy.* Cheltenham: Edward Elgar.

Hanley N. and Colombo S. (2009) Economic value of upland landscapes. In: Bonn, A., Allott, T., Hubacek, K. And Stewart, K. (eds.) *Drivers of Environmental Change in Uplands,* London, Routledge.

Hanley N., Colombo S., Tinch D., Black A., and Aftab A. (2006) Estimating the benefits of water quality improvements under the Water Framework Directive: are benefits transferable? Eur Rev Agric Econ 33: 391-413

Hanley N., Davies A., Angelopoulos K., Hamilton A., Ross A., Tinch D. and Watson F. (2008) Economic determinants of biodiversity change over a 400-year period in the Scottish uplands. Journal of Applied Ecology 45(6): 1557-1565(9)

Hanley N. and Macmillan D.C. (2000). Contingent Valuation versus Choice Experiments: estimating the benefits of Environmentally Sensitive Areas in Scotland. Journal of Agricultural Economics 51(1): 129-132

Hanley N., MacMillan D.C., Wrigh R.E. and Patterson I. (2003) Economics and the Design of Nature Conservation Policy: A Case Study of Wild Goose Conservation in Scotland Using Choice Experiments. Animal Conservation 6: 123-129.

Hanley N., Ready R., Colombo S., Watson F., Stewart M. and Bergman E.A. (2009) The impacts of knowledge of the past on preferences for future landscape change. Journal of Environmental Managment. 90(3): 1404-1412

Hanley N. and Spash C.L. (1993). *Cost-benefit Analysis and the Environment*, Aldershot: Edward Elgar Publishing Ltd

Hanley N., Tinch D., Angelopoulos K., Davies A., Watson F. and Barbier E.B. (2009) What drives long-run biodiversity change? New insights from combining economics, paleoecology and environmental history. Journal of Environmental Economics and Management. 57(1): 5-20

Hanley N., Wight R., and Alvarez-Farizo B. (2006a) Estimating the Economic Value of Improvements in River Ecology Using Choice Experiments: An application to the water framework directive. Journal of Environmental Management. 78: 183-193

Hediger W. (1994) On the opportunity cost of climate change and policy. In: *Swiss Topical Workshop on Decision Making Under Uncertainty and Climate Change Risk Economics.* IPCC, Working Group III, Published by Paul Scherrer Institute, Environmental Economics.

Helson H. (1964) *Adaptation-Level Theory: An Experimental and Systematic Approach to Behavior*, Harper & Row, New York

Hsee C.K. (1996) The evaluability hypothesis: an explanation for preference reversals between joint and separate evaluations of alternatives, Organizational Behavior and Human Decision Processes 67: 242–257.

Hume (1742) *Essays, Moral, Political, and Literary* Eugene F Miller Ed. http://www.econlib.org/library/LFBooks/Hume/hmMPL.html#

Johnston R.J. and Duke J.M. (2007) Benefit Transfer Equivalence Tests with Non-normal Distributions. Environ Resource Econ. 41:1–23

Jones C. D., Patterson M. E. and Hammitt W. E. (2000) Evaluating the construct validity of sense of belonging as a measure of landscape perception. Journal of Leisure Research. 32: 383-395.

Juster , F.T. and Stafford, F.P. (eds.), (1985) Time, goods and well-being. The Institute for Social Research, University of Michigan, Ann Arbor, MI, 1985.

Kahneman D. (2003) Maps of Bounded Rationality: Pshychology for Behavioural Economics. The American Economic Review. 1449 – 1475

Kahneman D. and Knetsch J.L. (1992). Valuing public goods: The purchase of moral satisfaction. Journal of Environmental Economics and Management 22: 57-70.

Kahneman D. Knetsch J.L. and Thaler R.H. (2000) Anomalies: The Endowment Effect, Loss Aversion and the Status Quo Bias In: Kahneman D. and Tversky A. (eds.) *Choices, Values and Frames,* Cambridge: Cambridge University Press.

Kahneman D., Ritov I. and Schkade, D. (2000) Economic Preferences or Attitude Expressions? An Analysis of Dollar Responses to Public Issues. In: Kahneman D. and Tversky A. (eds.) *Choices, Values and Frames,* Cambridge: Cambridge University Press.

Kahneman D., Kreuger A., Schkade D., Schwarz N. and Stone A. (2004) A Survey Method for Characterizing Daily Life Experience: The Day Reconstruction Method. *Science.* 306: 1776–1780.

Kahneman D., Sarin R.K. and Warker P.P. (1997), Back to Bentham? Explorations of experienced utility. Quarterly Journal of Economics. 12:2

Kahneman D. and Sugden R. (2005) Experienced utility as a standard of policy design. Environmental and Resource Economics. 32: 161-181

Kahneman D. and Thaler R.H. (2006) Anomolies: Utility Maximization and Experienced Utility. Journal of Economic Perspectives. 20(1): 221-234.

Kahneman D. and Tversky A. (1979) Prospect Theory: An Analysis of Decision under Risk. Econometrica 47(2): 263–292.

Kahneman D. and Tversky A. (1984) Choices, values and frames. American Psychologist. 39: 341-150.

Kahneman D. and Tversky A. (2000) Choices, values and frames. In: Kahneman D and Tversky A (eds.) *Choices, Values and Frames,* Cambridge: Cambridge University Press.

Kahneman (2000) Experienced Utility and Objective Happiness: A Moment Based Approach. In: Kahneman D and Tversky A (eds.) *Choices, Values and Frames,* Cambridge: Cambridge University Press.

Kahneman D. (1999). Objective happiness. In: Kahneman D., Diene E. and Schwarz N. (eds.) *Well-Being: The Foundations of Hedonic Psychology*. New York: Russell Sage Foundation.

Kaltenborn B. P. and Bjerke T. (2002) The relationship of general life values to attitudes towards large carnivores. Human Ecology Review 9:55–61

Kane P. S. (1981), Assessing landscape attractiveness: a comparative test of two new method. Applied Geography 1: 77-96.

Kemp M.A. and Maxwell (1993) Exploring a Budget Context for Contingent Valuation Estimates. In :Hausman J (ed.) *Contingent Valuation: A Critical Assessment,* Amsterdam: North Holland Press.

Krinsky I. and Robb A.L. (1986) On approximating the statistical properties of elasticities. Rev Econ Statistics 68(4):715–719

Krutilla J.V. (1967) Conservation Reconsidered. The American Economic Review 57(4): 777 - 786

Lancaster K. (1966) A new approach to consumer theory. Journal of Political Economy 74(1): 132-157.

Larson R. and Csikszentmihalyi M. (1983): The Experience Sampling Method. In: Reis, H. T. (Ed.) *Naturalistic approaches to studying social interaction*. San Francisco: Jossey-Bass

Lee F.S. (2002) Theory creation and the methodological foundation of Post Keynesian economics. Cambridge Journal of Economics 26(6):789-804

Leiter A.M. and Pruckner G.J. (2009) Proportionality of Willingness to Pay to Small Changes in Risk: The Impact of Attitudinal Factors in Scope Tests. Environmental & Resource Economics 42(2): 169-186

Loewenstein G., O'Donoghue T. and Rabin M. (2003) Projection Bias in Predicting Future Utility. The Quartely Journal of Economics

Loomes G. (2006) (How) Can we value health, safety and the environment. Journal of Economic Psychology 27

Lynam T., de Jong W., Sheil D., Kusumanto T. and Evans K. (2007) A review of tools for community knowledge, preferences, and values in decision-making in natural resource management. Ecology and Society 12(1)

MacMillan D., Philip L., Hanley N. and Alvarez-Farizo B. (2003) Valuing non-market benefits of wild goose conservation: a comparison of interview and group-based approaches. Ecological Economics, 43: 49-59.

MacMillan D., Hanley N. and Lienhoop N. (2006) Contingent valuation: environmental polling or preference engine? Ecological Economics 60(1): 299-307.

Marshall, A. (1920) *Principles of Economics.* 8th Edition London: Macmillan and Co., Ltd. http://www.econlib.org/library/Marshall/marP11.htm

Mathews K.E., Freeman M.L. and Desvousges W.H. (2006) How and how much? The role of information in stated choice questionnaires. In: Kanninen B. (Ed.), *Valuing Environmental Amenities Using Stated Choice Studies: A Common Sense Approach to Theory and Practice, The Economics of Non-Market Goods and Services*, vol. 8, Springer, Dordrecht

Munro A. and Hanley N. (1999) Information, Uncertainty and Contingent Valuation. In: Bateman, I. and Willis, K. (eds.) *Valuing Environmental Preferences: Theory and Practice of the Contingent Valuation Method in the US, EC and Developing Countries,* OUP.

Natori Y. and Chenoweth R. (2008) Differences in rural landscape perceptions and preferences between farmers and naturalists. Journal of Environmental Psychology 28(3): 250-267

NCC (1987) *Changes in the Cumbrian Countryside*. NCC, Peterborough

Oreszczyn, S. (2000) A systems approach to the research of people's relationships with English hedgerows, Landscape and Urban Planning, 50(1-3): 107-117

Oreszczyn S. and Lane A. (2000) The meaning of hedgerows in the English landscape: Different stakeholder perspectives and the implications for future hedge management, Journal of Environmental Management 60(1): 101-118

Palmer J. F. (2004) Using spatial metrics to predict scenic perception in a changing landscape: Dennis, Massachusetts, Landscape and Urban Planning 69: 201-218.

Pareto V; Page A. N. (1971) *Translation of Manuale di economia politica ("Manual of political economy")*, A.M. Kelley, New York.

Peak District Rural Deprivation Forum 2004. *Hard Times*, http://www.pdrdf.org.uk/hillfarmingreport.htm, accessed December 2007

Peak District National Park (undated) Study Area / Fact Sheet Six http://www.peakdistrict-nationalpark.info/studyArea/factsheets/06.html last accessed October 2009.

Peak District National Park (undated b) Study Area / Fact Sheet Two http://www.peakdistrict-nationalpark.info/studyArea/factsheets/02.html last accessed October 2009.

Perman R. Ma Y. McGilvary J. and Common M. (2003) *Natural Resource and Environmental Economics*, Addison Wesley

Pichert D. and Katsikopoulos K.V. (2008) Green defaults: Information presentation and pro-environmental behaviour. Journal of Environmental Psychology 28(1) : 63-73

Poe G.L., Giraud K.L. and Loomis J.B. (2005) Computational methods for measuring the difference in empirical distributions. Am J Agric Econ 87(2):353–365

Portney P.R. (1994) The contingent valuation debate: why economists should care. Journal of Economic Perspectives 8(4): 3-17.

Rambonilaza M. and Dachary-Bernard J. (2007) Land-use planning and public preferences: What can we learn from Choice Experiments method? Landscape and Urban Planning 83: 318-326.

Ratcliffe, D.A. and Thompson, D.B.A. (1988) The British uplands their ecological character and international significance, in M.B. Usher, and D.B.A. Thompson (eds) *Ecological Change in the Uplands*, pp9-36, Blackwell Scientific Publications, Oxford

Read D. (2004) Utility Theory from Jeremy Bentham to Daniel Kahneman. Department for Operational Research, London School of Economics, Working Paper Series No. LSEOR 04-64.

Redelmeier D.A. and Kahneman D. (1996) Patients' memories of painful medical treatments: Real-time and retrospective evaluations of two minimally invasive procedures. Pain. 66: 3-8.

Ridder B. (2007) An exploration of the value of naturalness and wild nature. Journal of Agricultural and Environmental Ethics 20(2): 195-213

Robinson, J. P., & Godbey, P. (1997). *Time for life: The surprising ways Americans use their time.* Pennsylvania State University Press.

Robinson J.S., Clouston B., Suh J. and Chaloupka M. 2008 Are citizens' juries a useful tool for assessing environmental value? Environmental Conservation **35**:351-360

Rodwell J.S. (1991) *British Plant Communities*, *Volume 2*, Cambridge, CUP.

Rosen S. (1974) Hedonic prices and implicit markets: product differentiation in pure competition. Journal of Political Economy. 82: 34-55.

LaRossa R. (2005) Grounded Theory Methods and qualitative family research. Journal of Marriage and Family. 67(4): 837–857

Sarker A., Ross H. And Shrestha K.K. (2008) A common-pool resource approach for water quality management: An Australian case study. Ecological Economics 68(1): 461-471

Scarpa R., Thiene M. and Train K. (2008) Utility in WTP space: a tool to address confounding random scale effects in destination choice to the Alps. American Journal of Agricultural Economics. 90: 994-1010.

Scitovsky T. (1976) *The Joyless Economy: The Psychology of Human Satisfaction.* Oxford: Oxford University Press

Stone A.A., S.S. Shiffman and M. DeVries (1999) Rethinking Self-report Assessment Methodologies. In: Kahneman D., Diener E. and Schwarz N. (eds.) *Well-Being: The Foundations of Hedonic Psychology* (pp. 26–39). New York: Cambridge University Press.

Sugden R. (2007) Cost-Benefit Analysis as Market Simulation: A New Approach to the Problem of Anomalies in Environmental Evaluation *RFF Discussion Paper No. 07-28-REV*

Thaler R. (1980) Toward a positive theory of consumer choice. Journal of Economic Behaviour and Organization. 1(1): 39-60.

Thompson D.B.A., MacDonald A.J., Marsden J.H. and Galbraith C.A. (1995) Upland heather moorland in Great-Britain: A review of international importance, vegetation

change and some objectives for nature conservation. Biological Conservation 71(2): 163-178

Tinch D., Hanley N., Dallimer M., Posen P., Acs S., Gaston K.J. & Armsworth P.R. (2009) Historical perspectives on the development of multifunctional landscapes: a case study from the UK uplands. In: *Multifunctional Rural Land Management: Economics and Policies*. Brouwer, F. & van der Heide, M. (eds.). Earthscan, London, UK.

Tudor G. and Mackey E.C. (1995) Upland land cover change in post-war Scotland. In: D.B.A. Thompson, A.J. Hester and M.B. Usher (eds.) *Heaths and Moorlands: Cultural Landscapes*, pp28-42, HMSO, Edinburgh

Tversky A., Sattath S. and Slovic P. (2000) Contingent Weighting in Judgement and Choice. In: Kahneman D and Tversky A (eds.) *Choices, Values and Frames,* Cambridge: Cambridge University Press.

Tversky A. and Kahneman D. (1982) Judgment under uncertainty: Heuristics and biases. In: Kahneman D, Slovic P and Tversky A (eds.) *Judgment under uncertainty: Heuristics and biases.* Cambridge: Cambridge University Press.

Van den Berg A. E., Vlek C.A.J. and Coeterier J.F. (1998) Group differences in the aesthetic evaluation of nature development plans: A multilevel approach, Journal of Environmental Psychology, 18: 141-157.

Van Praag B. and Baarsma B. (2005) Using happiness surveys to value intangibles: the case of airport noise, *Economic Journal* 52: 111–125.

Vouligny E., Domon G., Ruiz J.(2009) An assessment of ordinary landscapes by an expert and by its residents: landscape values in areas of intensive agricultural use. Land Use Policy. 26(4): 890-900

Walker D. and Myrick F. (2006) Grounded Theory: An exploration of process and procedure. Qualitative Health Research. 16(4): 547-559

Weisbrod, B.A. (1964) Collective-consumption services of individual-consumption goods. Quarterly Journal of Economics 78: 471-477

Willis K. 2002 Drinking Water Quality in Scotland 2002, Scottish Government Publications http://www.scotland.gov.uk/Publications/2003/10/18341/27841 Last accessed October 2009.

Worrall, F., Reed, M., Warburton, J. and Burt, T. (2003) 'Carbon budget for a British upland peat catchment', Science of the Total Environment. 312(1-3): 133-146

Appendices

Appendix 1: Experimental Evidence against Decision Utility.

Arguments for experienced utility are based upon the biases found experimentally in valuation techniques in the work of the Kahnemanist / New Benthamite school. The eight key arguments against decision utility as based on contingent valuation are presented below along with some brief notes on the alternative application of Choice Experiments.

1. Impact of affective responses: Individuals can struggle to translate affective response into monetary value especially where elements are evaluated separately (Loomes 2006). This can lead to what appears to be irrational behaviour, Hsee (2000) showed that in isolation individuals valued a 24 piece dinner set more than a 40 piece set with 9 damaged pieces but 31 pieces including the same pieces as the 24 piece set intact, that is they value more less which violates the transitivity assumption of utility theory. Using Choice Experiments where bundles of goods are valued against each other partially mitigates this issue compared to contingent valuation techniques.

2. Relative and absolute values: Whilst individuals can often rank the relative preference for different scenarios placing an absolute value is more complex and without some level of modulus can result in highly divergent values being assigned (Kahneman, Ritov and Schkade 1999). This has implications for open ended CV surveys from which structured Choice Experiments do not suffer. However, issues with starting point can impact on any valuation technique with individuals bounding responses based on the initial starting point presented to

them, whether this is the initial choice in a Choice Experiment or question in a contingent valuation survey.

3. Scope and embedding effects: Related closely to the impact of affective response, scoping and embedding effects relate to the issue of lack of proportionality in values derived for public goods. Whilst twice the level of good provision would be anticipated to be valued twice as much this is found experimentally to rarely be the case (Kahneman and Knetsch 1993, Leier and Pruckner 2009).

4. Matching and choice: Tversky et al (1988) identified different heuristics between matching and choice tasks. Choice invokes a qualitative reasoning (ordinal) whilst matching relies more on a quantitative assessment (cardinal). For this reason valuation exercises which rely on choice are likely to give a divergent WTP than those relying on matching. The result is a prominence effect, prominent attributes will weigh more heavily in choice than matching exercises. So there is a possible bias towards the more 'important' attributes in a Choice Experiment. However, the issues with open ended valuation identified above would tend to suggest that lack of experience at matching may be a more serious problem.

5. Procedural invariance – starting point and range bias: Value and preference should, in traditional economic models, not be impacted by the framing of the decision. Individuals should be able to compare a potential utility gain or loss from a change in policy and relate it to a monetary value based upon current consumption patterns (Loomes 2006). However, results reported in Loomes

(2006) by DoT, New Zealand Land Transport Authority and DEFRA all show significant starting point and range bias despite efforts to avoid these problems. In particular the DEFRA study is reported to have used random card sorting which participants were aware of yet the value of the first card was found to have significant impact on the values elicited. As Choice Experiments only have a monetary value for one attribute within a bundle of attributes the issue of starting point bias is somewhat mitigated against unless the cost attribute dominates the other attributes. However, starting point bias may still be an issue for Choice Experiment techniques.

6. Adaptation: Adaptation level was first proposed by Helson (1964) and extended by Scitovsky 1976. In summary the issue of adaptation is that the overall satisfaction individuals anticipate tends not to equate to the final satisfaction they report once a change in consumption (or income in the case of the Hedonic Treadmill (Brickman and Campbell 1971) is experienced. Importantly Scitovsky (1976) identified two types of goods, *pleasures and comforts*, pleasures are goods to which individuals do not adapt, the suggestion being that consumption should concentrate on pleasures (i.e. goods to which one will not adapt) as buying comforts is a waste of money. However, this leaves a question of how ones goes about identifying comforts and pleasures in making 'purchase' decisions? Kahneman and Sugden (2005) note that it is unlikely that individuals adapt to beautiful landscapes which may suggest that household expenditure on non market environmental resources is a valuable way to increase utility.

7. Focussing effects: Simply by asking individuals about a particular issue you may bias results by bringing this issue to the forefront of their minds. Kemp and Maxwell (1993) showed this dramatically by invoking a value of $85 when the issue of oil spills of the coast of Alaska was valued alone whilst when considered in combination with other public goods the value assigned was only 29 cents. Choice Experiments have some relative merit over CV studies as components of a good are considered in combination but this still presents a significant issue where the policy implications of value are considered.

8. Representative moment (peak end rule): Redelmeier and Kahneman (1996) identified individualsplace additional emphasis on the last moments of an experience when that experience is remembered. Do et al (2008) show similar results for pleasurable experiences.

Given these factors it is identified that experienced and remembered utility are likely to be divergent.

Appendix 2: Visual Information Presented to Participants

Figure A2.1 Visual information on the impacts of management intensity.

	More Intensive Management	Less Intensive Management
Moorland		
Moorland Fringe		
Valley Bottom Farmland		

Figure A2.2 Visual information: species anticipated to benefit from less intensive management

Figure A2.3 Visual Information: Footpath pictures and reinforcing text presented**.**

Figure A2.4 Completed example of the socioeconomic survey

Some questions about you – this information will be used and analysed entirely anonymously!

Would you describe yourself as a local of the Peak District National Park?

YES / (NO)

How often do you visit the Peak District National Park?

Daily, (Once or twice a week,) Every couple of weeks, Every month or two, Every six months, Once a year, Less than once a year, Never.

Which sites in the Peak District National Park do you visit most often?

Dam Flask

Do any members of your household visit the Peak District National Park more often than you?

YES - Please give some details _____

(NO)

How often do you visit other national parks or other outdoor resources in the UK? (E.g. Yorkshire Dales, North York Moors, Sherwood Forest etc.)

Daily, Once or twice a week, Every couple of weeks, Every month or two, (Every six) months, Once a year, Less than once a year, Never.

Please list which parks you have visited in the last 2 years: Yorks Dales, Lake District, ~~Snowdonia~~ Nevis Range,

If you visit National Parks why? (Please circle all that refer to you)

I live there (Walking,) Bird Watching, (Towns and Historical Sites) Sports, Other . Please give any more information you think might be useful (e.g. type of sport or other use)_____

Sex Male (Female)

Age Under 20, 20-30, (30-40,) 40-50, 50-60, 60-70, Over 70 .

Household Income - Per Year

Under £10,000 PA, £10,000 – £15,000, £15,000 -£20,000, £20,000-£30,000, £30,000-£50,000, (£50,000-£75,000,) Over £75,000

Number of people in your household. 2 Adults 2 Children

Appendix 3: Robustness Testing

A3.1 Decision Utility: Chapter 4

Table A3.1 Alternative Error specification and socioeconomic: Error component logit model coefficients for the 'Decision' treatment**.**

Treatment	*Decision*		*Error Component*		*Socio-economics*	
Mean Values	*Coef.*	*S.e.*	*Coef.*	*S.e.*	*Coef.*	*S.e.*
Const	**-1.604**	0.572	**-1.687**	0.56	**-1.532**	0.603
MoorLI	-0.106	0.151	-0.106	0.15	-0.075	0.156
MoorMI	**-0.887**	0.208	**-0.886**	0.21	**-0.842**	0.221
FringeLI	**-0.530**	0.166	**-0.529**	0.17	**-0.517**	0.167
FringeMI	-0.279	0.169	-0.279	0.17	-0.250	0.173
FarmLI	**-0.784**	0.176	**-0.782**	0.18	**-0.751**	0.183
FarmMI	**-1.168**	0.205	**-1.166**	0.21	**-1.143**	0.210
PathD	**0.323**	0.132	**0.322**	0.13	**0.318**	0.134
PathI	**0.465**	0.209	**0.463**	0.21	**0.472**	0.210
TAX	**-0.013**	0.001	**-0.013**	0.00	**-0.013**	0.001
INCOME	-0.014	0.009	-0.001	0.01	-0.002	0.009
FEMALE	**2.161**	0.372	**2.215**	0.39	**2.152**	0.386
AGE	**0.035**	0.008	**0.033**	0.01	**0.040**	0.010
Local					-0.444	0.444
OM					0.566	0.484
Error component						
Sigma	**2.579**	0.185	**2.780**	0.34	**2.590**	0.184
Local			-0.115	0.1505		
Pseudo R^2	0.22		0.22		0.22	
Log Likelihood	-3733		-4784		-4732	
N	50		50		50	

Where Sigma can be interpreted as an estimate of the impacts of unobserved random effects. The large and significant error component suggests correlation of the unobservable portion of the utility of alternatives A and B. Coefficients found to be statistically significant at the 5 percent level are indicated in bold.

Table A3.2 Explanation of variable abbreviations and coding used in this Appendix

Const	Alternative specific constant term (ASC) (= 0 for baseline zero cost, = 1 for option A or B)
MoorLI	Shift to less intensive moorland management (dummy coded)
MoorMI	Shift to more intensive moorland management (dummy coded)
FringeLI	Shift to less intensive moorland fringe management (dummy coded)
FringeMI	Shift to more intensive moorland fringe management (dummy coded)
FarmLI	Shift to less intensive valley bottom farmland management (dummy coded)
FarmMI	Shift to more intensive valley bottom farmland management (dummy coded)
PathD	Degraded footpath network (dummy coded)
PathI	Improved footpath network (dummy coded)
TAX	Tax increase to the household indicated in pounds (absolute number)
INCOME	Household income (absolute number) (interacted with ASC)
FEMALE	Gender (Female = 1, Male = 0) (Interacted with ASC)
AGE	Respondent's age in years (Interacted with ASC)
LOCAL	Stated Association (Yes=1, No=0) (Interacted with ASC)
OM	Other family member makes more use of the PDNP (Yes=1, No=0)(Interacted with ASC)
PM	Visit occurred in the afternoon (Yes=1, No=0)(Interacted with ASC)

Table A3.3 WTP for a change from the current level of provision (n=50 in all cases).

Variable	Decision	Decision Alt. Error Comp.	Decision Alt. Socio-Economics
Moor LI (From no change to less intensive)	-£8.01 (£11.38) (NS)	-£7.97 (£11.39)(NS)	-£5.80 (£12.00)(NS)
Moor MI (From no change to more intensive)	-£66.81 (£16.09)***	-£66.77 (£16.12)***	-£64.74 (£17.40)***
Fringe LI (From no change to less intensive)	-£39.97 (£12.75)***	-£39.89 (£12.76)***	-£39.74 (£13.06)***
Fringe MI (From no change to more intensive)	-£21.01 (£12.88) (NS)	-£ 21.03 (£12.94) (NS)	-£ 19.20 (£13.46) (NS)
Farm LI (From no change to less intensive)	-£59.04 (£14.29)***	-£58.97 (£14.28)***	-£57.75 (£15.00)***
Farm MI (From no change to more intensive)	-£88.01 (£16.38)***	-£87.84 (£16.40)***	-£87.83 (£17.04)***
Path Degraded (compared to current)	£24.32 (£10.44)**	£24.27 (£10.45) **	£24.45 (£10.83) **
Path Improved (compared to current)	£35.02 (£15.99)**	-£34.92 (£16.04) **	-£36.24 (£16.39) **

Figures in brackets are standard errors *** = significant at the 1% level. **= 5%. * = 10%.

In each of the sets of tables presented in this appendix the baseline of the data presented in the text of the dissertation will be given in the first column. Subsequent columns will identify the impact of adapting the analysis in some way. In the tables presented above the baseline is the 'decision' utility based measure from Chapter 4. It can be seen that introducing an alternative error component specification, in this case testing if a feeling of association with the park results impacts on the error, is not found to be change estimates to any large extent for this first treatment. Equally the introduction of new socio economics again association to the park and the behaviour of other household members does not yield significant results and also do not impact in any great way on coefficients or willingness to pay. It should also be noted that the more negative log likelihoods associated with these estimates as opposed to the baseline which was presented suggests that this baseline is a superior model upon which to base decision making.

A3.2 Experienced Utility: Chapter 4

Table A3.4 Alternative Error and Socioeconomic specification: Error component logit model coefficients for the 'Experienced' treatment.

Treatment	*Experienced*		*Error Component*		*Socio-economics*	
	Coef.	*S.e.*	*Coef.*	*S.e.*	*Coef.*	*S.e.*
Mean Values						
Const	-0.893	0.660	-0.911	0.654	-0.855	0.679
MoorLI	**-0.437**	0.172	**-0.437**	0.172	**-0.456**	0.175
MoorMI	**-0.463**	0.191	**-0.463**	0.191	**-0.449**	0.192
FringeLI	**-0.629**	0.193	**-0.628**	0.193	**-0.623**	0.195
FringeMI	-0.163	0.171	-0.163	0.171	-0.173	0.173
FarmLI	-0.335	0.198	-0.335	0.199	-0.333	0.199
FarmMI	-**0.581**	0.254	**-0.580**	0.254	**-0.601**	0.257
PathD	0.222	0.149	0.222	0.150	0.205	0.151
PathI	-0.011	0.217	0.012	0.217	0.009	0.218
TAX	**-0.012**	0.001	**-0.012**	0.001	**-0.012**	0.001
INCOME	-0.002	0.008	-0.001	0.008	-0.000	0.009
FEMALE	**2.178**	0.372	**2.219**	0.391	**2.151**	0.386
AGE	**0.035**	0.007	**0.033**	0.008	**0.039**	0.010
Local					-0.436	0.435
OM					0.436	0.466
Error component						
Sigma	**2.560**	0.184	**2.780**	0.34	**2.587**	0.186
Local			-0.085	0.148		
Pseudo R^2	0.22		0.22		0.22	
Log Likelihood	-3750		-4784		-4732	
N	50		50		50	

Where Sigma can be interpreted as an estimate of the impacts of unobserved random effects. The large and significant error component suggests correlation of the unobservable portion of the utility of alternatives A and B. Coefficients found to be statistically significant at the 5 percent level are indicated in bold.

Table A3.5 WTP for a change from the current level of provision (n=50 in all cases).

Variable	Experienced	Experienced Alt. Error Comp.	Experienced Alt. Socio-Economics
Moor LI (From no change to less intensive)	-£36.18 (£14.46)**	-£36.17 (£14.47)**	-£38.45 (£15.02)**
Moor MI (From no change to more intensive)	-£38.32 (£16.08)**	-£38.32 (£16.08)**	-£37.80 (£16.47)**
Fringe LI (From no change to less intensive)	-£51.99 (£16.46)***	-£51.98 (£16.50)***	-£52.50 (£16.93)***
Fringe MI (From no change to more intensive)	-£13.45 (£14.22) (NS)	-£13.45 (£14.25) (NS)	-£14.59 (£14.63) (NS)
Farm LI (From no change to less intensive)	-£27.68 (£16.78)*	-£27.68 (£16.81)*	-£28.04 (£17.15)(NS)
Farm MI (From no change to more intensive)	-£48.03 (£21.27)**	-£47.99 (£21.32)**	-£50.63 (£21.99)**
Path Degraded (compared to current)	£18.36 (£12.64) (NS)	£18.36 (£12.74) (NS)	£17.26 (£13.08) (NS)
Path Improved (compared to current)	-£0.94 (£17.92) (NS)	-£0.96 (£17.98) (NS)	-£0.76 (£18.33) (NS)

Figures in brackets are standard errors *** = significant at the 1% level. **= 5%. * = 10%.

As was found for the decision baseline; using experience as a baseline there is limited impact of either changing the error component or the socioeconomic specification. However, in this case there is a marginal change of significance for one attribute (less intensive farm management) which becomes insignificant when additional socio-economic variables are included.

A3.3 Remembered 1: Chapter 4

Table A3.6 Alternative Error and Socioeconomic specification: Error component logit model coefficients for the 'Remembered 1' treatment.

Treatment	*Remembered 1*		*Error Component*		*Socio-economics*	
	Coef.	*S.e.*	*Coef.*	*S.e.*	*Coef.*	*S.e.*
Mean Values						
Const	-0.733	0.588	-0.708	0.597	-0.825	0.593
MoorLI	-0.083	0.161	-0.083	0.161	-0.088	0.163
MoorMI	**-0.590**	0.229	**-0.590**	0.229	**-0.585**	0.229
FringeLI	-0.299	0.158	-0.300	0.158	-0.282	0.159
FringeMI	-0.338	0.190	-0.338	0.190	-0.348	0.191
FarmLI	-**0.480**	0.224	**-0.480**	0.225	**-0.472**	0.224
FarmMI	**-0.761**	0.261	**-0.762**	0.262	**-0.756**	0.262
PathD	**0.386**	0.138	**0.386**	0.138	**0.356**	0.138
PathI	0.397	0.248	0.398	0.248	0.424	0.260
TAX	**-0.013**	0.001	**-0.013**	0.001	**-0.013**	0.001
INCOME	-0.002	0.008	-0.002	0.008	-0.000	0.009
FEMALE	**2.139**	0.374	**2.170**	0.390	**2.113**	0.388
AGE	**0.033**	0.007	**0.032**	0.008	**0.039**	0.010
Local					-0.521	0.439
OM					0.396	0.473
Error component						
Sigma	**2.573**	0.187	**2.714**	0.321	**2.587**	0.186
Local			-0.080	0.146		
Pseudo R^2	0.22		0.22		0.22	
Log Likelihood	-3750		-4784		-4732	
N	50		50		50	

Where Sigma can be interpreted as an estimate of the impacts of unobserved random effects.The large and significant error component suggests correlation of the unobservable portion of the utility of alternatives A and B. Coefficients found to be statistically significant at the 5 percent level are indicated in bold.

Table A3.7 WTP for a change from the current level of provision (n=50 in all cases).

Variable	Remembered 1	Remembered 1 Alt. Error Comp.	Remembered 1 Alt. Socio-Economics
Moor LI (From no change to less intensive)	-£6.51 (£12.67) (NS)	-£6.54 (£12.69) (NS)	-£7.01 (£13.03) (NS)
Moor MI (From no change to more intensive)	-£46.55 (£18.22)**	-£46.57 (£18.23)**	-£46.76 (£18.53)**
Fringe LI (From no change to less intensive)	-£23.60 (£12.53)*	-£23.64 (£12.52)*	-£22.57 (£12.77)*
Fringe MI (From no change to more intensive)	-£26.68 (£15.24)*	-£26.69 (£15.26)*	-£27.82 (£15.50)*
Farm LI (From no change to less intensive)	-£37.87 (£18.21)**	-£37.90 (£18.26)**	-£37.71 (£18.43)**
Farm MI (From no change to more intensive)	-£60.06 (£21.07)***	-£60.13 (£21.17)***	-£60.37 (£21.42)***
Path Degraded (compared to current)	£30.41 (£11.60)***	£30.44 (£11.65)***	£28.40 (£11.72)**
Path Improved (compared to current)	£31.34 (£19.70)(NS)	£31.38 (£19.72)(NS)	£33.91 (£20.95)(NS)

Figures in brackets are standard errors *** = significant at the 1% level. **= 5%. * = 10%.

Again as can be seen the same pattern is observed for changes to WTP and coefficients given alternative error components and socioeconomic specification. It is thought that the presentation of the three experiments is sufficient to show that the results presented throughout this thesis are robust to changes in specification. This same pattern is observed for the remaining experiments reported in Chapters 4 and 5. Below results relating to the visitor survey will be presented in order to identify if the same trends are observed for this sample.

A3.4 Visitors Preferences: Chapter 6

Table A3.8 Alternative Error and Socioeconomic specification: Error component logit model coefficients for the Visitors Sample.

Treatment	*Visitor*		*Error Component*		*Socio-Economics*	
	Coef.	*S.e.*	*Coef.*	*S.e.*	*Coef.*	*S.e.*
Mean Values						
Const	**1.765**	0.356	**1.783**	0.364	**1.970**	0.385
MoorLI	**0.637**	0.105	**0.641**	0.105	**0.642**	0.107
MoorMI	**-0.523**	0.890	**-0.559**	0.092	**-0.562**	0.092
FringeLI	**0.300**	0.093	**0.328**	0.095	**0.310**	0.095
FringeMI	**-0.605**	0.110	**-0.601**	0.112	**-0.631**	0.115
FarmLI	**0.269**	0.100	**0.285**	0.102	**-0.315**	0.105
FarmMI	**-0.424**	0.083	**-0.437**	0.084	**-0.440**	0.086
PathD	**-0.247**	0.112	-0.219	0.113	**0.239**	0.113
PathI	**0.347**	0.132	**0.416**	0.135	**0.345**	0.134
PC	**-0.193**	0.026	**-0.198**	0.026	**-0.196**	0.026
INCOME	-0.004	0.006	-0.004	0.006	0.003	0.008
FEMALE	-0.049	0.309	-0.018	0.312	-0.004	0.332
AGE	0.008	0.006	0.007	0.006	0.011	0.007
PM					-0.301	0.333
OM					-0.348	0.441
Error component						
Sigma	**2.468**	0.205	**2.381**	0.214	**2.545**	0.219
Local			0.208	0.126		
Pseudo R^2	0.28		0.29		0.29	
Log Likelihood	-1847		-1790		-1779	
Respondents	315		315		315	

Where Sigma can be interpreted as an estimate of the impacts of unobserved random effects. The large and significant error component suggests correlation of the unobservable portion of the utility of alternatives A and B. *Coefficients found to be statistically significant at the 5 percent level are indicated in bold.*

Table A3.9 WTP for a change from the current level of provision.

Variable	Visitor	Error Component	Socio-economics
Moor LI	£3.31 (57p)***	£3.24 (£0.55)***	£3.28 (£0.56)***
Moor MI	-£2.71 (66p)***	-£2.83 (£0.66)***	-£2.87 (£0.67)***
Fringe LI	£1.55 (50p)***	£1.66 (£0. 50)** *	£1.58 (£0.50)***
Fringe MI	-£3.14 (57p)***	-£3.03 (£0.57)***	-£3.22 (£0.59)***
Farm LI	£1.40 (49p)***	£1.44 (£0.49)***	£1.61 (£0.51)***
Farm MI	-£2.20 (54p)***	-£2.21 (£0.53)***	-£2.25 (£0.54)***
Path Degraded	-£1.28 (51p)**	-£1.10 (£0.51)**	-£1.22 (£0.51)**
Path Improved	£1.80 (86p)**	£2.11 (£0.88)**	£1.75 (£0.85)**

*Figures in brackets are standard errors *** = significant at the 1% level. **= 5%. * = 10%.*

Again similar results are found in that results are relatively robust to changed specification. However, different error component specification does seem to impact on preference for footpath quality to some extent and there are some differences in estimates given the inclusion of additional socioeconomics – in particular for less intensively managed farmland.

A3.5 Alternative Baseline Specification

The tables below gives an example of the results with an alternative specification of the baseline in that it estimates preference for a move away from more intensively managed landscape features and a degraded footpath network – rather than the no change to intensity or footpaths which were presented throughout this dissertation.

Table A3.10 Alternative Baseline specification: Error component logit model coefficients for the decision treatment.

Treatment	*Predicted*	
	Coef.	*S.e.*
Mean Values		
Const	**-1.604**	0.572
MoorLI	**0.780**	0.187
MoorNC	**0.887**	0.208
FringeLI	-0.252	0.162
FringeNC	**0.279**	0.169
FarmLI	**0.384**	0.170
FarmNC	**1.168**	0.205
PathD	**0.323**	0.132
PathI	**0.465**	0.209
TAX	**-0.013**	0.001
INCOME	-0.001	0.008
FEMALE	**2.161**	0.372
AGE	**0.035**	0.008
Error component		
Sigma	**2.578**	0.185
Pseudo R^2	0.22	
Log Likelihood	-3733	

Where Sigma can be interpreted as an estimate of the impacts of unobserved random effects. The large and significant error component suggests correlation of the unobservable portion of the utility of alternatives A and B. Coefficients found to be statistically significant at the 5 percent level are indicated in bold).
N=50 in all cases

Table A3.11 Alternative baseline: WTP for a change from the current level of provision.

Variable	Predicted Utility
Moor LI (From more intensive to less intensive)	£58.80 (£14.48)***
Moor NC (From more intensive to no change in intensity)	£66.81 (£16.09)***
Fringe LI (From more intensive to less intensive)	-£18.95 (£12.12)(NS)
Fringe NC (From more intensive to no change in intensity)	£21.01 (£12.88)(NS)
Farm LI (From more intensive to less intensive)	£28.97 (£12.63)**
Farm NC(From more intensive to no change in intensity)	£88.01 (£16.38)***
Path Degraded	£24.32 (£10.44)**
Path Improved	£35.02 (£15.99)**

Figures in brackets are standard errors *** = significant at the 1% level. **= 5%. * = 10%.

As was mentioned above this alternative specification does not alter the results in any way – it just presents them in an alternative way. Simply switching the sign of the more intensive management estimate gives you a measure of No Change (NC), and the less intensive management estimate is seen to be equal to the No Change estimate less the previous less intensive management estimate (in the original baseline). It therefore simply presents an alternative way to consider the results.

Appendix 4: The Use of Results and Data Derived in this Dissertation for Benefits Transfer and Meta Analysis.

One often overlooked aspect of benefits transfer is the suitability of the baseline for analysis. This research was intended in part to identify preference for changed management practices; this focus was due to the changing agri-environmental framework in the uplands. The research was conducted in 2007 / 2008, new decoupled payments for the uplands (Upland ELS) are due in 2010 and trends of decline in the agricultural sector were already apparent when the research went ahead. As such the baseline environmental quality upon which this research was based is unlikely to still exist. As was shown in Chapter 2 management practices change and impact over time, the landscape is not static but ever evolving. Whilst the baseline was appropriate at the time of analysis the validity of transfer to alternative baselines is imperative. Taking the most simple laws of demand given that the quantity of a given landscape quality will have changed the value associated with that quality will also have changed. Whilst landscape change in the uplands is a relatively slow process this issue with baseline is likely to make accurate transfer complex and therefore levels of uncertainty associated with any transferred value will be (and should be reported as) high.

The most relevant values for policy analysis (currently in use in EFTEC Tinch et al 2009 and the NEA) are likely to be those of visitor's, non-use values (i.e. local residents and farmers) can raise some concerns amongst environmental economists. As such the current research probably best informs policy through identification of use values for the uplands of the UK and the Peak District in particular.

Appendix 5: Percentage of each alternative chosen in each experiment (Local Resident)

Table A5.1 Percentage of each alternative chosen in each experiment (Local Resident)

Experiment / Choice	A	B	Zero Cost
Decision	47%	34%	19%
Experienced	47%	33%	20%
Remembered 1	48%	35%	17%
Remembered 2	46%	35%	19%
Biodiversity & Farmer	45%	40%	15%
Historical	46%	43%	11%

Notes: Choice A as coded is always the cheaper of the options requiring some increase in tax.

Interestingly there is very little change in the proportions of each alternative being made between different treatments (although historical information stands out). Rather the results suggest that individuals are changing the choices made based upon the relative levels of individual attributes between option A, B and the zero cost.