

**CHOICE EXPERIMENTS AND THE SOCIAL VALUE OF FORESTS:
Forestry Commission woodlands in South-East England, UK
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Summary

The research investigated a relatively new approach to the valuation of the environment, the Choice Experiments method, as a way of incorporating social values in forest planning and management processes. In previous research multidimensional forest values are found to largely reflect more general environmental values and that there is at present a sound rationale for looking for innovative ways of capturing such values in the United Kingdom (UK) forestry decision making processes.

The work included a detailed examination of the theoretical principles behind the traditional approaches to valuing the environment which have been dominant in the formation of UK environmental policy. The main theoretical argument developed in the research was that in the context of valuing environmental goods and services, elicitation of trade-offs between the conflicting value dimensions is of higher importance and usefulness than the conventional monetary estimation. In the light of this main argument, the Choice Experiments (CE) method was examined in detail as a suitable approach for establishing trade-offs. This included a discussion of both theoretical and methodological aspects of the method which influenced the design of the empirical elements of the research.

The empirical research was based on a study related to state-owned woodlands in the South East region of England. The CE survey in the local communities around Friston Forest and Abbot's Wood near Eastbourne, East Sussex, England was designed to explore and explain the relationship between three major dimensions of forest management; nature conservation, provision for public access and experience of nature. The analysis of the survey data analysis was used to estimate several multinomial logit models which describe the effect of each of the specified dimensions to the overall value placed on the forest environment. The models were estimated for the whole sample as well as for sub-groups of the sample distinguished by socio-demographic characteristics. There were three key findings from the CE survey. First, the analysis of the choice data revealed strongly expressed preferences towards higher levels of woodland conservation and lower levels of provision for public access in the form of recreational facilities. Second, indifferent preferences were observed in relation to the form of nature experience in the woodlands. Third, the use of sub-groups and separate models allowed differentiation between segments of the population within the whole sample and hence the exploration of heterogeneity in tastes.

The application of the CE method demonstrated the usefulness and suitability of this approach for identifying preferences and trade-offs between specified environmental value dimensions including both use and non-use values. Among the main strengths of the method is the richness of the information obtained as well as the flexibility for estimating separate models to represent preferences of different segments of the studied population.

Overview

The review of literature established that UK forestry policy is guided by a new paradigm, which is based on the principles of sustainability and the incorporation of a wide range of economic, environmental and social values in forestry decision making. The review of recent studies into woodland and forest related values in the UK highlighted a diversity of social values ascribed to woodlands by members of the public (Macnaghten, Grove-White et al. 1998; Future

Foundations 1999; Willis, Garrod et al. 2000; Henwood and Pidgeon 2001; Lee 2001). The crucial challenge of capturing these values in ways appropriate to forest planning and management remains, and attracts research efforts within different social science disciplines.

Survey-based economic environmental valuation methodologies offer mechanisms for deriving the economic values of non-market benefits, based on eliciting individual willingness-to-pay. This is part of the Environmental Valuation (EV) framework that adopts the principles of neo-classical economics and has dominated the formulation of environmental policies worldwide. Despite this, the theoretical and methodological principles behind the environmental valuation (EV) framework have attracted considerable controversy (Clark 1995; Foster 1997; Clark, Burgess et al. 2000; Harrison and Burgess 2000). The result of this critique has been a search for alternative approaches and methodologies within the EV framework which would address the shortcomings associated with the conventional EV techniques. Among these the CE method appears to be one of the most popular alternatives. Introduced in the mid 1990s, its popularity has been growing in the environmental valuation context due to some apparent advantages over the more conventional methods (Hanley, Mourato et al. 2001). For example, the CE method is recognised for being more suitable for dealing with multi-attribute properties, it yields rich statistical information and it reduces some of the known respondent biases. The CE method implies a construction of hypothetical tasks, which are presented to individuals in a manageable number of choice sets (choice tasks), each containing descriptions of 2-3 alternatives. Respondents are then asked to choose one alternative from each choice set. The analysis of the results enables estimation of the trade-offs between the alternatives (as perceived by the respondents).

The present study was designed to investigate the potential of the CE method as a strategic level planning and management mechanism for forest management. The empirical work included carrying out a postal CE survey in state (Forestry Commission)-managed woodlands in South East England. Two groups of research questions were formulated from the literature, the first to examine the fundamental elements of the EV framework, and the second, within the framework, to investigate the potential of the CE method as a tool for capturing forest values in forest decision making. The appraisal of the EV framework was conducted through the analysis of its three elements: the concept of value; the underlying utility theory; and the willingness-to-pay as a measure of value. The first research question that was raised and addressed was:

Research Question 1.1. Do environmental valuation methodologies elicit social values through the aggregation of individual WTPs (or at least claim to have the potential to elicit such values) or are they only appropriate for the elicitation of individual values associated with the environment?

The examination of the key elements and the analysis of the critique (Norton, Costanza et al. 1998; Sagoff 1998) concluded with the development of an argument suggesting that the EV framework is suited to eliciting *existing short-term individual* values. These values represent utility maximising preferences and choices made by individuals. An aggregation of such individual values is not sufficient to represent social values. Only together with group deliberative processes and public participatory techniques can the social values be formulated and incorporated into environmental decision making. Having specified the proposed position of the EV framework and the corresponding methodologies on the elicitation of social and individual values the next research question considered was:

Research Question 1.2. Do WTP estimates adequately represent individual values? If not, what alternative approaches to obtaining value estimates can be proposed?

The further analysis of the arguments and counter-arguments reported in the literature (Gregory and Slovic 1997; Price 2000; Carson, Flores et al. 2001; Shapansky, Adamowicz et al. 2003) resulted in proposing the next part of the argument, stating that in the elicitation of individual values towards the environment, the emphasis needs to be shifted away from the estimation of an individual's willingness-to-pay, as this mechanism is not likely to provide adequate results for such types of study. Instead, the emphasis should be placed on the 'in-kind' (or compensatory) value trade-off elicitation. With the variety of environmental values held by people and the variety of valuers, there is always a place for conflicts and hence the need for trade-offs. The formulated position regarding the importance of the trade-offs was addressed by the last research question related to the EV framework:

Research Question 1.3. Is the newly introduced CE method any different from CVM and is it an adequate approach to the elicitation of value trade-offs?

There is a claim in the literature that the CE method has certain advantages over the more conventional and dominant CVM method (Adamowicz and Boxall 2001; Hanley, Mourato et al. 2001). It was argued, however, that the inherent mechanisms of the CE methods, such as the capacity to deal with multiple attributes and the treatment of the monetary element as only one of the attributes, makes it particularly suitable for the elicitation of in-kind or compensatory trade-offs. The proposed position regarding the potential of the CE method in eliciting non-monetary trade-offs informed the formulation of the next CE specific research questions, which in turn determined the design, implementation and analysis of the CE survey. The two research questions were:

Research Question 2.1. What information is it possible to obtain via non-monetary estimation of trade-offs in a CE study that could be useful to forest planning and management?

Research Question 2.2. What is the potential practical role of the CE methodology in forest planning and management?

In order to understand how the CE method approaches the identification of individual preferences in non-monetary terms and what information a CE application can produce that is useful for forestry planning and management, a detailed examination of the theoretical and methodological underpinnings behind the CE method was carried out. From the theoretical perspective, Random Utility Theory (RUT) offers a model of individual choices which suggests that individuals, if presented with a set of alternatives, choose the one that brings them the highest utility. The utility, in turn, is a combination of particular properties of each alternative (attributes). The RUT framework has been successfully used to date in many environmental valuation applications and has underpinned the present study. The CE survey within the present study, therefore, recognises these principles and assumptions relating to the processes of individual preference formulation and choice making.

The examination of numerous methodological issues allowed the key areas to be highlighted and taken into consideration in the design, implementation and analysis of the choice data. There were two areas of particular interest. Firstly, it was argued that a conditional multinomial logit (MNL) modelling approach should be adopted. Although it was acknowledged that researchers in a number of social disciplines at present continue to search for more statistically advanced models to represent human choice behaviour, the MNL models have been shown by previous studies to perform well and to produce robust results. Given the fundamental purpose of the present study of examining the CE method as a tool for capturing the wider social values in

forest decision making, the use of the MNL model was justified. Secondly, special attention was given to the complexity issue, as this is recognised as the major disadvantage of the CE method, hence extra care was taken in making decisions at the survey design stages. Special attention was also given to these topics after the survey was conducted and the results were discussed.

Equipped with the necessary knowledge of the information that it is possible to obtain through a CE application, and how to achieve robust results, the empirical part of the study was undertaken. Some preparatory research was done which resulted in the specification of the particular study context. Two closely located sites were chosen: Friston Forest and Abbot's Wood in East Sussex. Although not suggesting that the selected sites are fully representative of state-owned woodlands in South East England, these woodlands offered a diversity of features suitable for the investigation of the forest values attached to them by the public. The definition of the valuation object and the particular forest value dimensions was a result of a series of questionnaire-based interviews among visitors in the car parks of both sites. As a result of this stage the following three dimensions were taken further in the CE survey as attributes:

- Nature conservation;
- Facilities for access;
- Experience of nature.

The three attributes depict different dimensions of values attached by people on woodlands and forests. The *Nature conservation* encompasses the wildlife preservation and ecological functions associated with forests. Whilst *Facilities for access* reflect the provision for numerous recreational activities in forests which is one of the major benefits that state forests can offer. Finally, the *Experience of nature* is associated with the appreciation of woodlands for the opportunities of having contact with nature, which can take different forms for different people.

From a forest management perspective, these 3 attributes represent some of the key components of a management strategy. Conservation and provision of facilities for access are recognised and documented aspects of management strategies at all levels from Forest Design Plans to the UK's forestry policy. Although less familiar, the last attribute was also linked to existing practices in the form of the diversity of types of relationships between woodland management and local communities. From a respondent's perspective, on the other hand, the specified attributes represent woodland related characteristics which, according to the preparatory visitor survey, were found to be of particular importance to them. Eliciting their preferences towards these dimensions, and particularly the trade-offs in a CE study, therefore, would directly contribute to the formulation of forest management strategy.

In the CE survey, the three attributes of interest were presented in combination with a fourth attribute, which reflected the location of the woodland relative to the place of residence (*Distance*). This attribute was shown (reviewed in Hanley, Schlapfer et al. 2003) to be one of the determining factors in the formation of individual preferences and hence was included to enable respondents to trade-off the attributes of interest against the *Distance* attribute. The CE survey findings indeed confirmed the *a priori* expectations regarding the effect of the levels of this attribute; the utility appeared to decrease as the levels increased. Furthermore, the presence of the *Distance* attribute enabled exploring further the relative importance of the three attributes of interest. The findings regarding the 3 attributes of interest (*Nature Conservation, Facilities for access and Experience of nature*) contributed to the understanding of values attached to the woodlands by the members of public and allowed certain conclusions to be drawn regarding the suitability and usefulness of the CE method for forest planning and management.

Key findings

The discussion of the outcome of the data analysis was approached from two perspectives. Firstly, the discussion focused on assessing what information the study and estimated models produced that contributed to knowledge of individual preferences about woodlands. Secondly, a critical appraisal of methodological issues was offered.

The findings regarding individual preferences have direct implications for forest planning and management. The study showed that for local residents, especially for urban dwellers, individual woodland conservation values prevailed over those relating to the provision of facilities for access. Distinctions in value magnitudes were also demonstrated between particular sub-groups of the population being studied. For example, older people have more distinct preferences towards low provision of facilities for access and they are very much against the higher levels of provision of such facilities. In contrast, younger members of the population were found to be more indifferent towards the proposed levels of this attribute. Different preferences were also found when comparing respondents from small (1 or 2 person) and large (3 or more persons) households: individuals from the former appeared to have more distinct preferences towards the attributes, particularly nature conservation. The potential of the CE method and its applications in similar contexts can be envisaged. Such diversity of applications would contribute to the knowledge of the diversity of forest values and valuers in relation to other particular places.

Overall, one of the important advantages demonstrated through the application of the CE method is the richness of information obtained and its high degree of structure. Analysed raw data allows the calculation of the contribution of each attribute towards the utility of an alternative, or a comparison of the odds of choosing one alternative over the other. Alternatives that were not part of the CE study can be constructed and their utility evaluated based on the data obtained. Even though there was no WTP involved, the utility function provides a reliable quantifiable non-monetary output for the choice data which allows the comparison of single levels of interest, the attributes and their relative importance and, finally, the complete alternatives.

A number of comments on the complexity of the choices were made throughout the present work. These comments were made both by respondents and by authors previously investigating the issue. The complexity of choice tasks is a well documented disadvantage of the CE method. However, there are several reasons why such complexity is not easily avoidable and, maybe, even necessary. Firstly, the complexity of choice tasks is due to the objective complexity of any choice where numerous factors are involved. The CE methods model the process of decision making, a highly complex process, and in order to achieve accurate information such a method by definition needs to put a respondent into a challenging choice situation. Simple choices between obviously different and easily assessed alternatives will give little information to the researcher.

Secondly, and more importantly, the CE method not only allows the gathering of information on what preferences members of the public have, but it also enables respondents to understand their own preferences. When faced with difficult choice tasks respondents make a re-evaluation of what attributes are of importance to them, and which attributes they are willing to choose over others. As respondents are forced to find a trade-off rather than simply state their preferences, this makes respondents participants in their own individual decision-making process and builds a bridge towards public participation in environmental decision-making.

Recommendations and future research

In the light of the outcome of the CE survey, the following recommendations were made to the Forestry Commission to help future applications of the CE method to capture forest values in decision making processes:

- CE applications in an environmental valuation context have been increasing in popularity as an alternative to more conventional WTP-based approaches. The current work has shown that they can be applied successfully to obtain information which can be included in forest management and planning. The recommendation is that such CE studies can be carried out in different valuation as well as geographical contexts. There is a diversity of FC-owned woodlands varying in the degree of benefits they offer. CE studies can be carried out on particular design aspects of the provision of recreational facilities or they can involve a study similar to the present, aiming to find out the preferences of long distance visitors towards the forest management strategies (as opposed to preferences held by local residents).
- The study demonstrated that the CE method is a useful tool for obtaining a quantifiable estimation of individual preferences and trade-offs. The study also showed how CE can be used to account for the heterogeneity of preferences. In order to produce robust results from a CE survey, the link with findings from qualitative studies is crucial to determine the context of its application. This link ensures that the choices offered to the respondents represent the forest value dimensions that are of importance to them.
- The review of the theoretical and methodological aspects associated with the CE method, as well as its empirical application, revealed that the design of the survey and data analysis require care and rigour throughout. Care should be taken in deciding on the number of attributes, choice set designs and specification of the model in order to obtain robust results. The CE method also requires expertise in design and analysis, including the use of specialised software, hence placing particular demands on the researcher's part. However, a more important consideration to take into account is that such an exercise is demanding on the respondents. To find trade-offs between alternatives, the respondents often need to construct rather than express preferences. It is therefore recommended that the process of completing a CE survey is made as easy as possible for the respondents. This may require involvement of respondents in the survey design and choice of language.

The CE method is still developing and a number of generic directions for further development have been identified (Adamowicz and Boxall 2001). The present work enables the identification of the two directions for imminent further research. The first is related to the dataset analysis and the need for research into the use of statistically more advanced models that can improve the fit to the observed data and the possibilities of incorporating socio-demographic variables. The second direction is to explore the respondent's perceptions of the exercise and to raise issues of confusion and complexity in completing the questionnaire, along with the definition and interpretation of particular attributes and scenarios. Over 150 respondents expressed an interest in taking part in follow-up stages, which could be a good opportunity for continuing the research in this direction.

Overall, the future research and applications of the CE method should contribute towards further integration of qualitative, environmental valuation and public participatory methodologies. Research on the evaluation of public preferences is one of the priorities of contemporary social research. The environment is constantly changing, and so is society. An increase in urban population, and increasingly an 'urban' way of life along with a rural society, together with advances in modern technology alter people's attitudes towards the environment, forests and wildlife. The individual and social value of the environment and forests also continuously

adjusts to changes in the social behaviour of people. This requires the scientific community to continue the quest for the new approaches that could help decision makers take the public's preferences into account.

As argued at the outset of the research, social values, the values which ultimately need to be taken into account in policy making, do not represent a simple sum of individual values. The elicitation of individual values is valuable as an important step towards setting up publicly deliberated decision making. This also provides a sound rationale for increasing the amount of effort directed towards the use of CE in the elicitation of publicly held values towards the environment as opposed to WTP.

Of the numerous attempts to find a method and approach most suitable for the task, projects which stand out as useful are those where a complex approach is used and researchers are involved not only in value elicitation, but also in preference construction, which logically leads respondents to participation (Shapansky, Adamowicz et al. 2003). The present research confirms the importance of more comprehensive approaches aimed at getting a full picture of public preferences. The main argument for the use of CE is that the elicitation of public opinion is an important task in itself: its ultimate purpose is to provide guidance for decision-makers. Ideally decisions based on public involvement can minimise the consequences of the neglect of public opinion and possible conflicts between stakeholders and policy-makers. As witnessed throughout the work, CE can help establish the basis for public involvement techniques that advance towards full public involvement in decision making and the construction of authentic social values.

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