Environmental Values and Wetland Ecosystems: CVM, Ethics and Attitudes

by

Clive L. Spash

November 1998

Cambridge Research for the Environment
Department of Land Economy
University of Cambridge
19 Silver Street
CB3 9EP
England

Table of Contents

Acknowledgements

This report documents research carried out under the Environment and Climate Programme, Human Dimensions, EC DG-XII. The research reported here was one part of the UK section of the project on Social Processes of Environmental Valuation co-ordinated by Martin O'Connor of the University of Versailles. The principal investigators of the UK team were Alan Holland and John O'Neill Environmental Research Unit, Philosophy Department, University of Lancaster, Robin Grove-White, Centre for the Study of Environmental Change, Clive L. Spash, Department of Land Economy, University of Cambridge and Michael Jacobs, The Fabian Society.

Over the two year duration of the project several research assistants were hired to help at various stages: J. Aldred, M. Chen, C. Rutherford, A. Ryan, N. Sabbah, and T. Sing. Natasha Sabbah was responsible for the art work representing ecosystem types in the main survey. Some initial statistical analysis was performed by Gil Yaron, and additional analysis was carried out by Mauricio Villena. The interviews for the main survey were conducted by Euro Fieldwork under the supervision of the Director, Lyn Williams.

The attitudinal and ethical work on contingent valuation was designed, organised and directed by Clive Spash as part of the ecological economics research programme of Cambridge Research for the Environment (CRE) within the Department of Land Economy at Cambridge University. Alan Holland and John O'Neill made valuable contributions to the discussions over concepts underlying various approaches to measuring environmental attitudes and ethical beliefs. Together Holland, O'Neill and Spash hope to pursue the issues raised by this report in future collaborative research.

1. Introduction

The research reported here formed one part of a European project on the social processes of valuation (see O'Connor & Sang, 1998). The aim of the UK section of the project was to investigate different institutional processes for environmental valuation. Two institutions were chosen: the citizens jury and the contingent valuation method (CVM). This report is concerned with the section of the project on the contingent valuation method. Results on the citizens jury and cross-comparisons of research results are the subjects of separate works (Aldred & Jacobs, 1997; Spash & O'Neill, 1999).

Thus, the aim of this part of the research was to conduct a state of the art contingent valuation method study for comparison with an alternative valuation process to be conducted on the same environmental problem. In describing a state of the art CVM many observers immediately rely for guidance upon the report of the National Oceanic and Atmospheric Administration (NOAA) expert panel on CVM. This project rejects the "research by set rules" approach to contingent valuation which the NOAA panel decided upon. In fact the whole approach of the NOAA panel is an interesting social process in itself and worthy of a moments reflection. The research here describes and tests a broader model of social behaviour and explores some of the implications for environmental valuation. Thus, after discussing the NOAA approach to CVM, attention is focused upon developing a general model which forms the basis for the hypotheses tested in the empirical study. This model recognises links between social psychology, philosophy and economics.

1.1 Formation of the NOAA Rules

The assessment of damages arising from the Exxon Valdez oil spill in Alaska created public controversy. In the Exxon case one result was the suggestion that a specific set of guidelines for conducting a CVM should be followed. A panel of experts was convened by NOAA to fight pressure from Exxon coming via the Bush administration. The panel, which included Kenneth Arrow (Exxon consultant) and Robert Solow (State of Alaska consultant), gave qualified support for CVM. They produced guidelines which suggest there is one correct approach to conducting a good CVM study i.e., methodologically similar to the operational criteria to be found in Cummings et al. (1986). Blind adoption of the NOAA guidelines has become a defence of the validity of specific work. Unfortunately, this ignores the variation in case study circumstances, such as whether property rights prescribe a WTP or WTA approach. In addition, merely quoting the use of NOAA guidelines seems an inadequate defence of a study and some regard for independent testing of the validity and applicability of both these guidelines and CVM results is required.

The NOAA panel guidelines dictate: use of WTP; in-house interviews on a random sample; full information on the resource change (including information on substitutes) and checks for understanding; closed-ended referendum formats (dichotomous choice); reinforcing budget restrictions; and careful pre-testing. Full information is rather vacuous concept and seems to misunderstand the impact of any information on

the valuation process. The panel also recommended the halving of any resulting valuation, which raises questions over the derivation and credibility of this particular set of rules. In this regard those using the guidelines should remember that the NOAA panel was politically appointed to adjudicate over the use of CVM in the USA as a result of the Exxon Valdez accident. The procedure for deriving the guidelines, with a Nobel laureate from each of the opposing camps on the panel, would be interesting to discover along with the underlying justification for some of these rules.

More generally, the extent to which any one set of rules can dictate CVM research must be questioned. The NOAA guidelines have not resolved the debate around CVM because they assume a technical solution to a much broader set of issues which they in effect avoid. That is, their methodological approach imposes a set behavioural model, economic rationality, and rejects divergent behaviour, for example see Spash (1997; 1998). Yet this "irrational" behaviour is some of the most interesting in terms of insights into what motivates individuals. This area of motivation to act tends to be ignored by economists but it is where the potential for the political success or failure of environmental policy lies.

Thus, there is a fundamental methodological divergence between the approach of contingent valuation practitioners who try to find evidence in support of their *a priori* model in the neo-classical economic tradition, and those who allow the data to inform them as to the possible variety of human motivation and behaviour. The future of contingent valuation is potentially rich if it is developed as a method of empirical investigation into environmental values rather than an exercise in producing the one true price. In this mode we present our research.

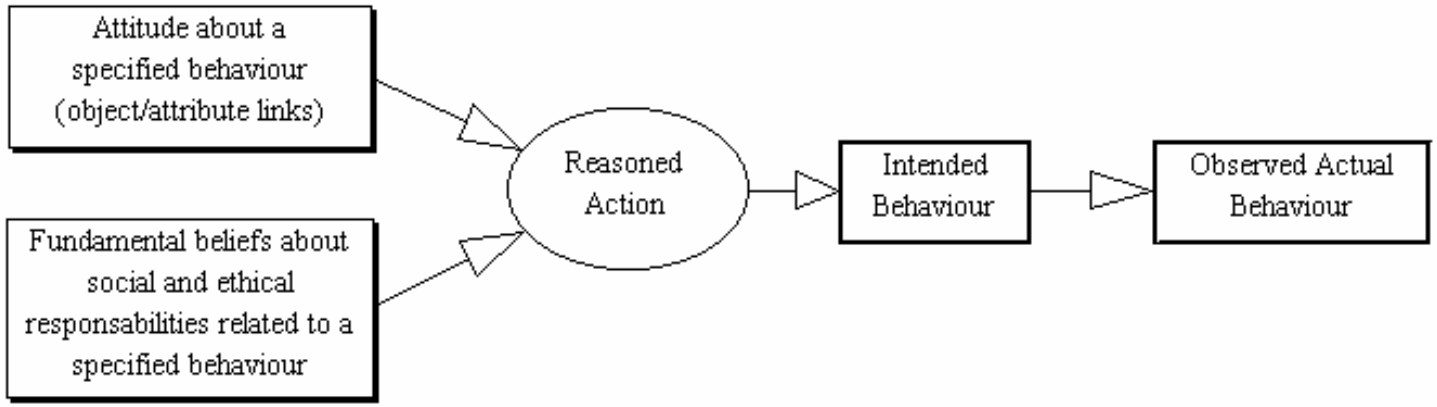
1.2 Beliefs, Attitudes and Behaviour

Research in economics could benefit from linking with the social psychology literature on the relationships between beliefs, attitudes and behaviour. One aim of the current research was to investigate these relationships in the context of environmental valuation. In this regard the research was a learning process allowing various ideas to be explored and, as a venture into attitudinal scales and their measurement, could undoubtedly be improved upon. The work comes close to employing the type of model put forward by Fishbein and Ajzen (1975), although none of the research team were trained social psychologists so the approach here is perhaps less sophisticated. In addition, the aim of the research project was to conduct an economic environmental valuation process for comparison with deliberative alternatives and this constrained the extent to which issues that arose in the attitudinal and beliefs work could be pursued. For example, developing an attitudinal scale from scratch seemed desirable as research progressed but would have been too expensive and time consuming and so existing scales had to form the basis of analysis in that regard.

In terms of the theoretical model, this relates the prediction of behaviour to behavioural intentions which are in turn determined by attitudes and beliefs. Figure 1.1 gives a schematic representation of this model. The specific use of the terms and the general model are described next.

Figure 1.1

Attitudes and Beliefs in the Prediction of Behaviour



Attitudes are taken to be subjective judgements, likes and dislikes, relating to a range of objects. In addition to physical entities, places and people these objects can also be behaviours or acts. For example, people can have attitudes to eating as well as food and restaurants. An attitude implies a predisposition to a set of consistent behaviour with respect to an object. This consistency may be best described in terms of a set of behaviours or a behavioural pattern over time, rather than a single action. For example, an individual may show their favourable attitude towards animal welfare by campaigning, signing petitions, making donations and eating no meat. However, they may refuse any one action at a given time and focusing upon that single action may therefore be misleading. The set of behaviours over time shows their disposition which is then best measured by a behavioural index of observations on a range of actions.

This creates some difficulty for attitudes as a predictor of willingness to pay or accept in contingent valuation because these payments are single actions, or more precisely intentions to act. Fishbein and Ajzen suggest prediction of single acts requires that attitudinal measures correspond to the behaviour being analysed in terms of four distinct elements. These elements are the action, target, context and timing. For example, doing conservation work (action) in a woodland ecosystem (target) with some local friends (context) on the first Sunday in February at 10.30am. In order to predict conservation behaviour on the basis of attitudes these elements should be in correspondence, i.e. the measure of attitude should correspond to the behaviour. More generally, this correspondence principle means for any attitudinal scale to be a good predictor of behaviour requires that the scale should match the type and level of behaviour, e.g., general environmental attitudes would predict broadly defined behaviours while specific attitudes towards a particular object are best used to predict behaviours relating to that object. While this may seem intuitive, the earlier failure of attitudes as predictors of behavioural variation in social psychology has been attributed to a lack of such correspondence (Hill, 1981).

The other main aspect of behavioural prediction in the model used here is belief. Beliefs are used in two contexts by Fishbein and Ajzen, both as basic forms of informing the decision process. The first sense in which beliefs are used is to describe the probabilistic judgement concerning the consequences of a behaviour i.e. the relationship between an object and some attribute it may be believed to posses. This type of belief informs attitudes. For example, environmentalist (object) are all terrorists anarchists (attribute); or vegans (object) are all unhealthy, thin and pale (attributes). Several factors may influence a persons predisposition to an object such as feelings, desires, fears, convictions and prejudices. Specific predispositions are learnt in part as a consequence of past behaviours e.g., monetary rewards, punishments, social approval/disapproval, effort or social pressure in performing a behaviour. Thus a set of prior beliefs are formed which help determine attitudes about a specific behaviour.

The second sense in which beliefs are used is as informing personal subjective norms. In order to differentiate these core positional beliefs from those informing attitudes

they are termed here "fundamental beliefs".[1] They are regarded here as more fundamental and less easily revised in the light of the consequences of previous behaviour.

There are two aspects of fundamental beliefs: one relates to the social and the other the ethical perspective of the individual. The model of Fishbein and Azjen (1975) concentrates upon social norms adopted on the basis of considering the opinion of reference groups, e.g., people at work, with whom one socialises and family. These normative beliefs may be formed as a result of an inference process. A person who believes a given referent would be pleased if they performed a given behaviour may infer that the referent thinks they should perform the behaviour (Fishbein & Ajzen, 1975 p.305).

Besides these social norms, there seems to be a role for personal normative beliefs based upon deeper moral reflections as to how one should live. For example, religious convictions, an environmental ethic or belief in social justice. These may be regarded as ethical norms. Such motives to action are largely ignored by the reasoned action literature which has more developed into a model consistent with expected utility theory. Here this forgotten aspect is brought to the fore. There is evidently room for overlap between these two inputs to the formation and reinforcement of fundamental beliefs e.g., choice of friends on the basis of their moral beliefs, or adopting the religious convictions of parents. Alternatively they may conflict with personal ethical beliefs diverging from those of social groups. This can lead to moral dilemmas where responsibility to principals conflicts with the expectations of society. For example, being a pacifist in Western society has commonly been derided (e.g. as cowardice) and lead to the individual being ostracised.

These fundamental beliefs operate directly as a predictor of behaviour in parallel with attitudes. Fundamental beliefs have a social normative aspect while the personal attitudinal position is based upon expectations about behaviour. Thus, both the attitude towards a behaviour and the subjective norm determine a person's intention to perform an action. Note, the relationship between fundamental social and ethical beliefs and attitudes is unspecified. Feedback might be expected between the two with beliefs about attitudes being more strongly influenced by fundamental beliefs than vice versa. However, as Fishbein and Ajzen (p.304) argue maintaining the distinction between beliefs about the consequences of performing a behaviour and expectations of relevant referents is useful. There may, for example, be no beliefs about consequences related to a belief about a referent. Different processes underlie the formation of the attitude toward a behaviour and the normative belief. The inclusion of personal ethical beliefs within the category of fundamental beliefs reinforces this division further.

[1] The term fundamental beliefs needs to be separated from primary beliefs. Primary beliefs are referred to by Fishbein and Azjen as key predictors of behavioural intentions. They argue that where the aim is to change behaviour identifying primary beliefs is of central importance. They can be either the beliefs in consequences affecting attitudes or what is termed here the fundamental beliefs, but only the strongest in affect behavioural intentions from among these.

In order to maintain a simple representation of beliefs, attitudes and behaviour the formative role of beliefs about objects and referent groups are largely excluded from Figure 1.1. Similarly, any feedback from actual behaviour to attitudes or normative beliefs goes unconsidered. In this report the concern is less with the dynamic process of behaviour formation and more based around the role of attitudes and ethics as predicting a single behavioural act.

1.3 Outline of Report

The approach taken in the research project was to try and link environmental attitudes, ethical beliefs and behaviour in terms of willingness to pay. A contingent valuation survey was designed around the case study of wetland re-creation in The Fens of eastern England. The adaptation of the survey on the basis of pre-test results is described in Chapter 2. Initial use of an attitudinal scale based around ecocentric and anthropocentric positions was found at this stage to be inadequate. In the main survey a more detailed approach addressing beliefs about consequences was adopted. Before discussing these developments in detail the basic sample results are given in Chapter 3. The more fundamental research questions relating to philosophy, social psychology and the prediction of economic behaviour are then given in Chapter 4. There empirical results are presented on the model of attitudes and beliefs as predictors of variation in willingness to pay. In addition, an environmental political action scale was developed to explore how well the model could predict alternative intentions to behave in favour of the environment. A brief summary of conclusions is then given in the final chapter.

2. CVM Design and Pre-test

2.1 Survey Design

The design of a CVM requires pre-testing of the survey instrument to check timing, flow of the questions, ease of understanding and delivery, and to identify any specific problem areas. The CVM survey followed a general format previously used in unrelated research during 1996. This design has six sections (A to F): introductory framing and information; monetary valuation and follow-up; beliefs and attitudes; socio-economic; interviewee response; interviewer response. The full pre-test survey is summarised in Appendix I. Pre-test results were presented to an international workshop held at Lancaster University in April 1997. Workshop participants were then able to comment on the survey and a smaller working group made more specific design suggestions. In particular, Dr. Jacquie Burgess provided extensive and constructive feedback which aided several specifics in the final design. During the pre-test the general feedback from the interviewees and interviewers, sections E and F, showed that respondents found the questions in section C sometimes difficult but the remainder of the survey unproblematic. As detailed in this chapter, most questions under went some revision and the information pack was improved in terms of delivery and content. However, statistical analysis of pre-test results shows the survey operating well even before these improvements.

2.2 Choice of the Environmental Problem

The specific environmental issue upon which this project focused was chosen in co-operation with the entire UK team working on the social processes of valuation project. A search was initiated for a current project suitable for both contingent valuation and a citizens jury. This required consideration of the features of an environmental project which would allow both costs benefit analysis and participatory decision processes to operate effectively. In terms of the contingent valuation approach an issue which had features typically being assessed by other such studies was deemed desirable, e.g. wildlife, birds, aesthetics. For the citizens jury the issue had to be something citizens would feel worthy of spending several days deliberation, i.e. a substantive project or one with wider implications.

At the time of the research proposal the UK road system was undergoing extensive expansion and this raised many controversial cases. These were threatening some rarer habitats, such as land designated as Sites of Special Scientific Interest, and local wildlife interests were commonly impacted. However, willingness to pay and accept both seemed likely to prove problematic under the press coverage that was current at the time. A neutral and believable institutional context was difficult to imagine given the tension being expressed over property rights. In addition, in order to maintain comparability with any contingent valuation study, the deliberative approach of the citizens jury would have been restricted by the framing of the question in terms of a project level by-pass and the decision over this route or that. A review of transportation policy in general seemed more appropriate for deliberation but this moved away from the desired comparative project level case study. Thus, despite

looking at several potential road schemes in the end an entirely different type of project was adopted: re-creation of a wetland ecosystem.

The re-creation of wetland habitat provided an opportunity to use contingent valuation to evaluate the type of aspects of the environment which it has been claimed to do well. This was important because the aim was to show how the technique would operate under favourable conditions. A relatively small re-creation scheme was used in the survey so as to provide a marginal change in terms of habitat and so allow the concept of ecosystem valuation to be probed. Thus wetlands re-creation had both aspects of being suitable to CVM on the basis of past experience and providing some innovation in terms of focusing at an ecosystem rather than species level. In terms of the citizens jury a question remained over the motivation of the public to engage in the selected environmental issue and whether it was substantive enough for a jury process.

2.3 Institutional Context and Bid Vehicle

A lobby group called Wet Fens for the Future was arguing in favour of flooding an area of farm land within the area of The Fen of eastern England. This group was looking to create projects to achieve either wetland restoration or the creation of new wetlands in The Fens. The aim of such a site would include creation of rare bird habitat, and potential as a tourist and recreation attraction. The group was looking to attract government and European Community funding as well as private donations. They had already commissioned some natural science studies into the possibilities for their project given such factors as soil types and drainage.

The problem of the re-construction of a rare ecosystem and how it might be funded could have been approached from a local or national government perspective or that of a non-governmental organisation. Each funding possibility would imply a different institutional context for the project. In this survey a trust fund was chosen so as to reflect the likely type of institutional arrangement which would arise in practice. An alternative bid vehicle would have been to describe a government tax scenario, but given the lack of a directly associated bid vehicle (i.e. taxes on what?) this was felt to be too complex and unrealistic. The trust fund had the advantage of being easily understood and similar to the actual case of the Royal Society for the Protection of Birds (RSPB) wetland site at Wicken Fen. The Wet Fens for the Future organisation provided a charitable body which could be referenced in the survey as the supporter of the trust in the same way that RSPB supports Wicken Fen. Thus, the environmental issue was given a realistic institutional context, although this, by the very nature of CVM, was quite specific.

As the project being considered was an environmental improvement a willingness to pay question format was employed as opposed to willingness to accept compensation. The WTP/WTA format choice should be determined primarily by the prevailing property rights and in this case any move towards an increase in wetlands in The Fens would require the purchase of farmland. Thus, the environmental change would require payment and the WTP format was appropriate.

The question was left as an open-ended request. A dichotomous choice format has been popular in recent years because those supporting the approach regard a one-off yes/no decision as closer to a free market. This is a debatable point in itself with the yes/no decision being closer to a political referendum. There is some concern for the adoption of dichotomous choice in circumstances where prices are normally discussed and argued about (e.g., a market place, bazaars, second hand markets, or always in some countries) rather than given as fixed. In addition, in order to bound the range of choices given under dichotomous choice an open-ended CVM is required as a first step, unless an arbitrary range of bids is to be fixed by the researcher. This means the open-ended CVM must maintain a certain validity amongst those advocating dichotomous choice. Neither format is clearly superior on *a priori* grounds. However, the dichotomous choice format does suffer problems in practice. The "yea-saying" problem may be evidence of an anchoring bias, and has raised questions as to the usefulness of the format. Desvouges *et al*. (1993) found dichotomous choice exceeded open-ended and had a greater standard error i.e., substantial variability. The results of dichotomous choice have also been found to be vulnerable in terms of variability due to the choice of bids by the analyst and the choice of functional form for WTP estimation.

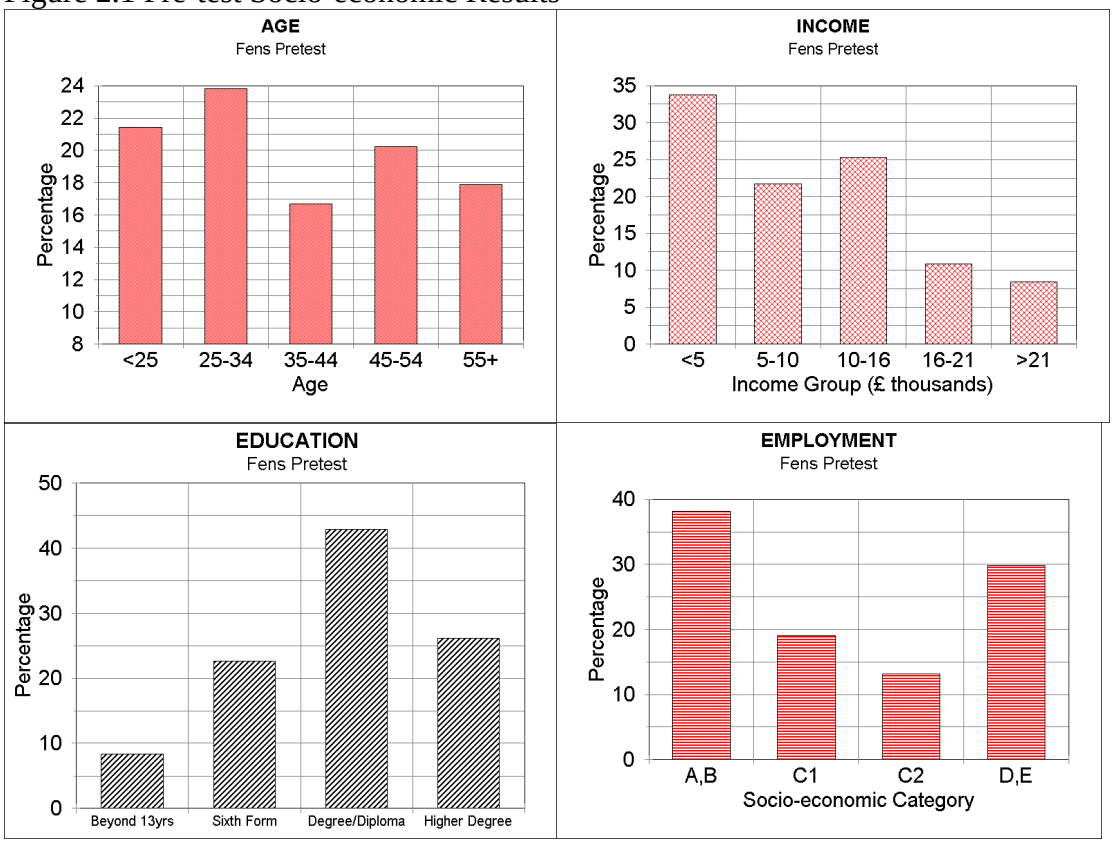
2.4 General Design

The basic approach of the first part, section A, of the survey was to introduce the respondent to a range of public policy issues and then narrow down on the wetlands topic and payment question. At this time information on basic knowledge of wetlands and the area could be gained. Due to some sensitivity over naming a particular site the location of the project had to be left a little vague although the nearest major town was mentioned. In addressing the willingness to pay question an information pack was developed i.e. background information on the issue and the expected environmental change. After the payment had been requested debriefing questions were asked and this completed the second part, section B. Questions on ethical beliefs and environmental attitudes were asked in section C. The next part of the main survey, section D, concerned collecting socio-economic data. Finally, interviewees were probed about the general difficulty of answering questions and the content of the survey, section E, and interviewers gave their opinion on the difficulties encountered by the respondent, section F.

2.5 Pre-test Sample, Results and Re-design

A total of 84 pre-test surveys were conducted by four interviewers largely in and around Cambridge. Respondents selected were UK residents. The sample aimed to achieve an approximate quota on age, sex, and income. The interview was conducted by at-home personal interviews. The survey was timed and took on average 18 minutes (min. 10, max. 26). Figure 2.1 gives distributional data on age, education, employment and income. The overall picture shows some bias towards young, well educated but low income groups (e.g., students, part-time academic researchers) which is to be expected in a University dominated town.

Figure 2.1 Pre-test Socio-economic Results



2.5.1 Section A: Framing and Respondent Knowledge

The first two questions (A1, A2) were aimed at framing the context for the CVM in terms of a range of issues which might call upon societies scarce resources (e.g. education, transport, health). The results are therefore of secondary importance, although they do provide some indication of the attitudes of respondents and the relative weight given to the public policy issues named. The second question (A2) used the same approach but related to nature conservation and then the survey moved to specific knowledge of the area where wetland re-creation would be proposed. The speed with which this occurred was felt to be too fast and a little more space was desired to allow more general reflection upon environmental issues. In the main survey the decision was made to follow the format of the first question and direct the focus of the respondent upon nature conservation, but to add a follow-up question on environmental problems. This new approach used an open ended question asking the respondent to name two other environmental issues (besides nature conservation) of concern to them. This also proved a useful test of respondent concern for and knowledge about environmental issues.

The next three pre-test questions (A3, A4, A5) were about the individual's knowledge of The Fens of East Anglia (whether they knew of them, their rarity, and features). The second and third were unsuccessful. Responses to both failed to give much variation, although more might have been expected in the main survey. Knowledge of features (A5) proved too complicated and the lack of variability made it a poor predictor of WTP in regression. As some simplification was desired in this section

these two question were dropped from the main survey. Instead, a question on area was developed form the pre-test text to A6. Unfortunately this also proved unsuccessful in the main survey due to inconsistent responses (e.g. counties, areas in various measures, comparisons with other places). Upon reflection, a simple familiarity scale would have been better.

The current and future visit questions (A6, A7) were asked after introducing the area with maps and a short description. The wording here was adjusted to improve the clarity of the introduction of The Fens. In addition, the national location map was reduced and included within the map of The Fens so just one figure then combined both of those used in the pre-test. The question on the likelihood of a future visits (A7) was made into a 5 point scale to allow greater differentiation between responses. The tendency with the dichotomous choice format of this question in the pre-test was to state "yes", although this may have been an artefact of the sample (i.e., being relatively near to the area of the proposed project).

2.5.2 Section B: Monetary Bids and Information Pack

2.5.2.1 Bid Curve Analysis

Stepwise regression was used to identify a useful subset from the collection of (12) predictor variables using the maximum F-statistic criteria. Backward prediction was used so that all predictors were originally included and then removed in turn (without replacement). The five best predictors were income, age, sex, extent to which animal rights/protection was held as a belief, and anthropocentrism. All were significant at the 90% level (t-ratio). Bid curve analysis of the pre-test data was conducted and the results are quite reasonable in terms of CVM work (R squared 0.31). Note, the position taken on rights and environmental attitudes are found relevant. These results are given in Table 2.1.

Table 2.1: Pre-test Bid Curve Analysis

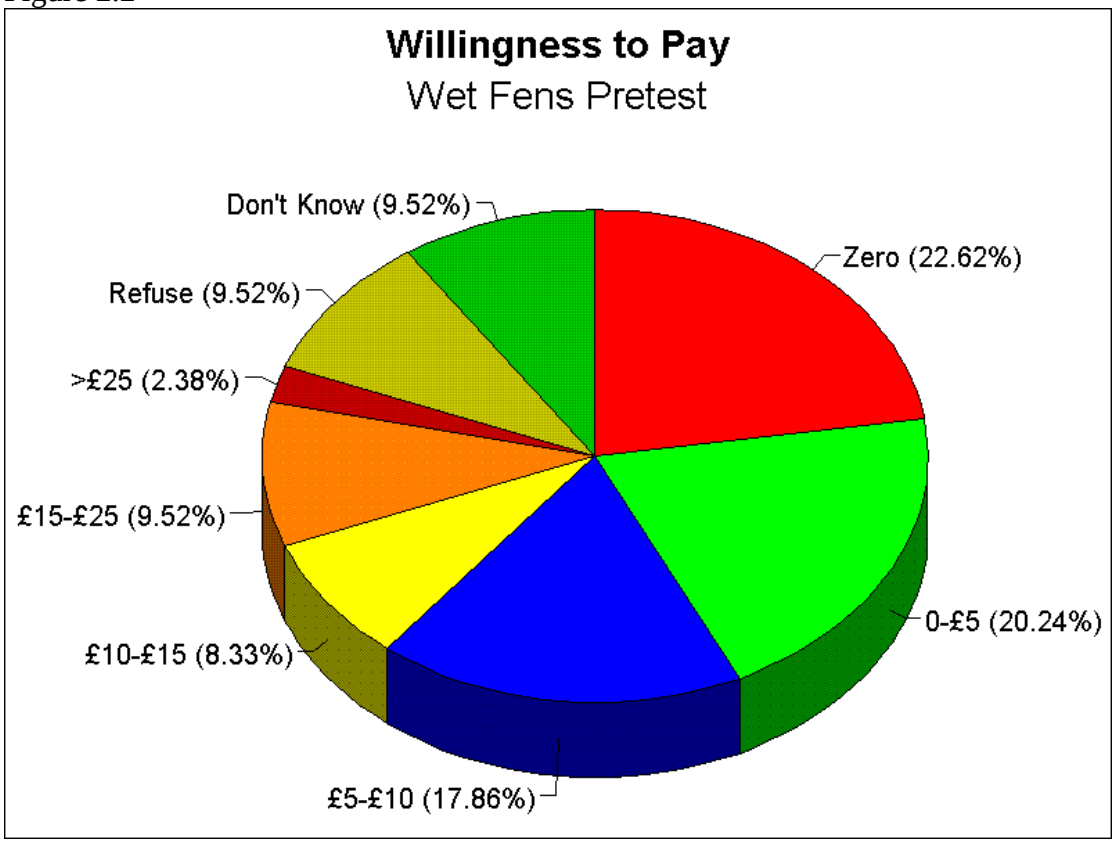
WTP=11.26+3.72INCOME+3.43AGE-8.33SEX-3.10ANTIRIGHTS-3.44ANTHRO

Variable	Coefficient	Std.Error	t-value	t-prob	PartR^2
Constant	11.264	8.6877	1.297	0.1999	0.0282
anti-rights	-3.0985	1.8084	-1.713	0.0920	0.0482
sex	-8.3327	3.4149	-2.440	0.0178	0.0931
age	3.4291	1.2737	2.692	0.0093	0.1111
income	3.7214	1.3062	2.849	0.0061	0.1228
anthro	-3.4404	1.8460	-1.864	0.0674	0.0565

R^2 = 0.315556 F(5, 58) = 5.3481 (0.0004) std. error= 12.6426 DW = 2.04
RSS = 9270.506802 for 6 variables and 64 observations
No evidence of Heteroscedasticity
Chi-squared(9) = 10.487 (0.3125) and F-Form(9, 48) = 1.0451 (0.4194)

The distribution of results for the WTP question are shown in the pie chart of Figure 2.2. This shows a large percentage of refusals and don't know responses. As some of the don't knows were given for reasons of lack of information the redesign for the main survey aimed to supply better information on wetland recreation and the two scenarios being presented. The extent of redesign is described next.

Figure 2.2



2.5.2.2 Information Pack

Originally the information provision was to have included two ecosystems diagrams to accompany the "creation of fen" photographs. In the pre-test these were not ready and the question was open as to whether providing more information would over-burden respondents. However, as noted, some pre-test respondents claimed a lack of information as their reason for zero/no bid. The information provided in the pre-test was therefore generally regarded as requiring improvement. This involved some simplification of existing materials and introduction of greater detail on the impact of the re-creation project.

In terms of simplification, the regional scale map showing the area after the project, used in the pre-test, was regarded as unnecessary given the scale of the project and was excluded from the main survey. Only one regional map was then used and this was labelled The Fens. This map was given an inset of the UK showing the location of the Eastern Counties where the The Fens are located. Thus three separate visuals from the pre-test (UK map, region before and after project) were reduced to one. These changes allowed room for the introduction of new material.

The description in words introduced some of the history of the area, i.e. the historical existence of wetlands and marsh land in the area. Next the size of the proposed site was introduced (1 mile by 1 mile) and the existence of the Wicken Fen site mentioned. This gave a context to the re-creation project before more detailed description of the farmland and fenland ecosystems. The overall aim was to convey the information in a neutral unemotive fashion.

Most important was the introduction and explanation of the environmental change expected due to the re-creation of a wetland area. Each type of land use and its associated wildlife was introduced separately. The wetlands and agricultural scenarios were referred to as different potential uses of The Fens, and the point was made that there was a difference of opinion over which use might be best. The wording was also carefully considered with language of common use being employed e.g. “web of life” rather than ecosystem.

Describing the two alternative ecosystems in an easily comprehensible fashion within a short amount of time proved a challenge. Communications with wetland ecologists revealed that any precise definition of species and food webs would be too complex for a survey format and that the exact species mix was dependent upon the type of management. The best alternative was to give a crude characterisation of the expected life forms most commonly associated with the different land uses. Thus, common key species were chosen to represent insects, plants, birds and mammals for each ecosystem. Conveying this information in a standard ecosystem diagram was also felt to be too technical a presentation of facts and would have failed to giving an impression of the species mix for those less familiar with their names. Thus, two pieces of colour art work were commissioned: one to represent the wetland ecosystem and one the farmland ecosystem. This allowed a general aesthetic description to be introduced visually and was accompanied by a key which could be used to identify the species in each picture.

So far each type of land use had been described separately but human intervention to change the habitat still needed to be communicated. The idea of active management to achieve such an environmental change was portrayed via colour photographs of an actual site. As the accompanying text explained, a land owner had actually undertaken the kind of project proposed. The photographs were of the same site from the same perspective with one before the project showing agricultural use and one after restoration to a wetland. In the pre-test each was shown separately but ease of comparison was aided by combining them on one sheet for the main survey; this was found to aid respondent understanding and delivery by the interviewers.

2.5.2.3 Other Section B Questions

Besides follow-up questions on reasons for bidding positive or zero/refuse a question on embedding and one on information effects were included. Question B6 aimed to test for embedding but had some problems in the pre-test. Given the wording interviewers felt only positive bids were to be selected so data was limited to these respondents. There did appear to be embedding problems with an unwillingness to

pay more because the contribution was seen as a lump sum payment for all such sites, even though individuals did desire more sites. Introducing the existence of several sites prior to the WTP question might have reduced this problem but would have required a quite different approach to the issue in terms of institutional arrangements. The fact that there were other sites was a point made via maps in the final survey, and this was reinforced by mentioning Wicken Fen as already being run by a charity (RSPB).

The other question concerned the effect of information in changing preferences i.e. the impact of the information pack. The pre-test results are given in Table 2.2. This question was felt to require a before and after comparison. Thus, an additional question was added to section A for the main survey to cover prior preferences.

Table 2.2: Pre-test Information Effects

	N	%
Preferences changed	2	2
Informed Only	57	68
Both	10	12
Neither	15	18
Total N	84	100

2.5.3 Section C: Beliefs and Attitudes

2.5.3.1 Belief About Rights for Birds

The questions in section C were generally found the hardest to answer by respondents. The idea behind C1 was to obtain four categories as a measure of the belief in species protection extending from animal rights based to economic and human centred. The pre-test results gave a relatively strong variable for explaining variations in WTP. As the question was phrased so as to correspond to the willingness to pay question the belief to behaviour link was maintained in accordance with the model described in chapter 1. This question was maintained for the final survey. The option of finding the question too difficult or complex to answer was added and replaced the open-ended final option in the pre-test.

Table 2.3: Right to Life

	N
Animal Rights	27
Consequentialist 1	30
Consequentialist 2	15
Humans First	6
Refuse	1
Other	5
Total N	84

Question C2 took those attributing rights in C1 and split them by whether their position would be defended when they faced personal consequences in terms of

reduced living standards. The core group maintaining rights despite having their living standard reduced to a minimum may then be regarded as showing a strong rights position and refusal to trade species existence, a type of lexicographic preference, see (Spash, 1998).

Table 2.4: Refusals to Trade

	N	%
Don't Know	5	6
Trade	16	19
Strong Rights	6	7
Total N	27	32

2.5.3.2 Ecocentric and Anthropocentirc Attitudes

A set of attitudinal questions were asked next, C3, with the intention of creating an attitudinal environmental scale. Three separate attitudinal scales were used following work by Thompson and Barton (1994). Their main results seemed to show successful prediction of environmental behaviour on the basis of ecocentric attitudes, valuing nature for its own sake, and anthropocentric attitudes, valuing nature because of its material or physical benefits to humans. Their analysis gave an internal reliability factor using Cronbach's alpha of 0.78 for ecocentrism, and 0.67 for anthropocentrism.

On the basis of this research three scales were included in the pre-test: a twelve item scale on ecocentrism, a nine item scale on anthropocentrism and a three point scale on environmental apathy. The environmental apathy scale, also used by Thompson and Barton, was included as an additional test of grouping amongst items. The questions used to develop the scales employed a measure from one, strongly disagree, to five, strongly agree. Following the approach of Thompson and Barton, all items on these scales were worded in the same direction, e.g. an ecocentric would, in theory, agree strongly with all the items as worded on that scale, and therefore there was the possibility of an acquiescence response set.

In the pre-test survey the number of refusals/don't knows for each item were very low suggesting that individuals were able to respond easily to the statements. A respondent's score on each scale was calculated by taking a simple (non-weighted) sum of all items belonging to that scale. Factor analysis of the ecocentric and anthropocentric items shows six factors and good grouping by the two sets of questions on the first two factors. The results are shown in Table 2.5. The two factors account for 21.9 and 18.0 percent of the variability. The items scoring above 0.4 for factors 1 and 2 give alpha reliability scores of 0.8123 and 0.8121 respectively. However, as explained further below the two main factors fail to measure what is expected with the ecocentric factor actually having mostly self regarding egocentric items, and the anthropocentric factor being more related to general beliefs about the quality of life.

Table 2.5 Pretest Factor Analysis

	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6
ANTHRO1	.17018	**.43820**	.00872	.32093	-.46339	.03293
ANTHRO2	-.09206	**.43956**	-.30409	.50991	-.00575	.18899
ANTHRO3	.09014	**.74443**	.21456	.30060	.11839	.03113
ANTHRO4	-.14645	.21981	.03478	.26827	-.03575	.71981
ANTHOR5	-.04542	**.78717**	.02510	.09161	.13949	.14769
ANTHRO6	.25819	**.60080**	-.08722	-.04211	.00777	.44584
ANTHRO7	.29284	.23854	.02294	.06210	.05855	.74377
ANTHRO8	-.01211	**.73885**	-.28410	-.08793	.12832	.29998
ANTHRO9	-.01802	**.79382**	-.03975	-.14254	-.14167	.00522
ECO1	.17210	.07614	-.11285	.71746	.00626	.14661
ECO2	**.62118**	.09061	.35494	-.17326	.26221	-.30395
ECO3	.01322	.00300	.15747	-.08262	.77855	.11711
ECO4	.17906	.08088	.77262	-.10078	.15678	.06381
ECO5	**.84734**	.06730	-.14524	.16744	-.04102	-.09001
ECO6	**.81881**	.11001	.32146	-.06702	-.00036	-.02829
ECO7	**.56781**	-.04121	.12042	.01918	.07548	.16326
ECO8	**.52252**	-.06990	.44996	.15636	.32587	.11156
ECO9	**.76004**	.00073	.19920	.22016	.00151	.20863
ECO10	.28898	.28675	-.06388	.12408	.76096	-.14898
ECO11	.06204	-.09923	.24328	.80298	-.07018	.04137
ECO12	.24400	-.16033	.74451	.12376	-.06710	-.04779

Variables from the environmental attitudes data were included in the bid curve analysis (ANTHRO and ECO) to test the hypotheses:

Ho: WTP is determined by anthropocentrism/ecocentrism.

The variable measuring anthropocentrism was significant. Thus, the hypothesis that anthropocentrism explained WTP gained support.

The Spearman correlation coefficient of mean scores on the ecocentrism scale with those on the anthropocentric scale was low at 0.16 and insignificant at the 10% level Thus, the hypothesis,

Ho: Anthropocentrism and ecocentrism are mutually exclusive value systems.

was supported. However, this positive, but weak, correlation of the two variables implies that the value systems might be compatible rather than mutually exclusive positions. That is the two scales, as devised, are in fact measuring indistinct concepts which have aspects in common. For example, both strongly ecocentric and anthropocentric positions could be held by the same individual, and there is no consistent exclusion of the one by the other as might be expected. That is, if ecocentric were at one extreme and anthropocentric at the other a strong negative correlation would be expected. This finding is of interest in itself but the insignificance of the result also raised concerns over the adequacy of the questions

being employed. More specifically the approach taken by Thompson and Barton in forming their attitudinal scale raised questions about face validity.

Further consideration was therefore given as to how well the questions forming the scale were operating at probing the underlying concepts normally represented by the terms ecocentric and anthropocentric. The statement of attitudes that are supposed to test for anthropocentric and ecocentric perspectives seemed to fail at meeting the definition given by the authors themselves. That is, many of the ecocentric attitudes are quite consistent with anthropocentric attitudes as defined in the article. For example, take the following statements that Thompson and Barton use in their ecocentric scale:

> "I can enjoy spending time in natural settings just for the sake of being out in nature"
>
> "Being out in nature is a great stress reducer for me"
>
> "I need time in nature to be happy"
>
> "Sometimes when I am unhappy I find comfort in nature"

This can be taken to imply a self centred orientation with personal enjoyment being the key reason why nature is important. Alternatively, emphasis could be placed on the enjoyment just coming from nature which seems to be the authors interpretation. However, even then human enjoyment from nature is different from intrinsic value in nature. The definition of the two scales as given by Thompson and Barton is characterised in Table 2.6, and shows how enjoying time in natural settings is easily interpreted as anthropocentric. The same applies to the improvement of human health by stress reduction or increasing happiness (utility) by associating with nature, all of which are easily regarded as utilitarian and consequentialist. In fact item ANTHRO6 does show exactly this recognition by the authors because it is classified as anthropocentric while being fundamentally identical to items ECO2, ECO5, ECO6, ECO7 and ECO9 which are classified as ecocentric but are in fact self-interested or egocentric. Item ANTHRO6 states:

> "Nature is important because of what it can contribute to the pleasure and welfare of humans"

In addition, Thompson and Barton equate egoistic with anthropocentric attitudes on the basis that they both "focus on outcomes for humans" (p.150). This was done in reference to work by Stern et al. (1993) which in fact made a clearer distinction between egoistic, social altruistic and biospheric attitudes. The egoistical motive means only undertaking a pro-environmental action if the personal costs to oneself are outweighed by the personal benefits and this excludes benefits to others. Anthropocentrism covers a range of values centred on humans but not purely the self (e.g. others in your community, country or in other countries, and future and past generations). The scale summarised as Factor 1 in the pre-test in fact represents egocentrism.

Table 2.6 Defining Ecocentric and Anthropcentric Positions

Ecocentric	Anthropocentric
Intrinsic value	Consequentialist
Moral standing in nature	Moral standing in humans
Spiritualists	Instrumentalists
Rights?	Utilitarian
Value nature for its own sake e.g. worth preserving regardless of economic or lifestyle implications	Value nature for services it provides e.g. enhancement and maintenance of human quality of life

There is then no reason to believe, as Thompson and Barton (p.156) do, that "an appeal to conserve for self-interested reasons (i.e., to save money) may be ineffective for those with ecocentric interests, but work well with anthropocentrics." The problem with the Thompson and Barton approach is that it is too crude, for example, making no distinction between egoism and altruism, or self-regarding and other regarding motivations. This also gives misleading conclusions.[2]

In summary, the Thompson and Barton scales were poorly constructed as probes of the concepts they claimed to measure. Although, they did seem to provide two strong factors these were of egocentrism and a type of anthropocentrism. In reviewing this issue a further search of the environmental psychology literature was conducted and alternative measures of environmental attitudes explored. As a result the questions, which were finally used in the main survey, differed from the pre-test and are based upon the work by Stern and colleagues, as discussed in Chapter 4.

[2] In drawing their conclusions Thompson and Barton claim their work shows that policy should be directed towards encouraging ecocentric attitudes. The essence of the argument is that other policies may over ride environmentalism because they serve human ends better. However, anthropocentrism could be robust in supporting environmentalism if either (i) environmental commitment is given priority and anthropocentrism is the basis for reasoning and rationalising rather than a motive, or (ii) if the judgement that experiencing Nature is best for humans has already been made. In addition, ecocentrism could be a weak basis for environmentalism if support for Nature has to combat "discomfort, inconvenience and expense" (p.150).

Table 2.7: Scale Items to Measure Ecocentric and Anthropocentric Attitudes

Item	**Name**	**Mean**	**SD**
The worst thing about the loss of the rain forest is that it will restrict the development of new medicines	ANTHR01	3.3	1.1
It bothers me that humans are running out of their supply of oil	ANTHR02	3.0	1.1
The thing that concerns me most about deforestation is that there will not be enough timber for future generations	ANTHR03	2.8	1.1
The most important reason for conservation is human survival	ANTHR04	3.3	1.2
One of the best things about recycling is that it saves money	ANTHR05	3.0	1.1
Nature is important because of what it can contribute to the pleasure and welfare of humans	ANTHR06	3.6	1.2
We need to preserve resources to maintain a high quality of life	ANTHR07	4.0	0.9
One of the most important reasons to conserve the environment is to ensure a continued high standard of living	ANTHR08	3.0	1.2
Continued land development is a good idea as long as a high quality of life can be preserved	ANTHR09	2.6	1.1
One of the worst things about overpopulation is that many natural areas are getting destroyed for development	**ECO1**	**4.1**	**1.0**
I can enjoy spending time in natural settings just for the sake of being out in nature	**ECO2**	**4.2**	**1.0**
Sometimes it makes me sad to see forests cleared for agriculture	**ECO3**	**4.1**	**0.8**
I prefer nature reserves to zoos	**ECO4**	**4.3**	**0.8**
I need time in nature to be happy	**ECO5**	**3.8**	**1.1**
Sometimes when I am unhappy I find comfort in nature	**ECO6**	**3.6**	1.0
It makes me quite sad to see environments destroyed	**ECO7**	**4.4**	**0.8**
Nature is valuable for its own sake	**ECO8**	**4.3**	0.9
Being out in nature is a great stress reducer for me	**ECO9**	**4.0**	**0.8**
One of the most important reasons to conserve is to preserve unspoilt areas	**ECO10**	**4.0**	**0.8**
Sometimes animals seem almost human to me	**ECO11**	**2.9**	**1.4**
Humans are as much a part of the ecosystem as other animals	**ECO12**	**4.4**	**0.7**
I do not feel that humans are dependent on nature to survive	APATHY1	1.6	1.0
Most environmental problems will solve themselves given enough time	APATHY2	1.9	**1.1**
I don’t care about environmental problems	APATHY3	1.3	0.7

3. The Fenland Study Results

3.1 Population Sample Description and Population Statistics

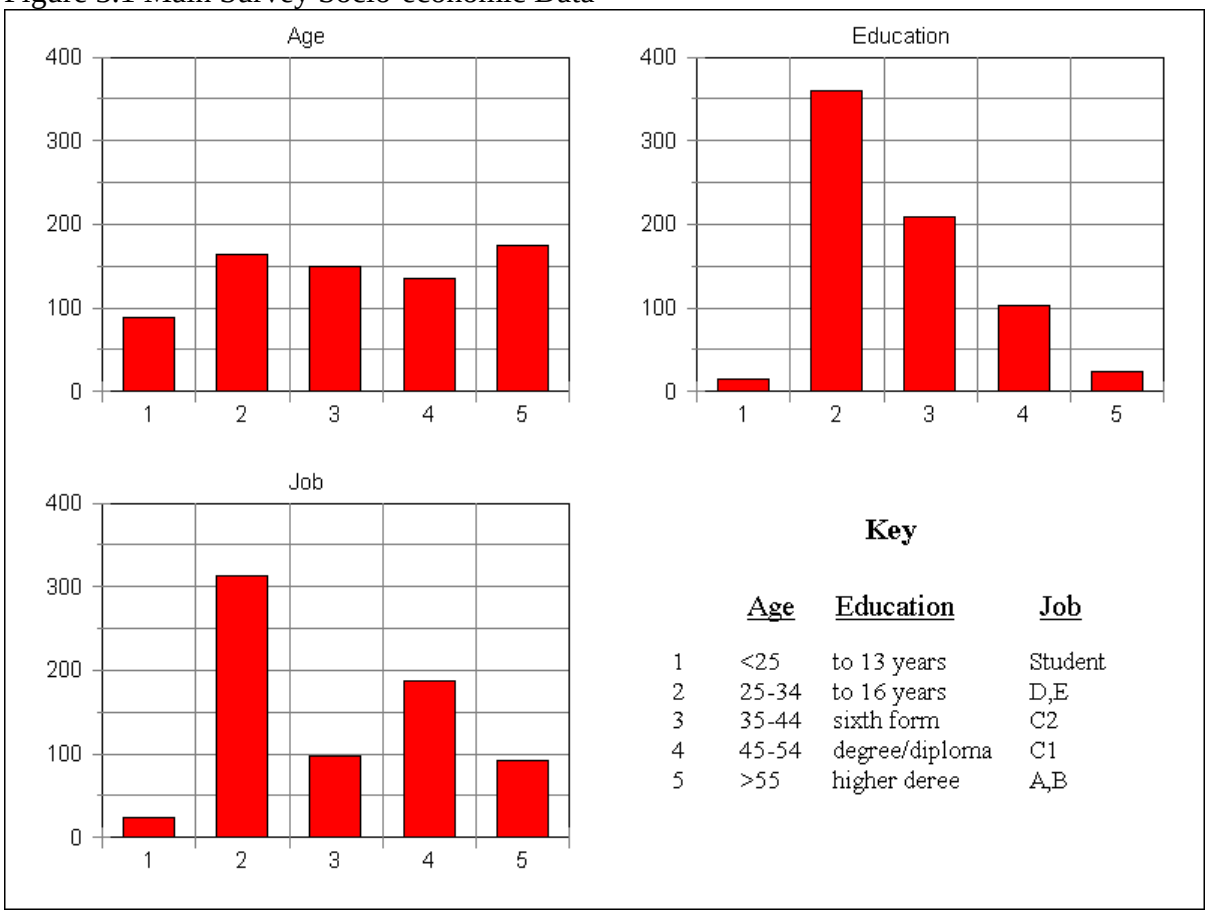
The survey was conducted for CRE by an independent market research company. The sample consisted of 713 at-home personal interviews using a random walk method based upon selected areas. While a random sample is the normal theoretical aim of such studies this is impossible because a complete list of the population is unavailable. For example, even voting registers are incomplete and especially so since the poll tax. Thus, the two stage stratified sampling technique is the second best, i.e. choosing a number of areas across the country and then selecting a sample randomly within each area.

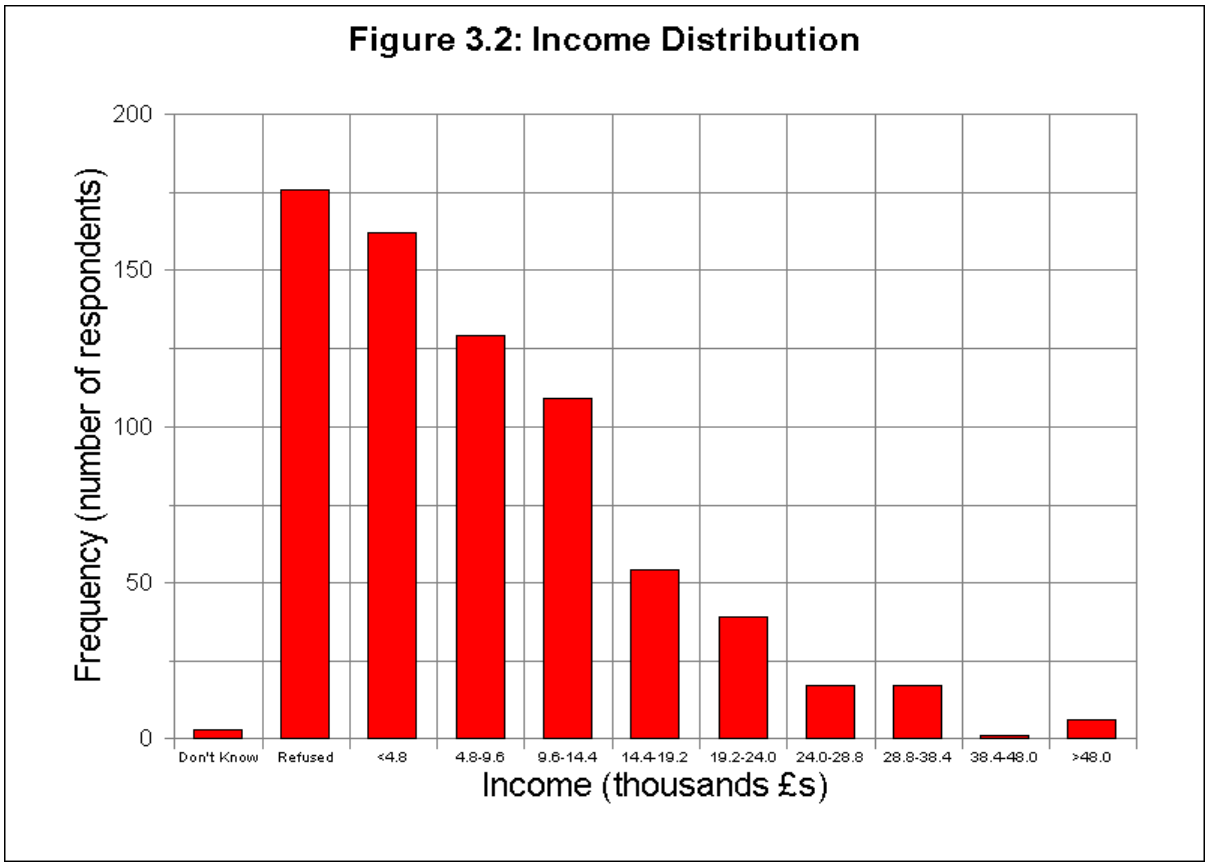
A "local" split of the sample was sought so that 48.5% of the interviews were conducted within the area of The Fens i.e. an area around The Wash encompassing part of Lincolnshire, Cambridgeshire, Suffolk and Norfolk. There were 59 different locations used in the sample with 31 in The Fens, and a broad spread in the national sample from Perth in Scotland to Newport in Wales and Southampton in England. The national sample tends to be centred on towns and cities as opposed to the local sample which has town, rural and village based interviews.

The results in terms of sample characteristics (age, education and job type) are shown in Figure 3.1. There was a very different distribution from the pre-test because the University town sampling problem nolonger existed. Some evidence for a slight bias, perhaps due to greater daytime sampling, can be seen in that there was a 60:40 female/male ratio, and relatively low frequencies in the working groups of semi-skilled and management (although a good number of skilled workers) and slightly more in the over 55 age group. A comparison with census data would be required to confirm any inferences.

The other main socio-economic variable is income which is shown in Figure 3.2. There are a high number of refusals with 25% of the sample falling into this category. There are also a large number of respondents claiming a gross income (before tax or any deductions) of less than £4,801, which seems quite low for such a large proportion of the sample, approximately 23%. This implies under reporting of income which is a common problem in survey work. In terms of the distribution responses in all categories were obtained, although the upper income groups were quite small.

Figure 3.1 Main Survey Socio-economic Data



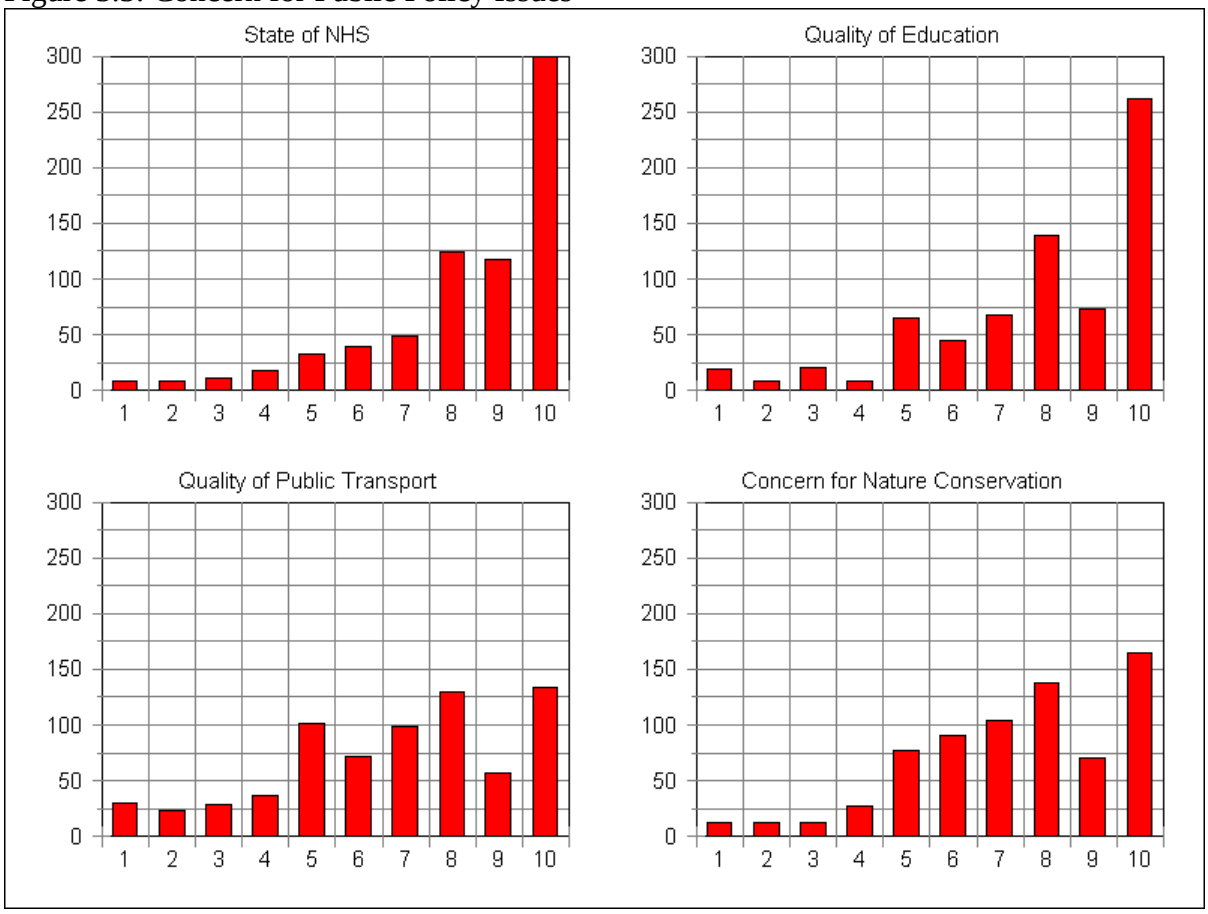


3.2 Framing

3.2.1 Concern for Public Policy Issues and the Environment

Three questions on framing the issue were asked. These related to the quality of education, the quality of public transport and the state of the National Health Service, all of which have proven of major concern in recent years in the UK. These three questions were followed separately by one on nature conservation. The aim was to make the respondent aware that nature conservation is but one category of issues related to public expenditure and only one issue which they might want to make contributions towards. Such framing is also suggested to help avoid embedding problems. The results for the four questions are given in Figure 3.3.

Figure 3.3: Concern for Public Policy Issues



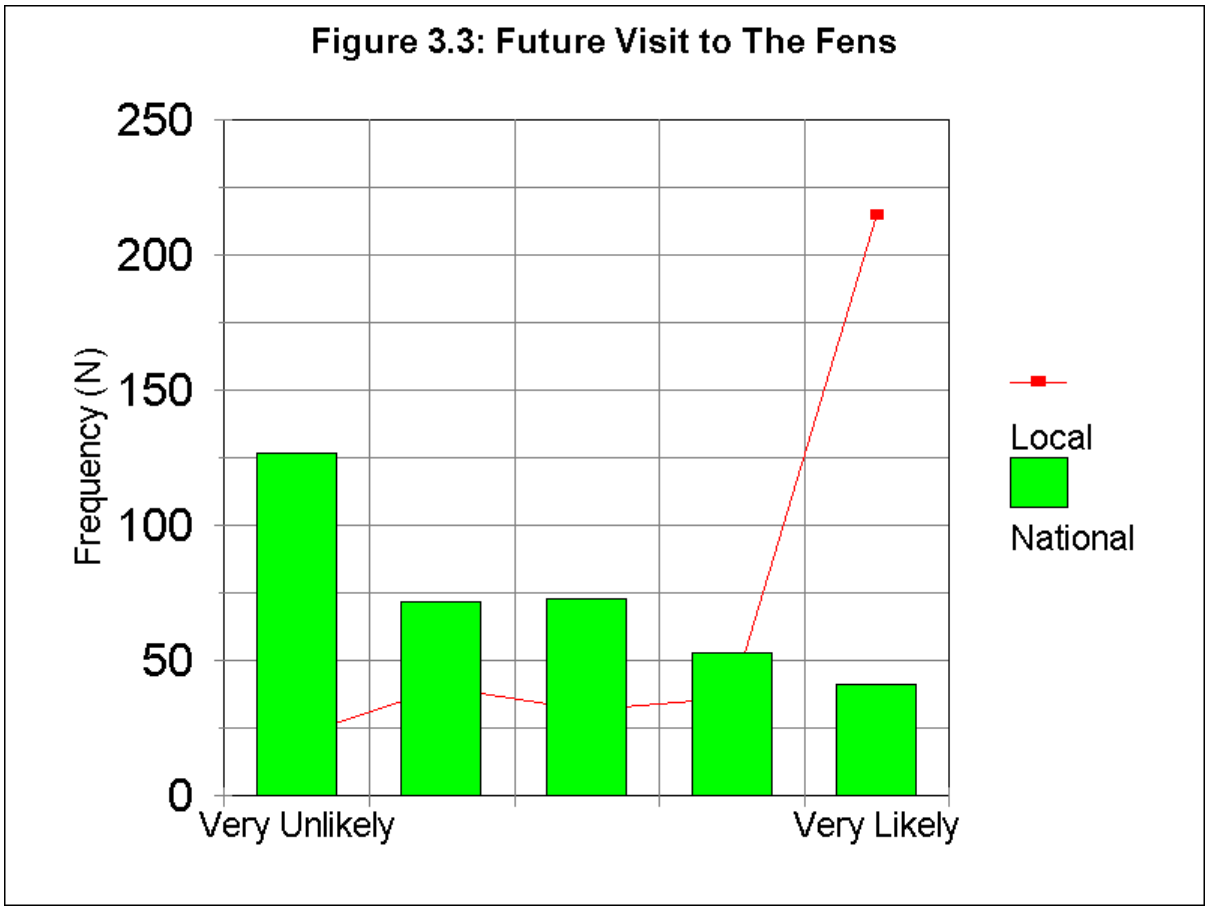
The extent of public awareness of environmental problems was revealed by the next stage of framing. Respondents were asked to name two environmental issues, besides nature conservation, which were of current concern to them. A minority of 30% of the sample were able to do so with 46% being unable or unwilling to give any environmental issues which were of concern to them, and the remaining 24% giving just one. Interestingly, these percentage breakdowns were identical for both the local and national samples.

3.3 Area Knowledge and Use

Respondents were asked whether they had ever heard of The Fens of East Anglia and 66% affirmed they had. They were next asked about the area they thought The Fens covered as a

probe into their knowledge level, but this proved unsuccessful as the responses varied outside the requested format with comparisons to other areas, and counties given as well as various numerical responses. After having been shown a map of the area designating The Fens, with an inset identifying its location in the UK, respondents were asked if they had ever visited the area. Approximately 60% of respondents had done so.

Next the respondents were asked whether they would be likely to visit the area in the future and rank their likelihood on a scale from 1, very unlikely, to 5, very likely. As expected the vast majority of "locals" visit the area, but some on the borders of The Fens can avoid the area in preference for town and city or less flat landscape, e.g. those living in Peterborough and Lincoln, and those on the southern border of the area where commuting to London or working in Cambridge is common. Others on the border of the region without a car would have to rely on public transport which would make visiting much of The Fens area difficult. Thus, some locals regard themselves as disconnected from The Fens. On the national scale a gradual decay function occurs with the majority being unlikely to visit the area in the future.



3.4 Basic WTP Results

The breakdown of bids by category is given in Figure 3.4 for the two sub-samples (local and national). This shows locals are more likely to bid positively as might be expected by the greater chance to visit the site. However, one issue relevant to the local sample, which was of concern during the project development, was the potential rejection of wetland re-creation in an area where flooding has historically been regarded as a threat. In particular, flooding in

the late 1940s caused the loss of life and this might have been a factor which could have lead to a lower general WTP amongst the local population or refusals to bid. However, the proportion of those refusing and being in the don't know category is similar for both national and local samples. As discussed in the next section, the view that wetlands were a potential hazard and should be reduced was held only by a handful of individuals.

The don't know category is large and consistent in both samples and for the total sample is 25.5%. The equality between refusals and don't knows found in the pre-test has disappeared with refusals at 5% in the main survey for the total sample. Note, the standard approach in CVM is to treat don't knows and refusals as zero bids, and they are often never separated out even in the questionnaire design. The largest category for the overall sample is the zero bid group at 40%, but this masks differences between the local and national samples; zero bids dominate at the national level, while for locals positive bids are the largest category by a few percent.

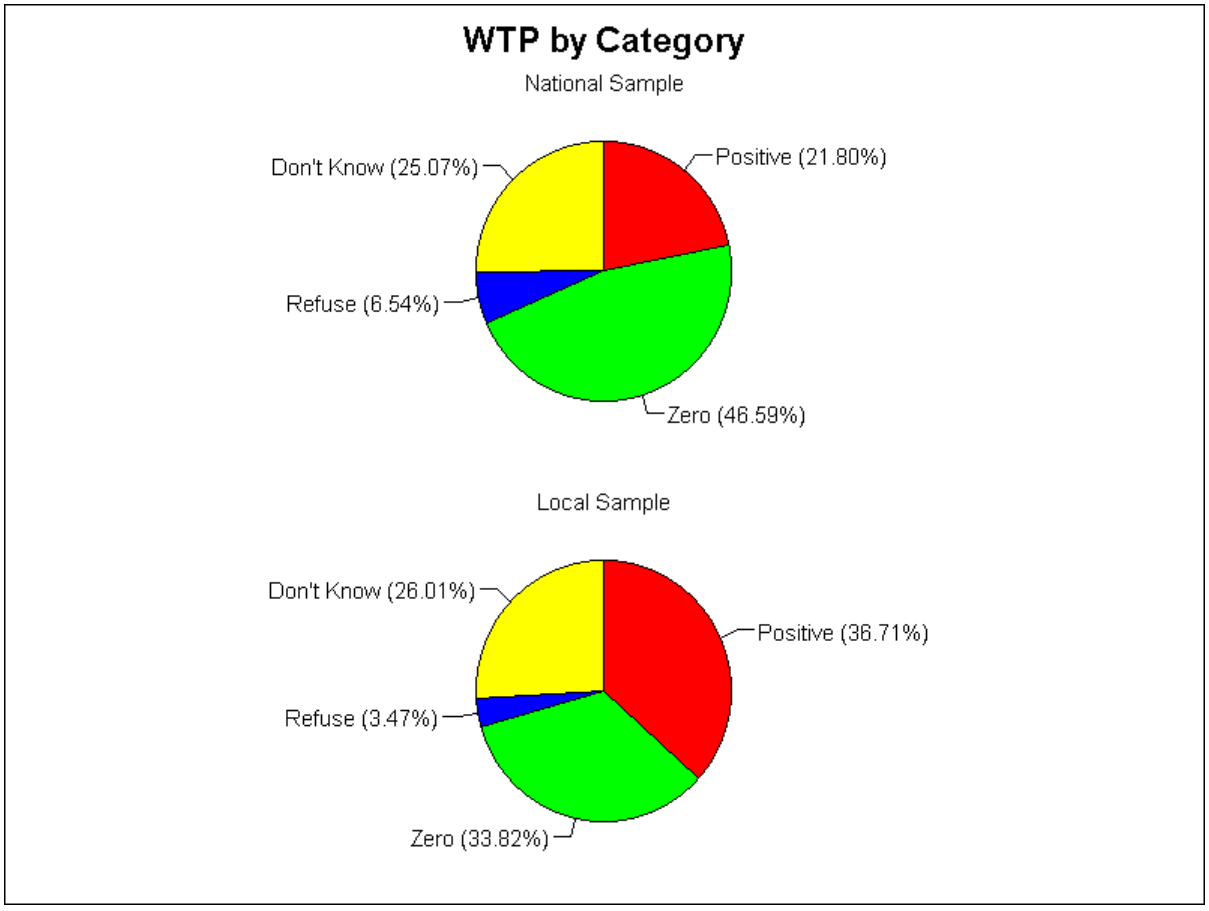


Table 3.1 Statistical Summary of Willingness to Pay Bids

	Mean (£)	Median (£)	5% Trimmed Mean (£)	Standard Deviation (£)	Maximum (£)	Total N
Local	7.89	1.50	5.07	16.17	100	244
National	5.64	0.00	2.47	18.82	200	251
Total	6.74	0.00	3.62	17.58	200	495

Excludes 36 refusals and 182 don't knows, of these local 102 national 116

3.5 Information and Preferences

Preferences about whether wetlands should be increased or decreased were requested prior to the willingness to pay section and information pack being introduced. The results for the total sample are shown in Table 3.2. Contrary to the concern that locals might be against flooding an area of farmland, only 8 wanted the area of wetlands decreased. Of these only one could have experienced the flooding in the late 1940's, a farmer over 55 years old, and therefore the category of those expected to pay to reduce wetlands proved relatively unimportant. A greater proportion of locals than non-locals claimed an existing preference for an increase in wetlands, i.e. excluding don't knows, 42% of locals as opposed to 27% in the national sample. Non-locals were also more prone to answering don't know with 19% doing so as opposed to only 12% of locals.

Table 3.2: Prior Preference Over Wetlands in The Fens

	N	Percent	Valid Percent
No preference	384	53.9	63.7
Increase wetlands	208	29.2	34.5
Decrease wetlands	11	1.5	1.8
Don't know	110	15.4	
Total N	713	100.0	100.0

Note: 603 valid cases when "don't know" excluded.

The results shown in Table 3.2 provide a prior preference for comparison with a question at the end of the payment section of the survey i.e. after the information pack and willingness to pay. The results from this second question are shown in Table 3.3. This seems to suggest only a small proportion of the sample changed their preferences due to the information provided, i.e. 11.6% of the sample. However, further investigation of the data shows a change in intentions, from the prior preference given in Table 3.2 and the stated WTP in response to the wetland re-creation scheme, which fails to show in Table 3.3.

Table 3.3: Change of Preference and/or Informed

	N	Percent	Valid Percent
Changed preference	43	6.0	6.1
More informed	408	57.2	57.9
Informed and changed	39	5.5	5.5
None of the above	215	30.2	30.5
Refused to answer	8	1.1	
Total N	713	100.0	100.0

Note: 705 valid cases when "refuse" excluded.

In fact, as shown in Table 3.4, there is a substantial minority of individuals who failed to register a preference change but actually formed a positive opinion of wetlands re-creation in The Fens during the survey. This is the group who stated either having no preference or not knowing at the start, but went on to give a positive WTP. More specifically, out of the 494 people who had no preference or answered don't know when asked about their preference for increasing wetland in The Fens, at the start of the survey, 88 gave a positive WTP without

signifying a preference change due to the information provided. That is, this positive bid is indicative of being in favour of wetland re-creation rather than being indifferent or not knowing how to respond, although all these individuals failed to reply that their preferences had changed. Instead 70 felt that they had been informed and 18 that they had neither been informed nor had their preferences changed. An additional person bid positively after having a preference for a decrease of wetlands in The Fens, but responded that they had been informed rather than their preference changing. Thus, in addition to the 82 people who stated that the information they had been given had changed their preferences or changed and informed their preferences, a further 89 appear to have actually changed their intentions in light of the survey information. One explanation for the failure to register this as a change of preference may be that, because these people had no prior preference, and were therefore forming their preference during the survey, the new position is regarded as an innovation rather than a change. In the vast majority of cases these people did signify that the information had an impact. The overall result is that 171 respondents either signified or showed signs of having formed or changed their preferences during the conduct of the survey, that is just over 24% of the sample (excluding 8 cases of missing data). That is 84% of those giving a positive WTP appear to have been influenced by the survey.

Those who answered that their preferences had changed (82 people) were asked how they had been altered. The most common response, 45%, was that the respondent's awareness of the environment as an issue needing funding had been raised. Never having thought about this particular issue before was next with over a quarter of the respondents giving this reasoning. Thus, approximately 71% of the respondents gave answers falling under these two headings, while other reasons and all the information being new accounted for the remainder, with the latter being the smallest percentage response.

Figure 3.4 Change in Stated Preference due to Information

	Preference Over Wetlands in The Fens															
	No Preference				Increase Wetlands				Decrease Wetlands				Don't Know			
	WTP				WTP				WTP				WTP			
CVM Survey Impact	+ve	zero	R	DK	+ve	zero	R	DK	+ve	zero	R	DK	+ve	zero	R	DK	N
changed your preference about whether extra money should be spent on wetland creation	9	3	2	2	6	2	2	7	0	0	0	1	4	2	0	3	43
given you more information than you had before	50	100	10	47	55	33	2	44	1	1	2	2	20	24	2	15	408
both informed you and changed your preferences	10	9	2	4	5	1	0	0	0	0	0	1	4	0	0	3	39
none of the above	15	82	11	24	22	13	1	13	0	2	0	1	3	14	2	12	215
Total N	84	194	25	77	88	49	5	64	1	3	2	5	31	40	4	33	705

Note: 705 valid responses, 8 missing data points

4. Environmental Values and Willingness to Pay

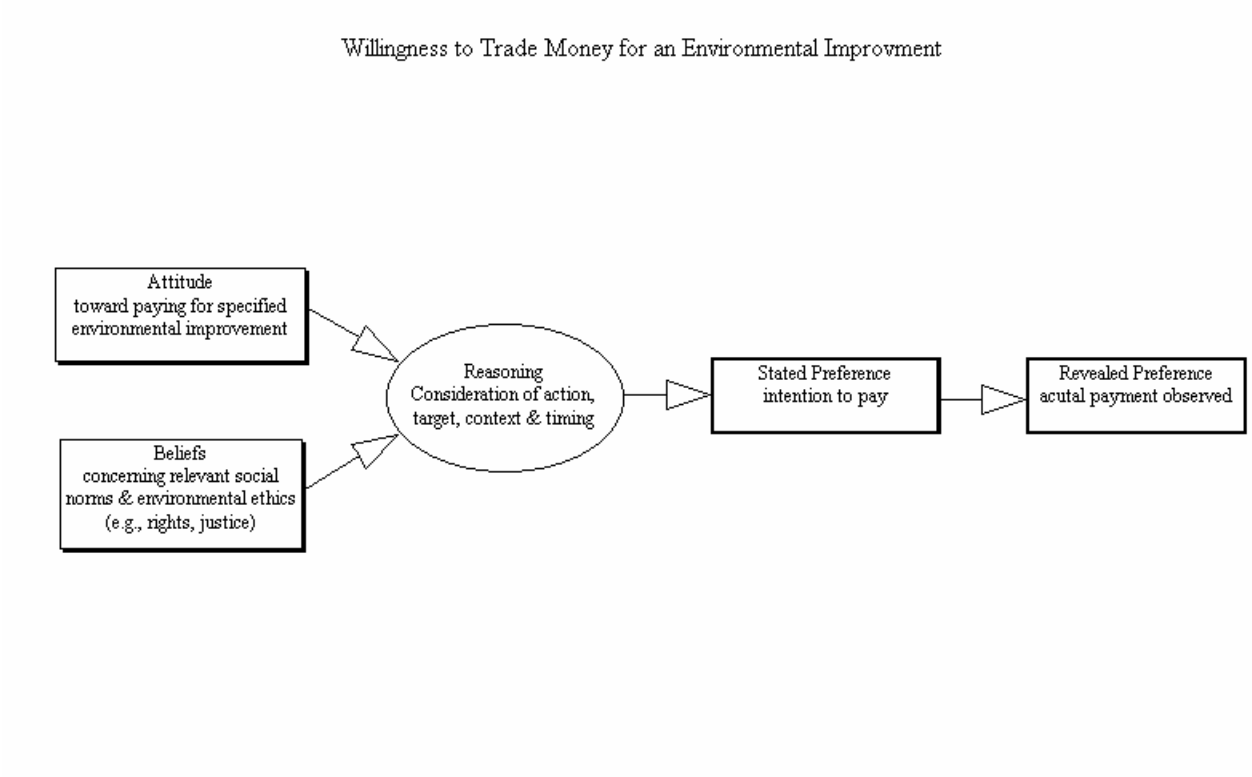
4.1 Introduction

The model in Chapter 1 was described in general terms. In order to make this more specific to the wetlands case study and contingent valuation in general this model can be adapted. The result is shown in Figure 4.1. Some debate in environmental economics has centred around the divergence of actual WTP from stated WTP, which are the actual and intended behaviours respectively. The literature on social psychology clarifies the distinction between the two. More importantly for policy purposes, and in order to describe the process of monetary valuation, the model draws attention to the antecedents of the stated preference. This is hypothesised to be particularly important for explaining the full range of responses to contingent valuation (zero bids, refusals, don't knows) rather than just the positive bids, which tend to gain most attention in the literature.

An important distinction here is between actual behaviours and attitudes. Some researchers designing contingent valuation studies have used membership of environmental organisations as an indicator of environmental attitudes. This is incorrect because joining such a group is an actual behaviour and the link then being analysed is between an actual behaviour and a possibly unrelated intended behaviour. This example shows the importance of economists beginning to consider a more comprehensive model as described here.

Attitudes are determined by beliefs about consequences. These beliefs can be probabilistic relationships or more general associations of objects with attributes. For example, wetlands (object) are good for rare bird species (attribute), or wetlands are breeding grounds for unpleasant insects. These types of beliefs should be differentiated from more fundamental ethical beliefs. Ethical beliefs relate to personal moral positions which are less easily manipulated by new information e.g., due to the media, other people or a contingent valuation survey. The area of reasoned action is then where fundamental beliefs and environmental attitudes are brought to bear upon the specific behaviour being requested e.g. payment to change an area of farmland into a wetland.

Figure 4.1


Willingness to Trade Money for an Environmental Improvment
Attitude
toward paying for specified
environmental improvement
Beliefs
concerning relevant social
norms & environmental ethics
(e.g., rights, justice)
Reasoning
Consideration of action,
target, context & timing
Stated Preference
intention to pay
Revealed Preference
acutal payment observed

4.2 Environmental Attitudes

The intial scale of interest was that providing a split between ecocentrism and anthropocentrism. However, as discussed in Chapter 2, experience in the pilot survey revealed that the definition used by Thompson and Barton (1994) was inadequate. While the predictive power in terms of environmental behaviour had been shown to be good in their study there was confusion as to what exactly was being measured. Some item questions seemed equally applicable to either category or mis-catergorised. Thus, a more comprehensive search for a scale was decided upon.

In choosing an attitudinal scale for the project several issues then seemed relevant:

- Specificity of the attitudinal concept to be addressed and measured e.g. general acceptance of biocentrism or specific attitudes to conservation;
- Content validity i.e., the success with which the scale actually addresses the underlying philosophical concept;
- Predictive validity i.e., the success with which the scale had been used to predict behaviour in the past;
- Resource constraints i.e., the extent to which research effort would be required to design or re-design the scale for the wetlands study.

As the attitudinal aspect of the project was only one part of the research no additional resources could be diverted into developing a new scale from scratch. Thus, from the outset the aim was to find a scale already in use which might be adopted.

4.2.1 Studies of Environmental Attitudes in Social Psychology

4.2.1.1 The New Environmental Paradigm

A study by Dunlap and Van Liere (1978) provided a general attitudinal scale which has since become regarded as a standard measure of environmental concern (Schultz & Stone, 1994, p.32). This measure of human attitudes towards the environment was called the New Environmental Paradigm (NEP). They argue that the dominant social paradigm is anti-ecological, but that arguments such as Meadows et al. (1972) on the limits to growth are a direct and growing form of challenge to this world view. Their attitudinal scale therefore aims to measure the ideas captured by the 1970s "spaceship Earth" metaphor.

The NEP was developed from 12 Likert-type items which were included amongst 23 other Likert-type items concerning a range of environmental issues (pollution, population, and natural resources). The survey was administered by post on two samples in Washington State, USA, one from the general public and the other from an environmental organisation. The 12 items were designed to capture key aspects of the emerging environmental literature (limits to growth, balance of Nature, anthropocentrism) and in consultation with environmental scientists and ecologists. Table 4.1 gives the items which were measured on a scale from 1 (strongly disagree) to 4 (strongly agree). Note, items 3, 4, 6 and 10 have an anti-NEP phrasing, while the others are pro-NEP. They found environmentalists strongly endorsed NEP while there was also a surprising degree of acceptance of the NEP by the general public

sample. Several tests were conducted to confirm that the NEP formed an internally consistent and unidimensional scale.[3]

Table 4.1 The New Environmental Paradigm

Item	NEP Statements
1	We are approaching the limit of the number of people the earth can support
2	The balance of nature is very delicate and easily upset
3	Humans have the right to modify the natural environment to suit their needs
4	Mankind was created to rule over the rest of nature
5	When humans interfere with nature it often produces disastrous consequences
6	Plants and animals exist primarily to be used by humans
7	To maintain a healthy economy we will have to develop a "steady-state" economy where industrial growth is controlled
8	Humans must live in harmony with nature in order to survive
9	The earth is like a spaceship with only limited room and resources
10	Humans need not adapt to the natural environment because they can remake it to suit their needs
11	There are limits to growth beyond which our industrial society cannot expand
12	Mankind is severely abusing the environment

Source: (Dunlap & Van Liere, 1978, Table1 p.13)
Note: items 3, 4, 6 and 10 are reverse.

Dunlap and Van Liere go on to consider the predictive, content and construct validity of the NEP. The predictive test included response to extra funding for two State environmental programmes (pollution control and conservation of natural resources), a 12 item scale on support for environmental regulations, and an 8 item scale on environmental behaviour. The NEP performed well on the predictive tests. Content validity was left for the reader to decide as the authors argued it depended largely upon "intersubjective agreement that the scale items adequately represent the "content" of the concept being measured" (p.16). Construct validity was shown by

[3] Cronbach's alpha was 0.813 and 0.759, omega from factor analysis was 0.849 and 0.802, and principal factor analysis gave a first unrotated principal factor accounting for 69.2 and 63.3 percent of the variance for the general public and the environmentalists respectively. All 12 items loaded highly on this factor.

product moment correlations with ideology (0.22), education (0.11) and age (0.09) for the general public sample.

In terms of using the NEP for predicting behavioural intentions there are some caveats. The NEP addresses general attitudes and would therefore, on the basis of the Fishbein and Ajzen correspondence principal, be expected to only predict general behavioural intentions. This would affect the extent to which NEP might be able to predict variations in WTP in the wetlands case study. Dunlap and Van Liere also note the tendancy for individuals to hold inconsistent attitudes without realising the conflict. Many of those endorsing the NEP might therefore fail to realise the full personal and societal implications of concepts such as a steady-state economy and living in harmony with Nature. As noted in Chapter 1 of this report, the influence of attitudes on behavioural intentions is but one aspect and fundamental social and ethical beliefs can be dominant in the process of reasoning over an action.

In terms of using the NEP in the current research the issue of content or face validity was considered relevant, as it had been with the pre-test scale. The problem with the NEP scale is that is uses concepts from the 1970s and environmental attitudes and concepts have changed in the intervening 25 years. The NEP focused upon the limits to growth debate of the early 1970s while in the 1990s the categories which dominate the scale have been superseded e.g., by sustainable development, biodiversity, global climatic change, critical natural capital and so on. These new categories tend to be more complex. In addition, some of the specific questions are problematic in themselves. Item 8 talks of "harmony with nature" which is a rather meaningless concept lacking discriminatory power. Both items 4 and 6 presuppose a religious orientation which means they might be readily denied by humanistic anthropocentrists, despite obviously being intended to indicate anthropocentric leanings. Despite this the NEP continues to be used successfully in the USA e.g., work by Schultz and Stone (1994) showing a link between authoritarianism and anti-environmentalist attitudes.

Another criticism of the NEP approach is that it fails to incorporate work on social psychology of attitude-behaviour interactions (Stern, Dietz, & Guagnano, 1995a). The type of model underlying this work was outlined in Chapter 1. Stern et al. found a reduced form of the NEP (based on 7 items from a more recent unpublished 15 item NEP scale) was indistinguishable from a scale measuring what they term "awareness of consequences" concerning general environmental conditions, both psychometrically and in terms of the relationship to behavioural intentions. They then conclude that the two scales measure a set of general beliefs which underlie, inform and form more specific beliefs and attitudes.

In relation to the model in Figure 1.1, Stern and colleagues are arguing for an additional level of explanation which comes prior to the specific attitudes and fundamental beliefs and would lie to the left of them in that diagram. However, the NEP might also be regarded as being at a broader level in terms of the definition of attitudes rather than determining specific attitudes. This would mean merely moving from one level of specificity to another from the consideration of specific attitudes and behaviour to general attitudes and behaviour. They are then identifying the NEP as relating to the global level of specificity as opposed to the behaviour, situation and

time specific level as discussed by Fishbein and Azjen (1975, pp.292-298). No causal link is necessary in terms of general beliefs being formed first and determining specific beliefs and attitudes. The range of beliefs could be formed simultaneously at all levels of specificity. This possibility means the role of the NEP is indeterminate because it could either be one way of measuring general attitudes as predictors of general intentions, or, as Stern and colleagues argue, be seen as measuring a set of basic beliefs which determine specific beliefs and attitudes.

Table 4.2 summarises some of the key aspects of the original NEP study. This table also provides an overview of several other studies reviewed below. The Thompson and Barton (1994) study is included for completeness and was discussed in detail in Chapter 1. Table 4.3 provides a complementary summary of the behavioural measures used in the studies by Stern and colleagues which are the subject of the next section.

Table 4.2 Selected Empirical Studies of Environmental Attitudes and Behavioural Intentions

Study	Behaviour	Attitudinal Scale			Sampling	Sample	Place	Survey	Attitudinal Measure
		Name[2]	Items	Type	Methods	(Size)		Date	
Dunlap & Van Liere (1977)	Political & Personal	NEP	12	Likert (4-point)	Mail systematic	Public (806) NGO (407)	Washington State	1976	General environmental concern
Stern, Dietz & Kalof (1993)	Political & WTP	AC_{bio} AC_{soc} AC_{ego}	3 3 3	Likert (4-point)	Mail systematic	Students (349)	New York State	1990	Specific awareness of environmental consequences
Thompson & Barton (1994)	Personal	Eco Anthro Apath	12 12 9	Likert (5-point)	Handout convenience	Public (115) Students (71)	Boston airport & Unknown Private College	?	Ecocentrism and anthropocentrism
Guagnano, Dietz & Stern (1994)	WTP	AC[3] AR PC[3]	3 2 2	?	Telephone random	Public (367)	Fairfax County Virginia	1992	Awareness of environmental consequences, Schwartz altruism[1]
Stern, Dietz, & Guagnano (1995)	Political & WTP	GAC[4] NEP	10 7	Likert (7-point?)	Telephone random	Public (199)	Fairfax County Virginia	1993 April /May	General awareness of environmental consequences[1]
Stern, Dietz Guagnano & Kalof (1995)	Political	AC_{bio} AC_{soc} AC_{ego}	4 2 2	Likert (7-point?)	Telephone random	Public (199)	Fairfax County Virginia	1993 April /May	Specific awareness of environmental consequences, Schwartz altruism[1]

1. Reference in the paper is made to the Schwartz norm-activation model of altruistic behaviour.
2. NEP new environmental paradigm, AC awareness of consequences, AR acceptance of responsibility, PC personal cost
3. PC actually uses items from AC_{ego} while AC in this study consists of two AC_{bio} items and an AC_{soc} item.
4. GAC is general awareness of consequences consisting of three AC_{ego} three AC_{bio} and four AC_{soc} items.

Table 4.3 Behavioural Measures as Used by Stern and Colleagues

Paper	Action	Behavioural Measures
Stern, Dietz, Kalof (1993)	Political	Willingness to take action, 4 item scale (demonstrate against environmentally damaging company, take a job with such a company, contribute money to environmental organisations, sign a petition for tougher environmental laws)
	WTP	"How many extra dollars per year in income tax would you be willing to pay if you knew the extra money would be spent to protect the environment?"
	WTP	"How much increase in gasoline prices, in cents per gallon, would you be willing to pay if the money was spent to protect the environment?"
Guagnano, Dietz, Stern (1994)	WTP	"Burning fossil fuels is believed to be one of the main contributing factors to global warming, sometimes called greenhouse effect. It's been suggested that raising gasoline prices would substantially reduce the use of fossil fuels. Assuming that would work, how much extra would you be willing to pay for a gallon of gasoline to help reduce global warming?"(Assumed "consumer good frame")
	WTP	"At most grocery stores, paper towels cost about 85 cents per roll. How much extra would you be willing to spend for a roll of paper towels made from recycled paper products?"(Assumed "consumer good frame")
	WTP	"Scientists are becoming increasingly concerned about the loss of many species of animals in Latin America due to heavy tree cutting in the rain forest. If the wealthier nations of the world, including the United States, were asked to establish a fund to preserve these forests, how much would you be willing to contribute to a one-time fund of this type?" (Assumed "contribution frame")
	WTP	As above but with the wording "What do you think would be a reasonable dollar amount for your taxes to increase to solve the problem?" (Assumed "non-contribution frame")
	WTP	"Some people are concerned that increasing amounts of toxic chemicals are making their way into our drinking water. In the event that one of these chemicals was found in the Fairfax County water supply and no responsible party could be identified, what would you be willing to contribute to a one-time fund to solve the problem?" (Assumed "contribution frame")
	WTP	As above but with the wording "What do you think would be a reasonable dollar amount for your taxes to increase to solve the problem?" (Assumed "non-contribution frame")
Stern, Dietz, Guagnano (1995)	Political	Willingness to take political action, 4 item scale (investing in a company that pollutes, taking a job with such a company, boycotting its products, and signing a petition for tougher environmental laws)
	WTP	WTP higher income tax to preserve tropical forests (exact wording not given).
	WTP	WTP a gasoline tax to reduce fossil fuel consumption (exact wording not given).
	Political	Writing a letter to Congress/White House to support policies to stop the loss of tropical forests
	Political	Writing a letter to Congress/White House to support policies to reduce the use of fossil fuels
Stern, Dietz, Kalof, Guagnano (1995)	Political	Willingness to take action, 4 item scale (investing in a company that pollutes, taking a job with such a company, boycotting its products, and signing a petition for tougher environmental laws)

4.2.1.2 Awareness of Consequences and Behavioural Intentions

The work by Stern and colleagues has been trying to develop a new attitudinal scale to measure human-environment interactions. In a series of papers they explore the concept of an environmental attitudinal scale for the prediction of behavioural intentions and develop this around the theme of being aware of the consequences of environmental changes due to human perturbation (Guagnano, Dietz, & Stern, 1994; Stern & Dietz, 1994; Stern et al., 1995a; Stern et al., 1993; Stern, Dietz, Kalof, & Guagnano, 1995b). This awareness of consequences (AC) has been employed to show empirical evidence for at least three centres of concern: self, other humans, and the biosphere. The measures of behavioural intention used include a scale on political action and several variations on willingness to pay questions. However, as discussed below, the approach to the willingness to pay portion of their work has some inadequacies from the economic viewpoint and, contrary to the stated intention, fails to represent a conventional contingent valuation approach. The research by Stern and colleagues is based around three sets of data of which the first was a convenience student sample and the other two samples of the general public in Fairfax County, Virginia, as shown in Table 4.2. The papers based upon this data are critically reviewed in chronological order.

In Stern et al. (1993) one aim was to explore the relationship between specific types of awareness about environmental consequences and the stated intention to take political action for the environment (e.g., demonstrating, petitioning, donating money and boycotting companies). In addition, two willingness to pay questions are used to see whether similar variables determine the outcome of contingent valuation of environmental improvements. They find only beliefs about consequences for oneself reliably predict willingness to pay through taxes. This represents an egoistic concern which in the extreme would mean only protecting the environment when the expected benefits for the individual themselves outweighed the costs.

In general, individuals may hold other environmental concerns simultaneously and these may vary between cultures (p.326). For the USA the hypothesis is that environmental concerns can be represented by egoistic, social-altruistic and biospheric values (Stern & Dietz, 1994). Social-altruism shows a concern for the impacts on other people. Biopsheric values mean an individual expresses and acts on moral principles that incorporate concerns of other species and natural systems. As Stern et al. (p.327) state: “Biospheric morality extends beyond kin and beyond all of humanity to other species, to places, and to the biosphere itself.” The awareness of consequences for each of these value orientations can be seen as a belief which feeds into an attitude, as explained in Chapter 1. Thus, while Stern et al. develop a different approach themselves, the attitudinal scale appears compatible with the social-psychological theory being explored in the wetlands research project.

The scales used for each category of awareness of consequences (AC) use three items each on a 4-point Likert-type scale. Behavioural intentions are measured using three methods: four items to create a scale on political action and two WTP questions. The natural log is taken of the WTP results after adding a relatively small amount to recode zero bids ($0.5 and $0.005) and ordinary least squares regression analysis is

under taken of the results. The WTP questions are phrased in terms of paying extra to "protect the environment" using either income tax or an increase in gasoline prices. The prediction of WTP shows AC_{ego} as significant in both cases and AC_{bio} significant for only the income tax to protect the environment. In contrast, political action is predicted significantly by all three AC scales. The authors interpret these results as showing how WTP questions focus attention upon things related to monetary expenditure and therefore personal well-being. Thus, questions about behavioural intentions which involve financial commitments focus attention on an economic calculus and elicit an egoistic value orientation.

One problem which arises in this work is the extent to which the authors relate their results as being relevant to contingent valuation. This is problematic because the WTP question is too general to be representative of an environmental change in line with the economic theory of non-market benefit valuation. The actual wording used is given in Table 4.3 and clearly lacks any detail. As a result the respondent is being asked to pay a kind of charitable contribution with unknown consequences rather than purchase an environmental change. This is a flaw common to all the papers by Stern and colleagues and is discussed in more detail with respect to Guagnano et al. (1994) where more specific claims were made about the implications of the analysis for non-market valuation of the environment. In terms of the results for the Stern et al. (1993) study rather than showing the impact of contingent valuation the authors may be observing how a poorly specified request fails to motivate those who are genuinely concerned about wider consequences because they fail to see what will be the outcome. Meanwhile those motivated by self interest gain moral satisfaction or a warm glow from the act of giving and this is all they require, i.e. they are unconcerned about the actual outcome from their giving (for more on the warm glow concept see Andreoni, 1989).

Willingness to pay for public goods is the focus of Guagnano, Dietz and Stern (1994). They note that, typically, willingness to pay in contingent valuation studies measures contributions to the provision of a public good, which by definition means the willingness to pay of others determines the final amount of the good provided to any one individual. Their contention, following Kahneman (1993), is that this differs in psychological terms from asking for the provision of a private good, where the amount supplied to an individual is determined by the individual's own willingness to pay. The psychological process being fundamentally different for the two goods may allow an explanation of the embedding problem but also could mean that WTP adds no information beyond that provided by attitudinal measures. Moral norms are then expected to be positively correlated with stated WTP for public goods. These moral norms are measured in this study using a two item scale on ascribed responsibility (AR) to oneself for ameliorating environmental problems and a three item scale on awareness of negative consequences (AC) for others (both human and non-human). The study then claims to show altruism determining WTP in line with the contribution model of public goods provision.

The behavioural measures are all single-item willingness to pay questions of various formats. There are four "environmental goods": reduced global warming, increased paper recycling, reduced deforestation, and cleaning-up chemical contamination of

local drinking water. For two of these "goods" there are two alternative payment mechanisms (i.e., trust or tax) giving a total of six WTP items. Unfortunately all six WTP items suffer from various problems in terms of representing an economic analysis using the contingent valuation method. Foremost amongst these problems is the poor specification of both the method of payment and the environmental improvement for which individuals are being asked to pay.

The authors claim their first two items are "conventional WTP questions" (p.414). Gasoline is the bid vehicle to purchase some type of unknown reduction in global warming which has unmentioned benefits, and paper towels are the bid vehicle to achieve a totally unspecified end, presumably related to paper recycling. Conventional WTP questions directly consider and describe the environmental improvement of concern e.g., the extent and outcome of improved air quality or the alteration of habitat at a specific location, or the benefits of an increase in the number of a given species within a defined area. An inability to achieve this type of description of consequences makes some environmental changes inappropriate for contingent valuation. The reason why prices increase is also unknown but might be a tax on gasoline for global warming, and if so there is an open question as to how this relates to the other tax scenarios. As the authors note in their conclusions, people react to the bid vehicle. Thus, if the bid vehicle is left unspecified the researcher can only guess as to what the respondent might be reacting. These loose specifications would be regarded as unacceptable in a conventional contingent valuation study, because there is no idea of what the individuals are actually getting for their money. Without knowing what is being bought and how there is no hypothetical market.

The other four cases are similarly problematic. A type of international fund and some form of unspecified tax are the bid vehicles for preserving an unspecified area of forest land in Latin America through an unknown institution. Similarly, an unspecified fund and tax are the bid vehicles for cleaning-up some kind of chemical waste somewhere in the local water supply; this chemical is heading towards drinking water with the implication of some kind of unspecified health impact. This means there is a lack of detail on the type of purchase, the method of payment, and the institutional context in all six cases. The last case is perhaps the most clear in that there is a local context to the contamination of drinking water and under the tax scenario the implication that a government agency might be responsible for clean-up. In the remaining cases, due to their general nature, the respondent could only be expected to reply with a charitable donation (if they perceive the scenario as a good cause) rather than buying something of direct benefit, and this would be best regarded as a "payment in principal" type of response.

Unintentioned variability is also introduced in to the various scenarios. The definition of payment vehicles neglects the introduction of institutional differences. That is, both cases of taxes are treated as if they were identical for the purposes of the study and the same is true of the trusts (i.e., taxes are non-contributory, trusts are contributory). However, people react in significantly different ways to an international trust as opposed to a local one, and a national tax compared to a local one. Defining all trusts as the same and all taxes as the same is far too simplistic. In addition, the descriptions introduce various types of risk and uncertainty into the

scenarios both in terms of the implied institutional contexts and the environmental problems to which the scenarios allude. So respondents may be expected to react differently to each scenario on the basis of aspects for which there are no control samples.

Another problem arises when the actual payment is requested. The aim should be to obtain the maximum willingness to pay. Instead the wording is weak and varies i.e., "how much extra" for the gasoline and paper towels, "how much" for the forests, and "what you would be willing" for the chemical clean-up. Under the tax bid vehicle the wording is change to "a reasonable dollar amount for your taxes to increase". What is regarded as reasonable may bear little relationship to a maximum willingness to pay and might also encourage altruism, e.g. as a reasonable person you should give something reasonable to help others. This last switch in wording is particularly problematic for the authors claim to be measuring contribution frames because (as with institutional aspects and risk) it confounds the differences between the scenarios.

Information provision is regarded as a key aspect of contingent valuation design. This includes framing of the actual question and scenario, but also the overall design of the survey. In this regard there is a potential problem for any study combining behavioural and attitudinal measurement in the same survey. If the attitudinal questions precede the questions on behavioural intentions this could effectively load respondents expectations. The impact of initial survey information on stated willingness to pay has been noted in some more recent contingent valuation work (see for example Ajzen, Brown, & Rosenthal, 1996). Unfortunately, there is no discussion of survey design in the study.

Analysis was carried out using bid curve regressions on the positive bids only, although the reasoning behind zero and non-response behaviours is of equal interest (especially given the typically high percentage in CVM). The model for the tax payment vehicle in the case of chemical waste in drinking water fails the F-test but is the only model where income is a significant predictor of WTP. This was also noted above to be the most highly specified scenario and therefore more realistic in terms of a monetary trade-off being requested. Failure of an income variable (or a surrogate such as age or education) to predict WTP is normally of concern in a contingent valuation study and requires explanation. In this study the apparent problem is taken as meaning other factors are more relevant than ability to pay in all WTP cases, but due to the general failure to specify what is being paid for this would hardly be surprising. The unspecified nature of the WTP question makes it a request to show altruism because there is no obvious or explicit direct personal gain to the respondent from payment.

In terms of the results, the AR scale was positively and significantly found to determine WTP for the four cases without an explicit tax payment vehicle. The AC scale was related to WTP for three cases: preventing deforestation by tax and trust and chemical clean-up by trust. The claim that this shows the Schwartz model predicting WTP is made without adequately explaining why AR fails to do so in some cases. While the tax scenarios are supposed to represent a non-contributory frame this apparently does not apply to the prevention of global warming where a tax is implicit.

In addition, why merely changing from a trust to a tax should achieve a change from contributory frame to non-contributory frame is unclear. The public good is, after all, still the same and the contribution model relates to the type of good not the method of payment. However, if an incentive compatible method of payment were required a compulsory form of tax might seem more appropriate. Income taxes are commonly recommended in the USA for contingent valuation due to concerns over bid vehicle bias, i.e. to avoid respondents reacting to the method of payment rather than valuing the good in question. In as far as payment of taxes is spread throughout the community it is regarded as a universal payment mechanism (e.g. all employed people are assessed for income tax), so this would be in line with the idea that payment depends upon contributions by others and the community as a whole will be paying. A trust allows people to opt out and free-ride. While a trust can be an appropriate bid vehicle depending upon the context, and environmental change, the point here is that why it should represent a contributory frame is unclear and requires explanation. There is no convincing argument put forward as to why altruism is excluded from contingent valuation by the use of taxes as a bid vehicle.

The aim of the paper was to analyse the difference between public goods and private or consumer goods but the approach confuses what is being paid for with the vehicle of payment. The authors hypothesis was that "Willingness to pay higher prices for environmental goods is viewed as altruistic behavior because the extra money people pay provides environmental benefits that are public goods." (p.412). The failure by the authors here is to argue that public goods are their concern and this is where altruism should be strongest, but then to show the bid vehicle influences the bid, and not that the type of good (public versus private) has a relationship to altruism. In fact there are no clearly private goods in this study, although such an hypothesis test would have require at least one. The two cases where consumer goods are used are misleading because the payment is not for gasoline or paper towels but to improve the environment by reducing global warming and increase recycling, respectively. Each of the WTP questions relates to an environmental public good or at least a quasi-public good, although, as noted, the environmental improvements are poorly defined.

Accepting that all the environmental goods in the survey are public goods, with various payment vehicles, means support for the original hypothesis would show as the positive influence of AC and AR scales on WTP across all six cases. As the authors state (p.412): "we expected that stated WTP would increase when moral norms were activated by two conditions: when individuals were aware of negative consequences for others (AC) and when they ascribed responsibility to themselves for preventing or ameliorating those consequences." The three item AC scale includes items the authors have elsewhere described as beliefs in consequences for the biosphere and other humans, i.e. altruism (Stern et al., 1995a; Stern et al., 1995b). However, this altruistic attitudinal scale fails to be a significant influence on WTP in three of the six cases. In addition, if altruism is driven more by the supposed contributory framing then why does AC show a positive significant influence on the supposed non-contributory case of taxes for forests? Similarly, why does AC fail to be significant for the gasoline and towel price rise scenarios while AR is significant?

In a contingent valuation study of this type the requirement is for the respondent to give their maximum WTP for a marginal change in a specified environmental attribute. The environmental changes here are poorly specified and lack a well defined institutional context, different types of uncertainty are introduced but go unrecognised, and the wording of the payment questions is weak and inconsistent. The impact of bid vehicles on WTP is well known and documented. The authors have shown some influence between attitudinal variables and a type of general payment in principle scenario, but their evidence is too weak and contradictory to claim much more. While this is itself of interest the result is mitigated by the poor specification of the environmental change which encourages altruists to bid positively. A well specified contingent valuation study is needed to substantiate the claims made in this research.

One of the dangers of the study is in the potential to take the results as implying more than they do and the authors have done this themselves. Thus, in Stern et al. (1995b, p.1631) in reference to this study they state that:

> "When contingent valuation items were framed as contributions to a fund to support environmental protection, willingness to pay was strongly influenced by beliefs about consequences of environmental degradation, but the effects disappeared when the questions were framed as willingness to pay taxes for the same environmental protections (Guagnano, Dietz, & Stern, 1994)."

In fact the AC variable remained highly significant for the tax to preserve forests in Latin America, but in any case the variation in the behavioural items would prevent any such general conclusions about the role of the bid vehicle.

In a paper relating to the NEP scale, Stern, Dietz and Guagnano (1995a) used a scale called General Awareness of Consequences (GAC). In a telephone survey they used 15 items which were then reduced to 10 in factor analysis. As shown in Table 4.3 five approaches to measuring behavioural intentions were employed and two of these were based upon a type of WTP approach (a tax to reduce gasoline consumption and an income tax to preserve tropical forests). However, as in Guagnano et al. (1994), in terms of a conventional approach to contingent valuation studies these WTP questions are very general and in fact relate to payment in principal rather than an expected actual payment. Even then there is no detail in terms of the type of environmental trade-off (i.e. what will be gained), or the specifics in terms of behaviour, situation or timing. From the general details given on the survey design the level of sophistication in terms of contingent valuation work is difficult to judge but apparently the WTP here is best regarded as a payment in principal for a general charitable contribution. The two specific questions asked also appear to be close to two of those in Guagnano et al. (1994). Data on WTP was converted to a smoothed log transform in the analysis. The reported OLS regression equations for the WTP intentions are rather poor in terms of ability of the model to predict variation; the R^2 for the gasoline tax is 0.080 (NEP model) 0.089 (GAC model) and for the forest 0.124 (NEP model) and 0.086 (GAC model). Only one of these models has statistically significant variables which are NEP and age in the WTP for forests. In terms of contingent valuation studies this would be regarded as very weak. In contrast the political action scale and letter writing, are predicted relatively well by the regressions. The political action

models have R^2 of 0.512 (NEP) and 0.565 (GAC). Three variables out of six are statistically significant in each case; namely, NEP or GAC, biospheric values, and gender.

Stern, Dietz, Kalof and Guagnano (1995b) relate the intention to take political action for the environment to beliefs about consequences for the biosphere, others and oneself. The analysis appears to be based upon the same sample data as the study above (i.e., Stern et al., 1995a) as is shown in Table 4.2, with the difference that the AC variable is broken down into more detail. A set of four factors are derived from 34 value items based upon work by Shalom Schwartz. These value factors are hypothesised to determine specific beliefs and attitudes. The results here are identical to those reported in Stern (1995a). The measure of behavioural intentions is the four item scale, political action, from that paper. The aim of this paper is to take the AC scale and break it down into the egoistic, social-altruistic and biospheric aspects taking items, and modifying them in some cases, from Stern et al. (1993). There is no reason given for the change to the phrasing of the items, although some are merely cases of rephrasing from positive to negative or *vice versa*. The overall aim is that each AC scale should "measure the belief that ongoing changes in the natural environment or environmental protection will have negative consequences for a set of objects that corresponds to a particular value orientation" (p.1621).

The results show beliefs about consequences for one-self and the biosphere are significant predictors of political action in regression models. Unfortunately no explanation is attempted for the failure of the scale measuring consequences for others. The Schwartz related items that are significant relate to biospheric-altruistic and egoistic value orientations. Thus, basic value orientations are found to have explanatory power for an individual's beliefs about environmental conditions and their stated willingness to take political action. Such values are seen to have direct effects and indirect effects (via beliefs) on behavioural intentions.

4.2.1.3 Conclusions on Work of Stern and Colleagues

When viewed as part of a broader piece of research the results of Guagnano et al. (1994) seem contradictory. The two item scale on personal consequences has elsewhere been included as a part of a three item measure of egoistic belief about consequences (Stern et al., 1993). In that study egoistic beliefs were found to be significant as a determinant of two very general WTP question. Payment by income tax or gasoline price rise was asked in order to "protect the environment". In that paper Stern, Dietz and Kalof (1993 p.336) state:

> "Questions about willingness to pay draw respondents' attention to the things on which they spend money, and these things are more likely to pertain to their well-being than to social-altruistic or biospheric value. If this argument is correct, a willingness-to-pay question has the effect of focusing attention on the egoistic value orientation."

In Guagnano, Dietz and Stern (1994) this egoistic scale is insignificant across all six WTP questions and the biospheric-altruistic AC item scale is significant for three WTP cases, including one tax. The reason for the failure of the egoistic measure may be due to the bluntly altruistic WTP questions and the only surprise is that a stronger

relationship across the WTP questions is absent. However, as noted earlier, the scale uses two items noted elsewhere as biospheric and only one social-altruistic, and as a result a biospheric weighting may be operative. There is some support for this because both cases where rain forests are to be preserved (fund and tax) have highly significant variables.

In the 1993 study the use of a student sample may cause the difference in results. However, the relationship between the students' egoistic attitude and WTP may be explained by their gaining a warm glow from the prospective payment (Andreoni, 1989). That is, the even greater generality of the WTP question in the 1993 study means mainly those who gain directly from the moral satisfaction of giving, regardless of the consequences after payment, are stimulated to claim a WTP. In contradiction of the egoistic motivation hypothesis, a biospheric AC scale is also significant in one of these WTP cases (payment by income tax) and so there does seem to be some consistency here with the 1995 study.

The research across these studies is itself of interest as an insight into charitable giving for the environment but the results are mitigated by the poor specification of the scenarios. This may encourage a biospheric oriented individual to bid positively if they can see some prospect of positive consequences for the environment (including belief in the institutional context). However, egoistic attitudes may also be relevant if the individual gains moral satisfaction from giving to a good cause regardless of what happens to the money afterwards. Either way the current research bears a poor relationship to contingent valuation studies, grounded in the welfare theory of neo-classical economics. Contingent valuation requires a well specified environmental change and institutional context. A state of the art contingent valuation study is needed to substantiated the claims made in this research and clarify the apparent contradictions.

4.2.2 Method of Analysis for the Wetlands Study

In order to measure environmental attitudes and on the basis of the literature reviewed the approach of Stern and colleagues was deemed most interesting and relevant to the wetlands project. Their work appeared flawed from an economic perspective but offered an interesting range of research questions. Stern et al had also attempted to explain WTP and some comparison of results would therefore be possible. The work on the wetlands would attempt to improve their approach by increasing the number of scale items, using a large national sample, in-house interviews and seeing how the scale operated outside of the USA. The contingent valuation work would also be state of the art.

4.2.2.1 Set of 18 Attitudinal Items

As described earlier, Stern and colleagues (1995a; Stern et al., 1993; 1995b) have used a range of scale items to measure beliefs about environmental systems and related problems in terms of the consequences for oneself (ACego variables), for the biosphere (ACbio variables), and for other humans (ACsoc variables). The set of questions used in the Stern et al. papers were limited to two or three on each AC scale. The combination of questions from the 1993 and 1995 papers allowed the number of items to be expanded to 5 for ACsoc and ACego but this still left only three potential items for ACbio. Thus, an expansion of the number of items was decided upon. This meant introducing some new questions which would match the approach already taken by Stern et al.

Design Approach

1. Environmental protection/change in the natural environment
2. Consequences
3. Object(s) corresponding to a particular value orientation

AC_{bio} Belief in Consequences for the Biosphere

The loss of a few thousand species of insects is hardly going to affect the way the Earth functions. {-ve}

1. Biodiversity loss, unspecified cause
2. Damage to functioning of Earth
3. Insects directly and indirectly general health of ecosystems/life on Earth.

Tropical rain forests are essential to maintaining a healthy planet Earth. {+ve}

1. Deforestation implicit, unspecified cause
2. Health of ecosystems degraded, loss of resilience
3. Tropical rain forests (their plants and species), and life on Earth

AC_{soc} Belief in Consequences for others

Claims that poorer countries suffer as a result of importing rich countries chemical waste are exaggerated. {-ve}

1. Chemical waste production
2. Dumping in environment
3. Population of poor countries

AC_{ego} Belief in consequences for self

Regulating the use of chemicals in agriculture will raise the cost of my shopping bill. {-ve}

1. Agro-chemical use
2. Cost of production
3. Oneself, individual

Each question was designed to take into account a clear cause and a consequence. This meant identifying an environmental problem and associating a target. For example, biodiversity loss is a problem the consequences are for the Earth's ecosystem functions, and a specific target, insects. This then was the general approach. In addition, wording was to be kept simple and a balance of positively and negatively phrased questions on each AC category maintained. As a result each of the three AC categories was expanded to 6 items giving 18 items about awareness of consequences, as shown in Table 4.4. In addition, the same process was used to develop a six item scale on political action as a behavioural intention; these items are shown in Table 4.5.

Table 4.4: Beliefs About Consequences

Variable	Source	Section C2 Question	Phrasing	Exact Wording Used
				AC_{bio} Belief in Consequences for the Biosphere
ACBio1	Stern95a Stern95b	4	-ve	While some local plants and animals may have been harmed by environmental degradation, over the whole earth there has been little effect.
ACBio2	Stern93[1]	8	+ve	Over the next several decades, thousands of species will become extinct.
ACBio3	Stern93[2]	20	-ve	Claims that current levels of pollution are changing earth's climate are exaggerated.
ACBio4	NEP & Stern93[6]	1	+ve	The balance of nature is delicate and easily upset.
ACBio5	New	24	-ve	The loss of a few thousand species of insects is hardly going to affect the way the Earth functions.
ACBio6	New	21	+ve	Tropical rain forests are essential to maintaining a healthy planet Earth.
				AC_{soc} Belief in Consequences for others
ACSoc1	Stern95a Stern95b	2	+ve	Environmental protection benefits everyone.
ACSoc2	Stern95a Stern95b	17	+ve	Environmental protection will help people have a better quality of life.
ACSoc3	Stern93	6	-ve	We don't need to worry much about the environment because future generations will be better able to deal with these problems than we are.
ACSoc4	Stern93[3]	14	+ve	The effects of pollution on public health are worse than we realise.
ACSoc5	Stern93[4]	9	+ve	Pollution generated here harms people all over the earth.
ACSoc6	New	12	-ve	Claims that poorer countries suffer as a result of importing rich countries chemical waste are exaggerated.
				AC_{ego} Belief in consequences for self
ACEgo1	Stern95a Stern95b	18	+ve	Environmental protection will provide a better world for me and my children.
ACEgo2	Stern95a Stern95b	5	+ve	Environmental protection is beneficial to my health.
ACEgo3	Stern93 Guagnano94	15	-ve	Protecting the environment will threaten jobs for people like me.
ACEgo4	Stern93[7]	3	-ve	Laws to protect the environment limit my choices and personal freedom.
ACEgo5	Stern93[5]	11	+ve	A clean environment provides me with better opportunities for recreation.
ACEgo6	New	22	-ve	Restricting the use of chemicals in agriculture will raise the cost of my shopping bill.

Notes to Table 4.4

1. Variation used in Stern95a and Stern95b: “Over the next decade, thousands of species of plants and animals will become extinct.”; also variation used in Guagnano94 “Over the next several decades, thousands of species on earth will be driven to extinction.”
2. Variation used in Stern95a and Stern95b: “Claims that we are changing the climate are greatly exaggerated.”; also variation used in Guagnano94 “Current claims that environmental problems are changing the earth’s climate are exaggerated.”
3. Variation used in Stern95a: “Environmental threats to public health have been exaggerated.”; also variation used in Guagnano94 “The effects of environmental problems on public health are worse than we realise.”
4. Variation used in Stern95a: “Environmental damage generated here harms people all over the world.”
5. Variation used in Stern95a: “Environmental protection provides me with better opportunities for recreation.”
6. Variation used in Stern95b: “The balance of nature is strong enough to cope with the impacts of modern industrial nations.”
7. Variation used in Guagnano94: “Laws aimed at protecting the environment usually end up limiting my personal freedom.”

Stern95a refers to Stern, Dietz and Guagnano (1995)
Stern95b refers to Stern, Dietz, Kalof and Guagnano (1995)
Stern93 refers to Stern, Dietz and Kalof (1993)
Guagnano94 refers to Guagnano, Dietz and Stern (1994)

Note: Guagnano94 also includes two personal responsibility questions which might have been attributed to ACSoc and ACBio respectively: “It is my personal responsibility to protect the environment for other people even if they seem to be unconcerned.” And “It is my responsibility to ensure the well-being of other species on earth.” Neither of these items loaded well with the other AC items in Guagnano94.

Table 4.5: Behavioural Scale on Political Action

Variable	Source	Section C2 Question	Phrasing	Exact Wording Used
				Political Action
PA1	Stern93	16	+ve	I would participate in a demonstration against companies that are harming the environment.
PA2	Stern93	7	+ve	I would contribute money to environmental organisations.
PA3	Stern93	13	+ve	I would sign a petition in support of tougher environmental laws.
PA4	Stern93	10	-ve	I would take a job with a company I knew was harming the environment.
PA5	New	19	-ve	I would never do voluntary work for nature conservation.
PA6	New	23	-ve	Environmental activists are a public nuisance whom I would never support.

4.2.2.2 Approach to Analysis of the Attitudinal Data

A series of questions can be asked to identify the extent to which an individual believes in each of the consequences related to environmental issues. This gives a set of items or component variables relating to each AC variable. However, including a comprehensive range of attitudinal scale component variables in a regression, in order to "explain" intended behaviour such as WTP, is impossible because many of these component variables will be closely correlated with each other. Thus, if these component variables can be formed into meaningful independent factors, such as the Stern et al. AC variables, these can be used as aggregate scales while maintaining the information from the component variables. Grouping a large number of possible explanatory component variables into a small number of distinct factors can then be employed to explain determinants of behaviour such as willingness to pay (WTP) for environmental improvements.

Factor analysis can be used to separated components into distinct value clusters. These cluster should be consistent with the AC variable which the components are addressing. For example, a question asking about "belief in the consequences of global warming for the biosphere" should group with a question asking about the "belief in consequences of biodiversity loss for the biosphere". In this way the AC variables proposed by Stern et al. should be confirmed by a factor analysis on the component variables. Factor analysis makes this possible by grouping together items that are more highly correlated with each other than with items in other groups or factors.

In this study, both principal component analysis (PCA) and common factor analysis (CFA) were used to group component attitudinal scale items. PCA does this by identifying linear combinations of component items as a group. The first component group to be derived by this process explains the largest amount of variance across all the scale component variables, the second component group the next largest and so on. Each of these component groups is independent (uncorrelated with any) of the others and, in theory, there can be as many independent component groups as there are variables. In practice, a small number of component groups can usually explain a large proportion of the variance in the data. Typically groups will continue to be extracted as long as the eigenvalue is greater than one and this practice is followed here.[4]

Thus, each principal component (the component group) is made up of a different mix of AC scale items. This is analogous to a series of different recipes made up from a given number of ingredients. The "factor loading" determines how much of each ingredient (component variable or item) goes into a recipe (principal component or component group). The basic factor loadings are usually rotated to try and "push" those variables which are only moderately associated with each principal component below a minimum level of association. Prior to rotation, a component (recipe) might be made up mainly from 8 variables (ingredients) with small amounts of 4 others. After rotation, this component might consist of large proportions of 5 variables and small amounts of the remainder.

[4] The eigenvalue (or characteristic root) is a measure of the variance of the component group.

The PCA is therefore a statistical method to try and get the AC scale items to fall into the desired categories, i.e. ACego, ACsoc, and ACbio. The main difference between "rotation" techniques is whether the principal components are allowed to correlate with each other.

Common factor analysis (CFA) is an alternative means of producing variable groupings. Each variable is related to a set of factors that are common to a number of variables and a factor unique to this variable. The factor loadings tell us how much of each factor is associated with each variable. The aim is to explain the variation in the data with a few factors and, as described above, factor loadings are rotated to make this more likely. Certain types of rotation allow the factors (or principal components) to be correlated with each other rather than each being strictly independent (orthogonal).

4.2.2.3 Factor Analysis for the Wetlands Study

Table 4.6a is based on the AC items used by Stern et al. (1995a; 1993; 1995b), and excludes the new items developed in the current research. The columns of the "rotated component matrix" show the relationship between each AC scale item and the principal components. Three principal components were identified because adding more combinations of the scale item does little to explain more of the variation in the data.

Table 4.6a: Principal Components Analysis Using Original Stern et al. Items: Showing All Items

	Factor1	Factor2	Factor3
ACBIO1	-.06738	**.61094**	-.37212
ACBIO2	.09855	-.11501	**.76418**
ACBIO3	-.32112	**.51138**	.16856
ACBIO4	**.49299**	-.11689	**.41915**
ACSOC1	**.59214**	-.02881	.30789
ACSOC2	**.80249**	-.10734	.12880
ACSOC3	-.23843	**.64018**	-.19591
ACSOC4	**.47932**	-.08186	**.47026**
ACSOC5	.32201	-.03966	**.74326**
ACEGO1	**.80037**	-.17976	.13428
ACEGO2	**.69540**	-.04503	.17154
ACEGO3	-.04363	**.66717**	-.01385
ACEGO4	.04141	**.70233**	-.03877
ACEGO5	**.68279**	-.11889	.06598

Factor	Eigen value	% of Variance	Cumulative %
1	4.54106	32.4	32.4
2	1.66866	11.9	44.4
3	1.11196	7.9	52.3

Notes: Listwise deletion of missing data. Rotated Component Matrix. Extraction method: principal component analysis. Rotation method: varimax with Kaiser Normalisation; rotation converged in four iterations. Factors loading is greater than 0.4 in bold.

The sign of each item reflects the association within a factor and are expected to the vary with the phrasing of each item, i.e. items were phrased both negatively and positively e.g., a score of 4 on one item would become a score of 1 if the phrasing were changed. The signs are largely as expected except for ACego4 under factor 1 although this is of very low significance.

The coefficients in the same row as each AC item variable indicate the statistical association (correlation) between each item variable and each principal component or factor. These are the "rotated factor loadings". The basic factor loadings are rotated to try and "push" those variables which are only moderately associated with each factor to a lower significance level. Such rotation encourages scale items to fall into categories. The most important relationships are shown on their own in Table 4.6b, i.e. those factor loadings greater than 0.40 (the criteria used by Stern. et. al). This helps in presenting clearly those variables which are most closely associated with each factor, while Table 4.6a shows the other lower factor loadings for item variables that are treated as too small to indicate a significant relationship.

Table 4.6b: Principal Components Analysis Using Original Stern et al. Items: Showing Most Significant Items

	Factor1	Factor2	Factor3
ACSOC2	.80249		
ACEGO1	.80037		
ACEGO2	.69540		
ACEGO5	.68279		
ACSOC1	.59214		
ACBIO4	.49299		.41915
ACSOC4	.47932		.47026
ACEGO4		.70233	
ACEGO3		.66717	
ACSOC3		.64018	
ACBIO1		.61094	
ACBIO3		.51138	
ACBIO2			.76418
ACSOC5			.74326

These results show that the AC scale items fail to group neatly into biospheric, social-altruistic and egoistic factors. One obvious connection between item variables within the first two factor is that questions with positive phrasing are grouped under factor 1 (ACsoc1,2,4 ACego1,2,5) and those with negative phrasing under factor 2 (ACego3,4, ACsoc3, ACbio1,3). The relationship between biospheric items seems poor as they fail to group with each other and generally have weaker factor loadings.

Table 4.7a shows the results after repeating the principal component analysis for the full set of AC scale item variables. The division between originally positively and negatively phrased questions is no longer absolute, although it remains. ACego6 appears to be somehow different from all the other variables and forms the main element of a fourth

factor. Factor 1 is now strengthened by the two new biospheric items, one of which also loads on factor 2. The new social-altruistic item loads on factor 2. However, the new items, while significant, tend to be at the lower end of the loading range.

Table 4.7a: Principal Components Showing All Attitudinal Items

	Factor1	Factor2	Factor3	Factor4
ACBIO1	-.06385	**.59451**	-.33830	-.05484
ACBIO2	.12745	-.10414	**.76036**	.00821
ACBIO3	-.24025	**.52952**	.14562	-.21384
ACBIO4	**.49550**	-.13860	.39809	-.02992
ACBIO5	**-.43984**	**.42163**	-.25404	.03097
ACBIO6	**.54253**	-.34620	.25470	.25832
ACSOC1	**.61053**	-.01304	.26042	-.18888
ACSOC2	**.80041**	-.12020	.10921	-.00559
ACSOC3	-.23480	**.62967**	-.17053	-.02014
ACSOC4	**.50676**	-.11617	**.44393**	.07602
ACSOC5	.30693	-.04004	**.75998**	-.04519
ACSOC6	-.31432	**.45608**	-.12380	.18357
ACEGO1	**.79723**	-.19539	.12279	.03356
ACEGO2	**.69967**	-.04079	.11109	-.04291
ACEGO3	-.04148	**.65007**	.03342	.13987
ACEGO4	.05218	**.67037**	-.03188	.08388
ACEGO5	**.65918**	-.11813	.05809	.03230
ACEGO6	-.04930	.13522	.00161	**.92066**

Factor	Eigen value	% of Variance	Cumulative %
1	5.52659	30.7	30.7
2	1.75472	9.7	40.5
3	1.10646	6.1	46.6
4	1.05489	5.9	52.5

Notes: Listwise deletion of missing data. Bold used where the loading is greater than 0.4. Rotated component matrix, extraction method: principal component analysis. Rotation method: varimax with Kaiser Normalisation; rotation converged in six iterations. Factors selected if eigen value>1.

Table 4.7b: Principal Components Showing Significant Attitudinal Items

	Factor1	Factor2	Factor3	Factor4
ACSOC2	.80041			
ACEGO1	.79723			
ACEGO2	.69967			
ACEGO5	.65918			
ACSOC1	.61053			
ACBIO6	.54253			
ACSOC4	.50676		.44393	
ACBIO4	.49550			
ACBIO5	-.43984	.42163		
ACEGO4		.67037		
ACEGO3		.65007		
ACSOC3		.62967		
ACBIO1		.59451		
ACBIO3		.52952		
ACSOC6		.45608		
ACBIO2			.76036	
ACSOC5			.75998	
ACEGO6				.92066

The outcome, as shown in Table 4.8, does show some striking resemblance to the result reported for a General Awareness of Consequences (GAC) scale by Stern et al. (1995a). Factor one has nine items from 18 while Stern found 10 items from 15 for their GAC scale. Of the nine items here six are held in common with the GAC scale in the Stern study, and the four strongest items here are also amongst the strongest items in the Stern study. Amongst the remaining three items is one which can be traced back to the NEP scale ("The balance of nature is delicate and easily upset"). The NEP scale has been found to be psychometrically indistinguishable from the GAC scale (Stern et al., 1995a p.736), so this result is as expected. The remaining two items which appear here in the GAC but not in Stern et al. are the new items on biopsheric attitudes. The four items in the Stern et al. GAC which fail to group with factor one here are one ACsoc and three ACbio, and these group evenly between factors two and three. The overall reliability of the scale here is 0.85 using Cronbach's alpha and for Stern et al. was 0.85 using Armor's theta. However, the scale factor here only accounts for 31% of the variance as opposed to 73% reported in Stern et al. The factor loadings here are generally higher than in Stern et al. as can be seen in Table 4.8. Overall, factor one is a strong repetition of the results for the GAC scale. This shows the GAC scale can transfer outside of one region of the USA and is operative for a national sample of the general public.

Table 4.8 General Awareness of Consequences

Variable	Item **Factor 1: GAC General Belief in Consequences (alpha 0.85)**	GAC Loading Spash study	 Stern study
ACSoc2	Environmental protection will help people have a better quality of life.	0.80	0.78
ACEgo1	Environmental protection will provide a better world for me and my children.	0.80	0.69
ACEgo2	Environmental protection is beneficial to my health.	0.70	0.79
ACEgo5	A clean environment provides me with better opportunities for recreation.	0.66	0.60
ACSoc1	Environmental protection benefits everyone.	0.61	0.53
ACBio6	Tropical rain forests are essential to maintaining a healthy planet Earth.	0.54	
ACSoc4	The effects of pollution on public health are worse than we realise.	0.51	-0.45*
ACBio4	The balance of nature is delicate and easily upset.	0.50	
ACBio5	The loss of a few thousand species of insects is hardly going to affect the way the Earth functions.	-0.44	

Note: negative phrasing used in Stern et al. (1995) for this item.

In terms of trying to identify more detailed scales the results are disappointing. There are several possible reasons why the identification of separate scales for ACbio, ACsoc and ACego failed. For the ACego items two separate factors seem to be operative, the wording of some items may relate more to a persons specific context rather than their environmental attitude, and social-altruism is held in common with eogistic and biospheric values. Each of these problems is discussed in turn.

There is a relatively low statistical correlation between each item variable within each component group. For example, ACego2 is poorly correlated with ACego4. Thus “strongly agreeing” with one ACego item fails to increase the likelihood of a respondent "strongly agreeing" with another ACego item. Instead, an individual may “disagree” with one egoistic scale item and “strongly agree” with another. In fact, there is a strong split between ACego items as shown in Table 4.9. As a test principal components analysis was run on each of the three AC scales individually and, while ACsoc and ACbio resulted in one factor each, ACego gave two factors with the main items being 1,2 and 5 for one factor and 3 and 4 for the other.

Table 4.9 Factor Analysis on Individual Scales

Scale Item	Factor 1	Factor 2
Egocentric		
ACEGO1	.82701	-.11005
ACEGO2	.78909	.00569
ACEGO3	-.13570	.74018
ACEGO4	.00391	.74795
ACEGO5	.76485	-.04846
ACEGO6	-.00957	.48934
Social-Altruistic		
ACSOC1	.66429	
ACSOC2	.74530	
ACSOC3	-.52329	
ACSOC4	.71060	
ACSOC5	.67915	
ACSOC6	-.54624	
Biocentric		
ACBIO1	-.60473	
ACBIO2	.54564	
ACBIO3	-.49865	
ACBIO4	.66796	
ACBIO5	-.70833	
ACBIO6	.72218	

The wording of items does allow room for various interpretations so that the association with environmentalism is unclear. For example, laws to protect the environment may be recognised as limiting choice but this has little to do with whether the consequence is as a result acceptable or not, i.e. an environmentalist being more ready to accept the restrictions. Both pro and anti environmentalists can agree or disagree with the statement. Similarly, whether protecting the environment threatens your job can have little to do with environmental attitudes. A person may be unaware of any environmental impact related to their job or they may believe their own particular job is secure regardless of regulation. The implicit part of this item is that an individual may be working in a sector which is environmentally damaging and therefore susceptible to regulation. However, both pro and anti-environmentalists may be working in the service sector and therefore both answer that they disagree. Thus, the relationship between these items and environmental attitudes appears obscure. While these two items load on each other their interpretation as a factor is difficult.

These two egoistic items also seem to have no obvious connection with the other items in factor 2 besides the general awareness of consequences. The factors and items are shown in detail in Table 4.9. Thus, an intuitive interpretation of the factor which differentiates it from GAC is difficult to find, although the two factors do separate. However, one possible interpretation is that factor 2 is measuring attitudes towards environmentalist and their claims rather than a belief about actual consequences. The GAC seems to focus

more on what can be positively achieved by environmental protection while factor 2 concerns more of a social and institutional context (laws, jobs, technological optimism) and typical claims from non-governmental institutions (global warming, chemical waste, biodiversity).

Table 4.9 Secondary and Tertiary Attitudinal Factors

Variable	Item	Loading
	Factor 2:Belief in Institution and Environmentalists Claims (alpha 0.72)	
ACEgo4	Laws to protect the environment limit my choices and personal freedom.	0.67
ACEgo3	Protecting the environment will threaten jobs for people like me.	0.65
ACSoc3	We don't need to worry much about the environment because future generations will be better able to deal with these problems than we are.	0.63
ACBio1	While some local plants and animals may have been harmed by environmental degradation, over the whole earth there has been little effect.	0.59
ACBio3	Claims that current levels of pollution are changing earth's climate are exaggerated.	0.53
ACSoc6	Claims that poorer countries suffer as a result of importing rich countries chemical waste are exaggerated.	0.46
ACBio5	The loss of a few thousand species of insects is hardly going to affect the way the Earth functions.	0.42
	Factor 3: AC_{biosoc} Belief in consequences for others & biosphere (alpha 0.67)	
ACBio2	Over the next several decades, thousands of species will become extinct.	0.76
ACSoc5	Pollution generated here harms people all over the earth.	0.76
ACSoc4	The effects of pollution on public health are worse than we realise.	0.44

There is a relatively strong correlation between biospheric, altruistic and egoistic variables. Individuals who say they agree strongly with statements of social-altruistic consequences are also likely to agree strongly with statements of egoistic consequences. Thus, the GAC comes through as the strongest factor. The link between egoistic and social-altruistic beliefs and of biospheric and social-altruistic beliefs may create a linking relationship in terms of the factor. This link can be seen if items are grouped into scales and their reliability tested. Starting with all six items and reducing the number to improve the alpha score gives the results in Table 4.10 for each of ACego, ACsoc, and ACbio. The reliability of the individual scales is less than when items on social-altruism are added. However, a factor analysis with just the ACego and ACbio items shows the same groupings of significant variables as under the full analysis, which implies a direct link.

Table 4.10 Alpha Reliability for Various Attitudinal Scales

	Items	Alpha
GAC (Spash)	ACego1, ACego2, ACego5, ACsoc1, ACsoc2 ACsoc4, ACbio4, ACbio5, ACbio6	0.8490
ACego	ACego1, ACego2, ACego5	0.6964
ACego-soc	ACego1, ACego2, ACego5, ACsoc1, ACsoc2, ACsoc4, ACsoc5	0.8285
ACsoc	ACsoc1, ACsoc2 ACsoc4, ACsoc5	0.7218
ACsoc-bio	ACsoc1, ACsoc2 ACsoc4, ACsoc5, ACbio4, ACbio5, ACbio6	0.8021*
ACbio	ACbio1, ACbio2, ACbio3, ACbio4, ACbio5, ACbio6	0.6803

*Note: all 12 items would give 0.8231

The results could, conceivably, reflect some of the survey sample behaving very differently from the majority. In order to investigate this possibility we have tried to identify outliers in the factor scores for each component. There are 64 cases with a standard deviation of more than ±2, but there is nothing obvious in common between these cases. More generally, restricting the sample to young people or women makes the results less intuitive; four or five factors are then derived rather than three.

4.3 The Political Action Behavioural Scale

The six items on political action were also included in a factor analysis with the attitudinal items to see if they separated out. They did form a separate factor with all items significant at 0.4 or higher. Only one attitudinal item loaded above 0.4 and that was ACsoc4 loading at 0.44. The political action items failed to load above 0.4 on any other factor. This shows that the behavioural scale is psychometrically different from the attitudinal scales. A factor analysis on the six items also gives one factor as reported in Table 4.11. The scale has a Cronbach's alpha of 0.7059. The correlation matrix for the scale is shown in Table 4.12.

Table 4.11 Factor Analysis for Political Action Scale

Item	Factor Loading
PA1	.66843
PA2	.70636
PA3	.73572
PA4	-.51212
PA5	-.66406
PA6	-.52864

Table 4.12 Political Action Correlation Matrix

	PA1	PA2	PA3	PA4POS	PA5POS
PA1	1.0000				
PA2	.3388	1.0000			
PA3	.4002	.4287	1.0000		
PA4POS	.1896	.2493	.3019	1.0000	
PA5POS	.2981	.3756	.3497	.2247	1.0000
PA6POS	.2905	.2255	.2349	.1484	.2631

4.4 Environmental Ethics

As described in Chapter 1 and the introduction to this chapter, besides environmental attitudes there is a role for fundamental ethical positions to influence intended behaviour through reasoning about an action. In this research the idea was to undertake an initial analysis of how a fundamental ethical position might influence the intention to behave in a certain way. The interaction of ethical positions with attitudes is another area of importance but of secondary concern here. In this section the aim is to find an approach to measuring an ethical stance so that it might be represented in analysis of WTP. This require identify a relevant set of ethical positions and then developing a measurement approach which relates to the specific environmental change under consideration, i.e. wetland re-creation.

4.4.1 Characterising A Key Issue: Refusals to Trade and Rights

The dominant economic theory of decision-making requires a fundamental philosophical assumption; namely that individuals believe the net utility from the consequences of an action determines whether that action is right or wrong. Cost-benefit analysis and it's tools, such as CVM, assume that individuals are able and willing to consider trade-offs in relation to the quantity and/or quality of public goods. Debates in environmental ethics have raised the issue of individuals refusing to make these judgements and so raised serious problems for the application of economic efficiency arguments (Sagoff, 1988; Spash, 1993a). One aspect of refusal can be a basis of belief in inviolable rights so that actions are intrinsically of value or deontological (Spash, 1993b; Spash, 1997).

Neo-classical economists reject the notion of deontology because there is an assumed rationality attributed to the ability to make trade-offs, whatever the commodity, as long as enough compensation is offered in return. This can be summarised by the old colloquialism that everybody has their price. However, some individuals may treat certain aspects of the environment differently from the manner suggested by this theoretical framework. If an individual believes that aspects of the environment, such as wildlife, have an absolute right to be protected, then that individual will refuse all money trade-offs which degrade what is regarded as an environmental commodity in the neo-classical framework.

Monetary valuation of the environment requires the definition of commodities in a way fundamentally identical to marketed goods and services. That is, when an

environmental improvement occurs an individual must give-up some consumption of other commodities to maintain a constant utility level. This gives an individual's willingness to pay amount, which can then be summed across all affected individuals to obtain an aggregate willingness to pay figure. Similarly, the minimum quantity of other commodities demanded to accept a reduction in environmental quality is the willingness to accept compensation. In this case, expenditure on other goods must be increased to compensate for the reduction in environmental quality, so maintaining the individuals initial level of welfare. Whether the other commodities are regarded in terms of a single numeraire (money) or remain as a diverse set of goods and services is inconsequential.

The essential message of the normal indifference curve is that individuals are able and willing to swap one bundle for another and can do so for a set of bundles without affecting their welfare level. A problem arises if, for example, an individual believes that aspects of the environment have to be protected without regard to the cost in terms of other commodities. That individual will refuse all money/commodity trade-offs which decrease what is regarded as an environmental commodity in the neo-classical framework. In theory, willingness to pay to prevent the loss would be all the available commodities the individual could command (i.e., their income) and willingness to accept compensation would be infinite. The respondent believes that aspect of the environment in question should remain at or above its current level in terms of either quantity or quality. This type of position may, be need not, be associated with a fundamental belief in certain rights e.g., human rights, animal rights.

Such preferences mean that utility functions including environmental aspects which are to be protected at all costs are undefined for an individual (since the axiom of continuity is violated), and that indifference curves collapse to single points (denying the principle of gross substitution). These preferences are termed lexicographic by neo-classical economics because they give absolute priority to one commodity over all others and therefore imply a strict ordering, as in a lexicon. The position described is, however, best regarded as extreme because its implications for the individual are total sacrifice for the environmental aspect to be protected (e.g., wetlands, an endangered bird species, biodiversity). Economists have tended to regard the denial of continuity and violation of gross substitution as of little relevance because lexicographic preferences are unrealistic and unlikely to occur (Malinvaud, 1972 p.20).

The extreme lexicographic position does indeed seem likely to be uncommon because of this overriding ranking of a good above even the individuals own life. Freeman (1986) gives the example of freedom expressed on car license plates in the State of New Hampshire by the slogan 'Live Free or Die'. He questions that all individuals would be prepared to deny themselves any quantity of material goods in exchange for a loss of freedom let alone die to prevent the loss. While this raises a question over the corruption of the individual by bribery (i.e., payment to achieve devaluation of principals) the extreme lexicographic position in the case of the environment is

brought into question. Thus, a modified form of the proposition can be offered as more likely.

The modified lexicographic position might be drawn-up in terms of first attaining a minimum standard of living prior to being prepared to defend the environment. Following Pigou (1952, p.759) this minimum might include, but not be restricted to: a defined quantity and quality of housing, medical care, education, food, leisure, sanitation and safety at work. Sen (1987), appealing back to notions of Adam Smith, goes further and defines functionings (the various living conditions we can achieve) and capabilities (our ability to achieve them) as essential parts of living standard rather than commodities. Such a living standard might be relatively materialistic in cultures where being a functional member of society is defined in such terms e.g., requiring ownership of a car and a television. As Sen (1987 p.17) states: "The same capability of being able to appear in public without shame has variable demands on commodities and wealth, depending on the nature of the society in which one lives." In this formulation the concept of lexicographic preferences becomes more readily acceptable but the definition for empirical purposes becomes far more difficult because the minimum living standard is expected to differ amongst social groupings.

Lexicographic preferences, as stated above, are generally regarded by economists as anomalies or obscure theoretical cases. Yet the prevalence of the deontological position seems likely to be high amongst those who claim absolute rights to life for humans and other animals, future generations, trees or ecosystems Evidence for the support of a deontological position can be seen in the membership of and support for animal rights groups, and the five million signatures gathered by members of the Cousteau Society to petition the United Nations to recognise the rights of future generations. In addition, Craig and Glasser (1993) interviewed environmental policy makers and found supporting, conversational evidence for a belief in intrinsic values. In contingent valuation evidence exists in developed countries to suggest individual's express lexicographic preferences for wildlife (Stevens, Echeverria, Glass, Hager, & More, 1991) and animals, plants and ecosystems (Spash & Hanley, 1995).

4.4.2 Empirical Approaches

Belief in refusals to trade seemed an appropriate approach to the existence of an environmental ethic. Lexicographic preferences are signified by a discontinuity in the preference function giving a single point, or bundle of goods, as the indifference set in goods space. The aim of the survey reported here was to identify the occurrence of such preferences and then see how far these might be indicative of a refusal to make trade-offs. This was achieved by direct questions on ethical beliefs which signify behaviour incompatible with a continuos preference function, and a follow-up question to push for the extent to which this position was seen as defensible. The approach to dealing with lexicographic preferences taken here was based upon previous work (for an overview see Spash, 1998) and the general approach is reviewed next in light of the few other studies previously conducted.

Stevens et al. (1991) collected data on individual preferences and found that around 25% of their sample revealed lexicographic preferences for wildlife preservation in the USA. The species studied were bald eagle, wild turkey, coyote and salmon. They state that 70% of their sample gave responses inconsistent with either neo-classical or lexicographic preferences because of statements denying monetary valuation was the correct determinant while making willingness to pay bids. However, 80% of the

remainder had lexicographic preferences as determined by disagreeing with the statement:

> 1. Wildlife preservation and money are both important to me; but decisions have to be made and more money could make up for the loss I would feel if there were less wildlife.

and simultaneously agreeing with one of the following two statements:

> Either,
>
> 2. As long as I have enough money to live on, wildlife preservation is more important to me than having more money.
>
> Or,
>
> 3. No matter how much money I have, having more money will always be more important to me than wildlife preservation.

Thus, the refusal to trade is clear for those refusing 1 and agreeing with 2, and appears consistent with the modified lexicographic position. However, those rejecting 1 and agreeing with 3 reject monetary compensation for wildlife but rank money above wildlife, which is inconsistent rather than lexicographic. In addition, the trade-off between money and wildlife is poor because money can be regarded as inclusive of utilitarian aspects of wildlife. The exact number of lexicographic individuals is therefore uncertain from the data reported in the paper.

Later Stevens et al. (1993) gave three possible interpretations of their results. First was an interpretation basically outlining the same argument as Sagoff (1988), but credited as the Bergson-Tinter-Samuelson framework. That is, that there are citizen values and consumer values, and that contingent valuation is inappropriately addressing the former rather than the latter. Second is a natural rights viewpoint equated with Kantian ethics and animal existence rights. Third is ambivalence theory where protest bids are found to occur when the values at stake are felt to be hard to compare. Ambivalence theory predicts that choices can be made when extremes are offered such as a large gain in wildlife for a small payment or a large loss of wildlife for a small gain, but individuals are unable to decide over intermediate trade-offs. While Stevens et al. show some evidence of ambivalence for bids between $50 and $75, they leave the cause unexplained.

Spash and Hanley (1995) also attempted to identify lexicographic preferences and found 23.2% of the sample in this category. In this study a rights based motivation was explicitly explored. Respondents were asked their willingness to pay into a trust fund set up to protect an area of ancient woodland in Scotland. Such ancient woodland is a rapidly-disappearing regional ecosystem, which is the principle habitat of rare birds (e.g., the Caipercaillie and Crested Tit) and rare mammals (e.g., the Scottish Wildcat and Pine Marten). Zero bids were analysed in light of the response to a list of possible motives. These motives were then related to the beliefs of respondents concerning their ethical view on rights, i.e. whether animals, plants or ecosystems have the right to be protected regardless of the cost to society. Sub-samples were defined according to whether respondents were asked about animal, plant or ecosystem rights. Each respondent appears in one sub-sample only. The results were as follows.

In the animal rights sub-sample only one person stated a zero bid because they placed no value on preserving the biodiversity of the forest. All respondents said that

animals had the right to be protected. Of these 49 said that this should be done irrespective of the costs which included 35 who were willing to pay a positive amount (14 zero bids). The correlation coefficient between a belief in absolute rights and WTP was -0.104.

In the ecosystem rights sample there were again no zero bids given for reasons of zero value. All but one respondent thought ecosystems had the right to be protected, with 50 of these persons believing that this protection should be extended regardless of the cost. Of these strong rights respondents, 34 were willing to pay some positive amount for biodiversity protection, whilst 16 refused to state a WTP figure. The correlation between WTP and absolute rights was +0.022.

In the biotic rights sample there were 42 positive bids and no zero bids on grounds of no value. All respondents said that plants/trees had the right to be protected. Of the 49 claiming protection should be given irrespective of the costs 33 gave a positive willingness to pay bid (16 zero bids). The correlation coefficient between a belief in absolute rights and WTP was +0.181.

Two main groups of individuals refusing to trade-off income against biodiversity protection are revealed by this study:

Group 1. Respondents who stated that animals/ecosystems/plants should be protected irrespective of the costs and who refused to give a WTP amount. (46 respondents or 23.2% of the sample.)

Group 2. As with 1, but where individuals have a positive WTP. (148 respondents or 74.7% of the sample)

Interestingly, 67% of those in group 1 believe that, “Biodiversity should be protected by law, and we shouldn’t have to pay money to protect it”. Those who said that rights should be upheld regardless of the cost (a belief in absolute rights), were often found to be willing to pay a positive amount, i.e., in spite of their implied infinite valuation. These respondents believe decreases in biodiversity should be prevented but are willing to pay relatively small amounts, in terms of their disposable income, to offset a threatened reduction. Several explanations might be offered and include: inconsistent preferences, absence of an alternative institutional arrangement to allow the individuals to vote for a scheme which prevents any deterioration in biodiversity, or a modified lexicographic position. In the extreme lexicographic case theory predicts the WTP to prevent a loss should be their entire spare income and they would still be worse-off even if the changed was prevented. Alternatively, under the modified lexicographic theory these individuals may be at their minimum living standard and therefore would be unable to pay. In this case they would be treated as zero bidders on the basis of a stated reason such as “no spare income”, regardless of their actual monetary income level. The protest zero bids therefore represent a logical option for those trying to protect rights.

4.4.3 The Wetlands Survey

In the current study, the survey instrument was design to accommodate the presence of lexicographic preferences and to probe those claiming such a position more fully. This approach allows for the adjustment of a CVM survey instrument to detect the

presence and extent of such preferences in the surveyed population, and also allows for the inclusion of variables reflecting those preferences for use in bid curve analysis. The method used in the survey takes a rights based ethical position as signifying an ethical stance compatible with the lexicographic preference hypothesis. In Section C of the survey respondents were asked to state the extent to which they saw rights as relevant to the current case study i.e. wetland re-creation with benefits for endangered bird species. Those making a specific attribution of rights were then probed further because a general discontent with trade-offs may disappear upon the specification of extreme consequences. Thus, respondents were asked to reflect upon the extent to which their refusal to trade was absolute by considering a potential conflict with their own standard of living. This allowed some refinement in the definition of various positions being adopted by the respondents and their stated acceptance of a position compatible with lexicographic preferences.

More specifically, respondent were initially told that: “A major aim of re-creating wetland is to provide sanctuary for endangered species of birds such as Bewick's swan, the pintail and gadwall.” They were then asked which one of four statements most closely matched their opinion about the wetlands re-creation scheme. These four statements represented key ethical positions and are shown in Table 4.10. Respondents also had a fifth choice “Can’t answer - this is too complicated” which 6% of the sample chose. As can be seen in Table 4.10, a large proportion of respondents attribute rights to birds, approximately 37%, while only 9% tend to put human’s first regardless of the circumstances. The majority of people weigh up the consequences of the case to decide whether protection is valid.

Table 4.10 Ethics and Bird Life

	Frequency Results		Position Statement
	N	%	
Rights for endangered species	266	37.3	"Such endangered species need protection because they have a right to life which cannot be traded against economic considerations."
Consequentialist favouring non-humans	149	20.9	"Protection of such endangered species must be weighed against economic considerations, but in this case, the endangered species should come first."
Consequentialist favouring human	187	26.2	"Protection of such endangered species must be weighed against economic considerations, and in this case, people's livelihoods come first."
Human's first	65	9.1	"Too much concern is shown for birds and not enough for humans, so I would rather see the resources used to help humans."
Don't Know	42	5.9	"Can't answer - this is too complicated."
Refuse	4	0.6	
Total	713	100.0	

The large proportion of the sample adopting a rights based position may seem extreme and the individuals concerned might fail to act in accordance with their stated belief. One concern here is that people may give an accepted social response. Although data was collected on whether others were listening during the interview and this occurred in only 19% of the interviews. In addition, the proportions in each ethical category are approximately the same regardless of whether other were present or not.

In order to try and probe the possibility that people might back down on their rights position a follow-up question was asked of those attributing rights to life to bird species. This involved confronting the respondent with the scenario where protecting endangered birds would mean they had to incur a personal cost which reduced their standard of living to what they regard as a minimum. Under such circumstances the respondent was asked whether they would still be willing to protect the birds right to life, or whether they would be prepared to see some bird species become extinct. As is clear from Table 4.11 this effectively split the proportion of those attributing rights although in both national and local samples a larger number maintain their position than accepted species extinction. The proportions in each category are similar across the two samples.

Table 4.11 Ethical Opinion About Species

	Local		National		Total	
	N	%	N	%	N	%
Right regardless of personal living standard	79	24.3	71	20.8	150	22.5
Right to life for species qualified by living standard	62	19.1	54	15.8	116	17.4
Relative utility, species first in this case	69	21.2	80	23.4	149	22.3
Relative utility, people first in this case	92	28.3	95	27.8	187	28.0
Humans first	23	7.1	42	12.3	65	9.7
Total	325	100.0	342	100.0	667	100.0

Note: excludes 42 don't know, 4 refuse

The expectation of a rights based or lexicographic preference is that individuals will bid all their spare income in such a situation for even a small improvement. In fact individuals may reject the institution which imposes such a condition upon them. This behaviour has the advantage for the individual of avoiding acceptance of an institution and a potential irreversibility. That is, if the improvement were reversed (wetland reverts to farmland) and the WTP bid had been made the individual would now have no spare income to give a positive WTP to preserve their choice. Thus, a rights based position is hypothesised to lead to protests in the form of zero bids, and refusals. The approach taken by Spash and Hanley (1995) was to identify zero bids for non-zero value reasons and see how many of these protest bids were consistent with a lexicographic preference. The hypothesis was then that individuals protest against CVM and bid nothing rather than take part in a process which implicitly buys and sells improvements in what are seen as rights and duties. In the current study there are three categories of people giving no valuation but who might hold a positive value for the environmental change, these are zero bidders, refusals and don't knows. This covers 71% of the sample. Reason for giving no value which economists would regard as consistent with a zero monetary valuation are being too poor, finding the change unimportant, and regarding other things as more important. These reasons are given by 62% of those giving no monetary value. The remaining respondents are mainly protesting against the bid vehicle, and requesting more information. The proportion of these individuals holding the two rights based positions is 40%. Thus, assuming all these remaining individuals are taken as zero bids for non-zero value reasons the percentage of the total sample showing behaviour consistent with the lexicographic definition in Spash and Hanley is 11%. While this is far lower than their finding the approach also obscures the type of behaviour being observed and its full impact on contingent valuation.

The ethical position an individual holds may affect their whole approach to the survey and this can be seen by looking more closely at the zero bids, refusals and don't

knows. If the reasons people give for adopting these positions and giving no value is related to their ethical position then ethics can be expected to influence the outcome of the contingent valuation process. That is, in considering the monetary valuation question people are bringing their fundamental ethical beliefs to bear on their decision. Table 4.12 shows that there is such an association.

If the various ethical positions are categorised by bid type a chi-squared test can be run to check for unexpected associations. That is, do the ethical position cause an unexpected frequency of responses in each WTP category. Carrying out this procedure shows that willingness to play the contingent valuation game is indeed affected by ethical position. Table 4.13 gives the results with a highly significant chi-squared result. (Note, no cells should have an expected frequency less than 1.0, and less than 20% of the cells should have an actual frequency below 5). This shows the unexpected outcome that those claiming a strong rights position are over represented in the positive bid category and under represented in zero bids, while the converse is true of those at the anthropocentric end of the scale. More generally the belief in rights or placing species first does seem to be related to a willingness to participate in the contingent valuation process.

A qualification is necessary to the picture of expected behaviour under lexicographic preferences. A positive bid by a believer in rights can still be consistent with a lexicographic preference. Such individuals are rejecting neo-classical choice theory but are observed to show behavioural intentions consistent with the expectations of mainstream economic theory by giving a WTP amount. The extreme model of lexicographic behaviour would predict being prepared to give everything for more of the higher ranked good. This is clearly not the case here as the WTP amounts are relatively small; for the positive bids the mean is just over £16 and the median £10. If the less extreme modified lexicographic preference position is adopted positive bids are expected to be the amount above a minimum standard of living. An additional complication is then that while the position seems more reasonable because it is less extreme that lack of extremity means it is also difficult to identify. That is, positive bids may be given which reduce income to a subjective minimum living standard but this minimum is unknown. However, given that the maximum bids are by high income earners, and the highest bid is £200, the modified position also seems an inaccurate interpretation. In summary, the positive bids by rights based individuals could in theory conform to a lexicographic model of human behaviour, but this seems a rather crude interpretation of reasoned action. Thus, while the lexicographic model appears inadequate as an explanation of the data here, a more general hypothesis is upheld, that fundamental ethical positions influence the outcome of a contingent valuation survey.

Table 4.12 Ethics and Reasons for Failing to Value the Wetland Re-creation Project

	Reason for Response							
	Too Poor	Change Unimportant	Other problems more important	Protest bid vehicle	Already contribute	More info.	Other	N (%)
Right regardless of personal living standard								
Actual	31.0	7.0	1.0	12.0	5.0	17.0	7.0	80
Expected	25.3	16.6	7.6	8.7	2.6	12.6	6.6	(17.3)
Adj. Standard Residual	1.5	-2.9	-2.8	1.3	1.7	1.5	0.2	
Rights qualified by living standard								
Actual	27.0	13.0	6.0	12.0	1.0	16.0	6.0	81
Expected	25.6	16.8	7.7	8.8	2.6	12.8	6.7	(17.4)
Adj. Standard Residual	0.4	-1.2	-0.7	1.3	-1.1	1.1	-0.3	
Relative utility, species first in this case								
Actual	29.0	26.0	5.0	10.0	4.0	15.0	7.0	96
Expected	30.3	19.9	9.1	10.4	3.1	15.2	7.9	(20.8)
Adj. Standard Residual	0.3	1.7	-1.6	-0.1	0.6	-0.1	-0.4	
Relative utility, people first in this case								
Actual	44.0	30.0	21.0	13.0	5.0	20.0	11.0	144
Expected	45.4	29.9	13.7	15.6	4.7	22.8	11.8	(31.2)
Adj. Standard Residual	-0.3	0.0	2.5	-0.8	0.2	-0.8	-0.3	
Humans first								
Actual	15.0	20.0	11.0	3.0	0.0	5.0	7.0	61
Expected	19.3	12.7	5.8	6.6	2.0	9.6	5.0	(13.2)
Adj. Standard Residual	-1.3	2.5	2.4	-1.6	-1.5	-1.7	1.0	
Total N	146	96	44	50	15	73	38	462
%	31.6	20.8	9.5	10.8	3.2	15.8	8.2	100.0

Pearson Chi-Square 47.74 DF 24 Significance 0.00272; Likelihood Ratio Chi-Square 53.16 DF 24 Significance 0.00055
Minimum Expected Frequency 1.981 Cells with expected frequency <5 - 5 of 35 (14.3%); Number of Missing Observations: 251

Table 4.13 Right to Life for Bird Species and WTP for Wetlands

	Willingness to Pay Category				
	Positive	Zero	Refuse	Don't Know	N (%)
Right regardless of personal living standard					
Actual	68.0	35.0	6.0	41.0	150
Expected	45.2	58.9	7.4	38.5	(22.5)
Adj. Standard Residual	4.6	-4.5	-0.6	0.5	
Right to life for species qualified by living standard					
Actual	35.0	40.0	5.0	36.0	116
Expected	35.0	45.6	5.7	29.7	(17.4)
Adj. Standard Residual	0.0	-1.2	-0.3	1.5	
Relative utility, species first in this case					
Actual	52.0	52.0	8.0	37.0	149
Expected	44.9	58.5	7.4	38.2	(22.3)
Adj. Standard Residual	1.4	-1.2	0.3	-0.3	
Relative utility, people first in this case					
Actual	43.0	88.0	9.0	47.0	187
Expected	56.4	73.5	9.3	47.9	(28.0)
Adj. Standard Residual	-2.5	2.6	-0.1	-0.2	
Humans first					
Actual	3.0	47.0	5.0	10.0	65
Expected	19.6	25.5	3.2	16.7	(9.7)
Adj. Standard Residual	-4.7	5.7	1.1	-2.0	
Total N	201	262	33	171	667
%	30.1	39.3	4.9	25.6	100.0

Pearson Chi-Square 67.5 DF 12 Significance 0.00000; Likelihood Ratio Chi-Square 72.21953 DF 12 Significance 0.00000
Minimum Expected Frequency -3.216 Cells with Expected Frequency < 5 - 1 of 20 (5.0%); Number of Missing Observations: 46

4.5 Bid Curve Analysis

As explained in Chapter 1, the research project was set-up to investigate the relationship between stated WTP and ethical and attitudinal positions. The amount an individual is willing to pay to create an area of wetland is therefore expected to vary according to their socio-economic characteristics as in a typical bid curve and also with the General Awareness of Consequences (GAC) scale, developed above, and their utilitarian versus rights based position. This statistical relationship is explored using linear regression. The study hypothesised that environmental attitudes and ethical beliefs help explain the environmental values being expressed via contingent valuation surveys.

Of the 713 individuals interviewed, 36 (5%) refused to answer the willingness to pay question and 182 (26%) were unable to answer responding "don't know". This leaves a sample of 495 positive and zero bidders. Regression analysis further reduces the sample because item non-responses for an explanatory variable will result in the response being deleted from further calculations (listwise deletion of missing variables). For example, income typically suffers from item non-response and as a result listwise deletion of missing data reduces total sample size. In this study 25% of respondents refused to give an income category answer. Thus, sample size will vary depending upon the variables in the equation (here the bid curve maintained a sample of 416).

A standard approach to constructing a bid curve from open-ended contingent valuation data is to assume a linear relationship between the natural logarithm of bids (Y) and a range of explanatory variables (X). This semi-log equation can be written as in the equation below and is estimated using ordinary least squares (OLS):

$$\ln Y_i = X'_i\beta + \varepsilon_i$$

where the subscript "i" refers to each individual in the sample. Zero bids in the data are given a positive but inconsequential value so that logarithms can be taken; the value used here being £0.001 (giving a natural log -6.91).

The variables used to explain why individuals bid a particular amount of money for wetland creation fall into categories following the survey design: knowledge and preferences about the site, ethical and attitudinal, and socio-economic. The variables employed in the model are explained in Table 4.14.

Table 4.14 Variables in Bid Curve

Variable Name	Definition	N	Min	Max	WTP Corr.*	Comments
LNWTP	Log WTP	495	-6.91	5.30		Natural log of WTP
VISITF	Likelihood of future visit	711	1	5	+ve	1 very unlikely to 5 very likely
ENV2ITEM	Environmental Knowledge/ Concern	713	0	1	+ve	1 if named two environmental concerns
PRIORPF	Prior preferences about wetlands	713	0	1	+ve	1 if a preference for more wetlands before information pack
CHANGEPF	Change Preferences	713	0	1	+ve	1 if reported preferences changed by survey
GAC	General awareness of consequences	641	11	36	+ve	Scale from 9 to 36 based on belief items
RIGHTS	Rights for endangered bird species	667	0	1	-ve	1 if in either absolute and qualified rights categories.
EDU16	Low education level	710	0	1	-ve	1 if educated to 16
AGEMED2	Middle aged	712	0	1		1 if individual 34 and 45
INCREFUS	Refused to give income level	713	0	1		1 if refused to give income level

*expected correlation with WTP

Table 4.15 gives the regression results. The method of variable selection was to start with the broadest set of variables consistent with the theoretical model, ensure collinearity was a minor problem, and the model was significant in terms of the F-test and then eliminate those variables with consistently insignificant statistics which were outside the core model. The explanatory power of the model reported here is quite good for this type of analysis, with an adjusted R squared of 0.30 and all variables strongly significant.

Several statistical tests were run and the regression reported no problems. A check was made for multi-collinearity looking at the correlation coefficients and variable tolerance. The tolerance is the proportion of the variability in an independent variable going unexplained by other independent variables. A variable with very low tolerance contributes little information to a model and can cause computational difficulties. As can be seen in Table 4.15 tolerances are high. A normality test was run on the residuals. The functional form was found to be well specified according to a regression of the squared residuals on a constant, the original regressors, the original regressors squared and all cross-products. Heteroscedasticity was found to be present but when corrected the significance of variables remained similar and there was no impact of concern for the overall model.

Table 4.15a Variables in the WTP Equation

Variable	B	SE B	Beta	Tolerance	T	Sig T
VISITF	0.476906	0.126568	0.163244	0.894646	3.768	0.0002
ENV2ITEM	1.919045	0.433467	0.195563	0.861098	4.427	0.0000
PRIORPF	1.585863	0.445273	0.158602	0.851798	3.562	0.0004
CHANGEPF	1.757735	0.591847	0.124361	0.959136	2.970	0.0032
GAC	0.211388	0.056915	0.169281	0.813008	3.714	0.0002
RIGHTS	0.949520	0.399619	0.100796	0.932184	2.376	0.0180
EDU16	-0.856163	0.382239	-0.093212	0.969785	-2.240	0.0256
AGEMED2	-0.995311	0.476682	-0.086553	0.978250	-2.088	0.0374
INCREFUS	-1.886056	0.450766	-0.174782	0.962544	-4.184	0.0000
(Constant)	-11.122368	1.640316			-6.781	0.0000

Table 4.15b Model Summary Statistics

Multiple R	0.5623
R square	0.3162
Adjusted R Square	0.3010
Std. Error of the Estimate	3.8432
F	20.9082
Significance of F	0.0000

4.5.1 Ethics and Attitudes

In terms of the hypothesis that stated willingness to pay can be predicted by ethical and attitudinal positions the evidence here is in support. The belief variable (RIGHTS) shows individuals who attributed rights to endangered species of birds and associated this with the wetlands project were prepared to pay significantly more for wetland creation. This is partially unexpected because a rights position might have resulted in more protest zeros or refusals. However, as was shown in the previous section, taking a rights position seems to result in a greater willingness to pay. One possible reason, in line with a lexicographic model, is that individuals give all available income rather than protesting. Those taking a utilitarian position are insignificantly related to the variability of WTP in this model. Thus, while ethical position does influence WTP the result shows those attributing rights to the environment do significantly pay more. This raises serious questions over the economic model of human behaviour and the conception of the underlying motive for paying to preserve ecosystems and endangered species.

Similarly, the GAC scale proves a robust element of the model explaining 13.25% of the variability. Environmental attitudes therefore prove to be a good explanation of the intention to pay for environmental attributes. However, the role of attitudes here goes beyond any simple neo-classical explanation of utility being captured for personal gain, as does the rights variable. Instead, remember that GAC includes items on social-altruism and ecocentrism as well as egoism. Thus, a social-altruistic and ecocentric attitude is seen as important to the WTP outcome. These are motives to action which again fit poorly into a narrow utilitarian framework and hedonistic model of human psychology.

4.5.2 Preference Formation

The two variables on preferences before and after the main payment section show significant relationships with WTP. The prior preference in favour of wetland re-creation was expected to have a positive relationship with WTP. The second variable shows people who claimed their preferences changed due to the information pack were also prepared to pay more. This implies that contingent valuation is explicitly forming preferences about the intention to pay for the environmental attribute being presented. If this finding is combined with the influence of ethics and attitudes then a picture begins to emerge of individuals being lead through a process of valuation which plays upon their ethical beliefs and environmental attitudes to elicit a payment.

4.5.3 Socio-economics

Other results are generally supportive of the model being consistent with expectations. Those who intend to visit the area in future bid a higher amount for wetland re-creation than those who have no such intention. This suggests that use values are significant for the wetland area concerned. Educational effects are also as expected with lower education being associated with lower bids. This effect is significant for those who left school at or before they were 16 years old.

The income variable reduces the data considerably due to the 25% refusal rate. Thus, while models were run using this data the final model excludes the variable. Income in these reduced samples was only significant for those with the second lowest income level, who bid more than other income groups. This runs contrary to theoretical

expectations. However, income is notoriously inaccurate as a variable. While income itself was therefore excluded, a dummy on the relationship of refusals to give income was included and proved highly significant. This shows that refusing to give an income category is related to paying less for the wetland project. Thus, income data may be connected by the respondent to their WTP response and a refusal could result from the individual wanting to avoid appearing uncharitable.

The only statistically significant age effect is for those aged 35-44 and explanations as to why being in this group has a negative relationship to WTP are purely speculative. There may be a cohort effect operating here which could relate to the time period in which these individuals were growing-up (1960s-1970s) or the stage in life they are going through (e.g. raising children). Dummy variables for other age groups were also considered but found to be insignificant. Older working people are, other things being equal, richer than those just entering the labour force and this might be expected to raise bid levels. However, age related effects can be obscured because some may be unemployed, in low paid jobs and pensioners may be surviving on state welfare. These older groups may also hold less "pro-environment" attitudes than younger groups, which acts in the opposite direction to having a higher income. Overall, while age is often expected to be positively correlated with WTP there is no clear *a priori* relationship.

A number of studies have found that, on average, women have a greater concern for the environment than men. Once any differences in income are controlled for we would expect women to bid more highly than men. Here there is no significant relationship between gender and WTP.

4.5.4 Political Action

If the model of the bid curve analysis is taken to try and predict political action the outcome is to find a strong result (adjusted R squared 0.44), but one in which certain variables are dropped due to insignificance. As shown in Table 14.16 by the blank lines the variables on future visit, age and preference change are insignificant. Interestingly, the prior preference is related to political action. Thus, the prior preference for wetlands can be related to a readiness to take political action for the environment, while those who changed their preference had no associated political motive. The low education group is negatively related to political action as they were to WTP, although the significance level has dropped. This implies the intention to pay is treated in a similar way by this group as an intended political action. Environmental knowledge and concern as expressed by naming two items also remains significant.

The strongest variables in terms of significance are GAC and RIGHTS. These two variables also account for most of the variance explained by variables of the regression (just under 39% and 3% respectively). This means that the attitudinal scale is very effective at explaining both intention to take political action for the environment and WTP for a specific environmental attribute. While RIGHTS is less strong it also appears relevant to both, and this reinforces the theoretical model explained in Chapter 1.

Table 14.16a Intention to Take Political Action for the Environment

Variable	B	SE B	Beta	Tolerance	T	Sig T
VISITF						
ENV2ITEM	.547263	.209773	.090494	0.863250	2.609	.0093
PRIORPF	.466502	.205167	.076900	0.908077	2.274	.0234
CHANGEPF						
GAC	.412413	.026516	.542110	0.855025	15.554	.0000
RIGHTS	.912025	.190706	.159612	0.932489	4.782	.0000
EDU16	-.354084	.182900	-.062758	0.988402	-1.936	.0534
AGEMED2						
INCREFUS	-.433379	.218628	-.064204	0.990118	-1.982	.0480
(Constant)	4.338147	.765825			5.665	.0000

Table 14.16b Model Summary Statistics

Multiple R	0.6666
R square	0.4443
Adjusted R Square	0.4381
Std. Error of the Estimate	2.1152
F	71.2911
Significance of F	0.0000

5. Conclusions

This report has outlined a theoretical model of human behaviour which includes attitudes and fundamental beliefs as key aspects. The decision over whether to express an intention to behave in a certain way towards the environment is then seen as the result of reasoning which is dependent upon an individuals environmental attitude and their moral beliefs about entities. Attitudes are related to beliefs about consequences, while fundamental beliefs are formed on the basis of personal moral philosophy. The role of social norms in the formation of beliefs was largely absent form the empirical work which followed but is also key.

On the basis of this theoretical model, the intention to pay for an environmental improvement was used to investigate a process of valuation. The institution of contingent valuation was then hypothesised to be an instance where ethical and attitudinal factors would be important in determining the outcome. The work of social psychologists was reviewed and different attitudinal measures found. The approach used in the pre-test was found to have certain inadequacies in terms of face validity and an alternative based upon the work of Stern and colleagues was employed. This uses an awareness of consequences based around items on egocentric, social-altruistic and ecocentric positions. The ethical position of an individual was probed using a set of questions related more directly to the wetland re-creation project being used for the contingent valuation study. This approach builds upon previous work concerned with the existence of lexicographic preferences.

The results of factor analysis showed that an attitudinal scale similar to that of Stern and colleagues had been successfully obtained from the survey. This scale was then used along with the ethical variable in bid curve analysis. The result was to find both ethical and attitudinal aspects were highly significant for willingness to pay. In addition, the ethical data showed, via chi-squared analysis, that readiness to play the contingent valuation game is related to an individual's ethical stance. However, the rights based position, which has been associated with lexicographic preferences, showed individuals being more likely to bid positively and this also was apparent in the bid curve analysis. Thus, the picture of ethical motives appears more complex than previously hypothesised. That is, individuals who take a rights based position may be more prepared to bid rather than always refusing to play the game or turning up as protest zeros. In this latter regard about 11% of the sample are found to act as possible protest zeros and hold a rights based position. Yet the picture obscures the extent to which ethical beliefs are operative within the contingent valuation approach, and the very reasons for bidding zero, refusing to bid or answering don't know are shown to be related to ethical stance.

This research shows that contingent valuation as an approach to environmental valuation plays upon the attitudes and ethics of the individual and manipulates these in unexplored ways. There is, for example, evidence for a change in preferences during the process which stimulates willingness to pay. However, the attitudes being stimulated are contrary to those expected by economic theory and relate to social-altruism and ecocentrism as well as egocentrism. Similarly, the ethics operating here

are rights based beliefs rather than consequentialist or utilitarian. That is, individuals are found to support a more complicated behaviour model of social psychology and one which challenges mainstream economic approaches in very fundamental areas.

6. Appendix I: Pre-test Survey Questions

A1. To start the interview, I'm going to read a list of issues and I would like you to tell me how concerned you are about each of them on the scale shown on this card. **SHOW CARD 1**

1-10❑Quality of education
1-10❑Quality of public transport
1-10❑State of the National Health Service

A2. On the same scale, how concerned are you about nature conservation?
1-10❑

A3. Have you heard of the Fens of East Anglia?
1 ❑ YES
0 ❑ NO➡A6

A4. How rare do you think the Fens are?
1 ❑ rare
2 ❑ not rare
3 ❑ no idea

A5. Which of the following features is typical of the Fens in East Anglia? PLEASE POINT TO ANY WHICH YOU THINK APPLY. **SHOW CARD 2.**

1 ❑ Open grassland
2❑ Forest and woodland
3 ❑ Hills and moorland
4 ❑ Marshland and swamp
5 ❑ Agricultural land
6 ❑ Mountains and exposed areas of rock

A6. **SHOW MAP 1:** U.K.: This map of the U.K. shows the location of the Eastern Counties. **SHOW MAP 'BEFORE':** Eastern Counties: This map of the Eastern Counties has the Fens marked on. You can see that the Fens area is quite large. It has an area of roughly 1950 square miles/5000 square kilometres.
Have you ever visited the Fens area marked on the map?
1 ❑ YES 0 ❑ NO

A7. Are you likely to visit the Fens area in the future?
1 ❑ YES/LIKELY 0 ❑ NO/UNLIKELY

SECTION B

There are a number of wetlands in the Fens. Some of the most important sites of wetlands are shown on this map. (POINT TO GREEN DOTS AND LINES ON MAP 'BEFORE'). **SHOW MAP 'AFTER'.** There is a proposal to convert existing agricultural land to wetland, in a part of the Fens. This would take place around here (POINT TO RED DOT ON MAP 'AFTER'), an area south of Kings Lynn, east of Wisbech. The total land area which would be converted is about 1 square mile, that is,

1 mile wide by 1 mile deep. **SHOW PHOTO 'BEFORE'.** This is a photo of a similar site as it looks today. **SHOW PHOTO 'AFTER'.** And this photo gives you an idea of what the land would look like after the changes have been made. The change to the land might be permanent.

If the wetland is created, a greater variety of animals and plants will live on it than live in the current agricultural land. There would be more different species of plants and animals. If the wetland is created, the plants and animals would depend on each other in a greater number of ways than on the current agricultural land. The scientific relationships between the plants and animals would be more complicated.

Some of the plants and animals which would be present in the wetland but not on the current agricultural land are very rare. For example, the wetland could be home to a type of swan, the Bewick swan. This is an endangered species. The wetlands of the Fens are currently home to around 90% of Bewick swans in the U.K., which is around 35% of Bewick swans in North Europe. This is an example. There would be other rare types of plants and animals which would live in the wetland but not on the current agricultural land.

From what I have just told you about the proposals to create more wetland in the Fens, some people think that the proposal should go ahead, while other people think the land should be left as it is at present.

A trust fund will be established to help pay for the project to create wetland, if contributions are adequate. The trust fund will be held for exclusive use on the project to create and maintain this wetland in the Fens. The trust fund will be controlled by Wet Fens for the Future, an independent charitable organisation sponsored by The Royal Society for the Protection of Birds, The Countryside Commission, English Nature, Cambridgeshire and Lincolnshire County Councils, and the Environment Agency.

Please keep in mind your own personal income when answering the following questions. Remember this is only one of many environmental issues which may cost you money. Also remember there are no correct answers and you should answer for yourself.

B1. What is the maximum you be willing to pay as a one-off contribution to the trust fund to help create the wetland?

£ 1❑ REFUSED0 ❑ DON'T KNOW

Code	Category (tick one only)	
01	Positive payment	GOTO B4
02	Zero payment	GOTO B2
03	Refused to answer / Don't know	GOTO B2

IF POSITIVE PAYMENT GOTO B4

B2. IF REFUSAL OR ZERO PAYMENT. What is the reason for your answer (leaving a blank)? PRINT EXACT ANSWERS AND CODE AFTER INTERVIEW. **PROBE FULLY** ESPECIALLY INTERVIEWEES CLAIMING NO SPARE INCOME

Code	Reason
01	I have no spare income but would otherwise contribute
02	I feel the environmental improvement of the Fens is unimportant
03	I do not live in The Fens so I feel paying anything is irrelevant to me
04	I do not believe paying will solve the problem
05	I believe this improvement will take place without my contribution
06	I do not understand the question
07	I do not think I should have to pay
08	Other

IF MORE THAN ONE ANSWER CODED IN B2a THEN GOTO B3. IF ONLY ONE ANSWER CODED IN B2a THEN GOTO B6.

B3. What was the **main** reason for your answer?
NOW GOTO B6.

B4. What is the reason for your wanting to pay to create wetland in The Fens?
PRINT EXACT ANSWERS AND ESPECIALLY PROBE THOSE MAKING EXTREMELY HIGH BIDS

Code	Reason
01	I would prefer more wetland in The Fens
02	I feel the environmental improvement of the Fens is important
03	I live in The Fens so I feel I should support local projects
04	I get pleasure from knowing I have contributed to a good cause
05	I get pleasure from knowing certain rare animal/birds remain protected
06	I have a moral duty to do my share to protect the environment
07	I think everyone should pay more to improve the environment
08	Other

IF MORE THAN ONE ANSWER CODED IN B4a THEN GOTO B5. IF ONLY ONE ANSWER CODED IN B4a THEN GOTO B6.

B5. What was the **main** reason for your answer?

B6. Would you increase the amount you are willing to pay if more wetland than the 1 square mile that we have so far mentioned would be created?
1 ❑ YES ➡B7
0 ❑ NO➡B6.1

B6.1 IF NO. Please indicate which **one** of the following most closely approximates your reason:

1❑	I place no value on the creation of wetland other than in this area
2 ❑	The amount I have stated as a contribution to the trust fund reflects my support for the wetland creation programme as a whole, and should be divided between all such projects equally

B6.2 Would you prefer more wetland to be created, in addition to the current site?
1 ❑ YES
0 ❑ NO

B7. Do you feel the information presented to you so far in this interview has:
READ THE FOLLOWING. NOTE ONLY ONE CATEGORY TO APPLY

1 ❑ changed your opinions about whether extra money should be spent on wetland creation

2 ❑ merely given you more information than you had before

3 ❑ both informed you and changed your opinions

4 ❑ none of the above

IF THE ANSWER TO B7 WAS EITHER CATEGORIES 1 OR 3 THEN ASK THE FOLLOWING B7a.

B7a. How have your opinions changed?

SECTION C: ENVIRONMENTAL ATTITUDES

C1. A major aim of creating wetland is as a bird sanctuary to protect endangered species of birds such as such as the whooper swan, Bewick's swan, the pintail and gadwall. Which **one** of the following statements most closely matches your opinion:
PLEASE TICK ONE BOX ONLY

1❑"The wetland should be created to help prevent these endangered species becoming extinct because such species have a right to life which cannot be traded against economic considerations."

2❑"We have to weigh up protection of these species against economic considerations, and in this case that means protecting the species, even if the economic performance of the region suffers."

3❑"These endangered species should only be protected as long as the economic performance of the region does not suffer."

4❑"Too much concern is shown for birds and not enough for humans, so I would rather see the resources used to help humans."

5❑Other. Please specify:

IF THE ANSWER TO C1 WAS **STATEMENT 1,** THEN ASK THE FOLLOWING QUESTION C2. OTHERWISE GOTO C3.

C2. READ SLOWLY AND CAREFULLY.
If you were to have to incur a personal cost which reduced your standard of living to what you regard as a minimum, in order to protect the endangered birds, would you still protect their rights to life, or would you be prepared to see some bird species become extinct.

1❑ I would be prepared to see some bird species become extinct.

2❑ I would protect their right to life at the expense of my standard of living.

.

C3 I am now going to ask you how you feel about a series of statements I'm going to read to you. These statements are things that different people sometimes say. There are no right or wrong answers to these questions.
SHOW CARD 3. Please use one of the numbers on this scale to indicate how you feel, where 1 is strongly disagree and 5 is strongly agree.

1. "One of the worst things about overpopulation is that many natural areas are getting destroyed for development."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

2. "I can enjoy spending time in natural settings just for the sake of being out in nature."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

3. "The worst thing about the loss of the rain forest is that it will restrict the development of new medicines."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

4. "Sometimes it makes me sad to see forests cleared for agriculture."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

5. "I prefer nature reserves to zoos."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

6. "It bothers me that humans are running out of their supply of oil."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

7. "I need time in nature to be happy."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

8. "The thing that concerns me most about deforestation is that there will not be enough timber for future generations."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

9. "I do not feel that humans are dependent on nature to survive."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

10. "Sometimes when I am unhappy I find comfort in nature."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

11. "Most environmental problems will solve themselves given enough time."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

12. "I don’t care about environmental problems."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

13. " It makes me quite sad to see environments destroyed."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

14. "The most important reason for conservation is human survival"

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

15. "One of the best things about recycling is that it saves money."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

16. "Nature is important because of what it can contribute to the pleasure and welfare of humans."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

17. "Nature is valuable for its own sake."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

18. "We need to preserve resources to maintain a high quality of life."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

19. "Being out in nature is a great stress reducer for me."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

20. "One of the most important reasons to conserve the environment is to ensure a continued high standard of living."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

21. "One of the most important reasons to conserve is to preserve unspoilt areas."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

22. "Continued land development is a good idea as long as a high quality of life can be preserved."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

23. "Sometimes animals seem almost human to me."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

24. "Humans are as much a part of the ecosystem as other animals."

Strongly Disagree				**Strongly Agree**
1	**2**	**3**	**4**	**5**

SECTION D: SOCIO-ECONOMIC

Finally, it helps us in our work if we can provide some background information on the person interviewed I have just a few questions about your background that will only be used for statistical purposes.

D1 RECORD SEX

0 ❑Male 1 ❑Female

D2 **SHOW CARD 4**

Which of these age groups do you fit into:

01 ❑Under25 02 ❑25-34 03 ❑35-44 04 ❑45-54 05 ❑55+

D3. Please show me on this scale the type of diet which you eat.

01 ❑All types of fish and meat

02 ❑Some types of fish and meat. Please describe _____

03 ❑Vegetarian but not vegan

04 ❑Vegan

D4. Which of the following have you attended?

❑School beyond age of 13

❑Post 16 College / School sixth form

❑University or College (degree/diploma)

❑University or College for higher degree (masters/doctorate)

D5. What is your occupation? _____

PLEASE OBTAIN SUFFICIENT DETAIL TO DETERMINE A CATEGORY

Code	Categories
01	A, B Management, professional, administrative inc. engineers, architects, teachers, local government managers
02	C1 'White collar' workers, junior management, clerical, inc. sales representatives, buyers, nurses, community workers, computer programmers
03	C2 Skilled manual workers, inc. skilled trades relating to metals, electricity, textiles, printing; bakers, butchers, TV repair technicians
04	D, E Semi-skilled/unskilled manual and those on benefits/pensions, inc. security officers, waiters, gardeners, HGV drivers, care workers

D6. **SHOW CARD 5.** On this scale, what is your personal gross income from all sources before tax or anything else is deducted? 1-5❑

D7. Is there anything you would like to add before we close the interview?

SECTION E

This is a pilot survey. It would be very helpful to the designers of the survey if I could just you for your opinions about the survey itself.

E1. Are there any important things we failed to ask you about?

0 ❑ NO➡E2

1 ❑ YES ➡Please tell me about them.

E2. Were there any questions where you felt you were being pushed towards a particular answer?

0 ❑ NO➡E3

1 ❑ YES ➡Which question numbers?

Why did you feel pushed?

E3. Were there any questions which you found difficult to answer?

0 ❑ NO➡E4

1 ❑ YES ➡ Which question numbers?

Please try to describe why you found them difficult. Is there any way you think they could be made easier?

TO THE INTERVIEWER: WERE THERE ANY QUESTIONS WHERE YOU NOTICED THE INTERVIEWEE PARTICULARLY STRUGGLING TO ANSWER, OR ANSWERING IN AN UNUSUAL OR UNNATURAL WAY? PLEASE GENTLY SUGGEST THESE QUESTIONS TO THE INTERVIEWEE NOW.

Question numbers:

SECTION F

F1. Were other people present and listening-in when you interviewed this individual?

1 ❑YES 0 ❑NO

F2. Were any particular questions a problem for the interviewee? Please note their numbers below.

F3. Any other comments.

7. Appendix II: Main Survey

- *Instructions to interviewers are in italics and capitals*
- *Please NOTE: some questions are only asked depending upon previous answers*
- *Please take care to ask the relevant questions*
- *Arrows ➡ have been included to indicate the sequencing of questions*
- *Mark a refusal to respond 'R'; do not leave a blank*
- *Where appropriate fill in boxes with a tick ✔*
- *Open ended questions are followed by coding boxes. Do Not read these codes to the respondent.*

INTRODUCE YOURSELF AS FOLLOWS
Good morning/afternoon, sir/madam. We are carrying out a survey regarding nature conservation and would like to ask you about your opinions. The interview is likely to take fifteen minutes.
IF NOT INTERESTED THANK THEM AND LEAVE.

Interview Location : _____

Interviewer Code Number

Time interview starts (24hour clock)

Time interview ends (24hour clock)

Is the interviewee a U.K. resident?
If NOT a U.K. resident, STOP INTERVIEW, THANK THEM AND LEAVE.

Opening statement
"This survey has four sections. First are some questions about the environment in general and then an area in the East of England. Next there is some information on a specific conservation scheme and questions about how and why this might be supported. The third part is about your attitudes to environmental issues, and finally are a few questions on your background."

"Please just say if you would like to stop the interview at any time. All answers are confidential and **there are no correct answers**. Your opinion is what counts."

SECTION A: BACKGROUND, FRAMING AND KNOWLEDGE

A1. To start the interview, I'm going to read a list of issues and I would like you to tell me how concerned you are about each of them on the scale shown on this card. **SHOW CARD 1**

1-10 ❑ Quality of education

1-10 ❑ Quality of public transport

1-10 ❑ State of the National Health Service

A2. On the same scale how concerned are you about Nature conservation?

1-10 ❑ Nature conservation

A3. Are there any other environmental issues about which you are currently concerned. If so, please name two.

(i) ❑ _____

(ii) ❑ _____

(iii) ❑ None

A4. Have you ever heard of the Fens of East Anglia?

1 ❑ YES 0 ❑ NO

A5. What area do you think the Fens cover?

_____ area _____ measure (miles/kilometers or acres/hectares)

_____ Don't Know

SHOW MAP 1: *The Fens*
Indicate to the interviewee the location of the Eastern Counties.
Indicate to the interviewee the Fens

- "The Fens cover an area of about 44 miles by 44 miles."
- "Within this are several wetland areas such as the Nene and Ouse Washes and Wicken Fen."

A6. Have you ever visited the area marked as The Fens on the map?

1 ❑ YES 0 ❑ NO

A7. How likely are you to visit The Fens area in the future?

Very Unlikely				Very Likely
1	2	3	4	5

A8. Do you have a preference about whether the wetland areas in The Fens are increased or decreased.

1 ❑ No preference

2 ❑ Yes they should be increased.

3 ❑ Yes they should be decreased

4 ❑ Don’t Know

SECTION B: TRUST FUND

- "As mentioned, there are a number of wetlands in The Fens. These are all that remains of a large marshes and wetland which once covered the area. These Fenlands were drained, starting in the 1600s, to provide good agricultural land. There is now a proposal to convert some existing agricultural land back into wetland."

- "One proposed site is an area south of Kings Lynn, and east of Wisbech. The total land area which would initially be converted is 1 mile by 1 mile, about the size of the RSPB reserve at Wicken Fen.

SHOW PICTURE 1: *Agriculture on The Fens*

- "Much of the current agricultural land in The Fens is represented by a web of life which includes the creatures shown in this picture. You can see here several creatures commonly associated with farms growing winter wheat and sugar beet.
    - These include birds such as seagulls, crows, rooks, partridge and pheasants
    - and animals such as rabbits, hares, rats, and voles."

Point out the different animals, birds and plants.

SHOW PICTURE 2. *Wetland on The Fens*

- "A typical wetland area has a very different web of life because there are small lakes, ponds and reeds, as well as grassy meadows for grazing cattle. The creatures found here tend to be rarer.
    - These might include: birds such as the Grey Heron, Marsh Harrier, Short-eared owl, Willow Warbler, Bearded tit, the Bewick swan, and finches (e.g. the Twite).
    - Insects also occur such as dragonfly, caddisfly and swallowtail butterfly.
    - Animals such as otter are able to live here.
    - The plant life includes willows and water lilies."

Point out the different animals, birds and plants.

SHOW PHOTOGRAPHS: *Agricultural and Wetland Use of the Fens***.**

- "Some people think that re-creating wetlands is a good idea, while other people think the land should be left for use by farmers. A few years ago, one land owner in The Fens privately converted an area from agricultural use to wetlands and these photographs show how the landscape changed."

- "The re-creation of wetlands in The Fens would require setting land aside for a long time and may be hard to reverse. Therefore the land would need to be purchased for the purpose. A charity called Wet Fens for the Future has been established to buy and manage land. The charity has the support of the RSPB and some regional councils, but the project will only go ahead if enough funds can be raised to buy the land and manage the site."

- "Please keep in mind your own personal income when answering the following question. Remember this is only one of many environmental issues which may cost you money. Also remember there are no correct answers and you should answer for yourself."

B1. What is the maximum you be willing to pay as a one-off contribution to the trust fund to help create an extra square mile of wetland in The Fens?

£_____ ➡ *IF positive go to B3*
IF zero continue to B2

❑ REFUSED ➡ *Continue to B2*

❑ DON'T KNOW ➡ *Continue to B2*

Code	Category (tick one only)	
1	Positive payment	*GO TO B4*
2	Zero payment	*Continue*
3	Refused to answer	*Continue*
4	Don't know	*Continue*

B2. *REFUSAL, ZERO PAYMENT,DON'T KNOW.*

B 2a What is the reason for your answer?

Print exact answer and code after interview.
PROBE FULLY
Especially interviewees claiming NO SPARE INCOME

_____

_____

_____

_____

Code	Reasons Zero Bid, Refusal, Don't Know
01	Too poor so can't afford to contribute
02	Change is totally unimportant to me
03	Change is not as important as other things (e.g. charities/problems)
05	Already contribute to conservation (e.g. RSPB, National Trust)
04	Protest against bid vehicle (e.g. should be funded by tax/government)
06	Lack information about this scheme

B2b. So, the **main** reason for your answer was?

_____

_____

_____

➨ *Now go to B4*

B3. *POSITIVE BIDS ONLY*

B3a What is the reason for your wanting to pay to create wetland in The Fens?

Print exact answers
PROBE FULLY
Especially those making EXTREMELY HIGH BIDS

_____

_____

_____

Code	Reason(s) Positive Bid
01	I prefer the wetland (water, wildlife, biodiversity, conservation)
02	I liked the pictures you showed me
03	I prefer the landscape and aesthetics of the wetland
04	Dislike of farming due to chemicals or size
05	Recreational possibilities (e.g. fishing, walking, bird watching)
06	To help Nature/the environment
07	Other

B3b. So the **main** reason for your wanting to pay to create Wetland in the Fens is?

_____

_____

_____

B4.

B4a If the area to be restored were larger than 1 square mile would you be prepared to pay more?

1 ❑ YES ➡*go to B5*

0 ❑ NO ➡ *continue*

B4b *IF REFUSAL*

What is the reason for your answer?

Print exact answer.

PROBE FULLY

Especially interviewees claiming NO SPARE INCOME

_____

_____

_____

Code	Reasons Zero Bid, Refusal, Don't Know
01	Too poor so can't afford to contribute
02	Change is totally unimportant to me
03	Change is not as important as other things (e.g. charities/problems)
05	Already contribute to conservation (e.g. RSPB, National Trust)
04	Protest against bid vehicle (e.g. should be funded by tax/government)
06	Lack information
07	Other

B5.

B5a Do you feel the information presented to you so far in this interview has:

READ THE FOLLOWING.

NOTE ONLY ONE CATEGORY TO APPLY

1 ❑	changed your preference about whether extra money should be spent on wetland creation	Continue to 5b
2 ❑	given you more information than you had before	Go to Section C
3 ❑	both informed you and changed your preferences	Continue to 5b
4 ❑	none of the above	Go to Section C

B5b. How have your preferences changed?

_____

_____

_____

Code	How have preferences changed
01	Never thought about this issues before
02	All the information given was new to me
03	Raised my awareness of the environment as an issue needing funding
04	Other

SECTION C: ENVIRONMENTAL ATTITUDES

C1. "A major aim of re-creating wetland is to provide sanctuary for endangered species of birds such as Bewick's swan, the pintail and gadwall."

C1a. **SHOW CARD 2**

Which **one** of the following statements most closely matches your opinion about the wetlands re-creation scheme:

PLEASE TICK ONE BOX ONLY

1❑ "Such endangered species need protection because they have a right to life which cannot be traded against economic considerations."

2❑ "Protection of such endangered species must be weighed against economic considerations, but in this case, the endangered species should come first."

3❑ "Protection of such endangered species must be weighed against economic considerations, and in this case, people's livelihoods come first."

4❑ "Too much concern is shown for birds and not enough for humans, so I would rather see the resources used to help humans."

5❑ "Can't answer - this is too complicated."

STATEMENT 1 RESPONSES, *continue to C1b*
STATEMENT 2, 3, 4, or 5 RESPONSES *go to C2*

C1b. *READ SLOWLY AND CAREFULLY.*

Assume protecting the endangered birds would mean you had to incur a personal cost which reduced your standard of living to what you regard as a minimum. Would you still be willing to protect their right to life, or would you be prepared to see some bird species become extinct?

1❑ I would be prepared to see some bird species become extinct.

2❑ I would protect their right to life at the expense of my standard of living.

C2. I am now going to ask you how you feel about a series of statements I'm going to read to you. These statements are things that different people sometimes say. There are no right or wrong answers to these questions. **SHOW CARD3**

1. "The balance of nature is delicate and easily upset."

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

2. "Environmental protection benefits everyone."

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

3. "Laws to protect the environment limit my choices and personal freedom."

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

4. "While some local plants and animals may have been harmed by environmental degradation, over the whole earth there has been little effect."

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

5. "Environmental protection is beneficial to my health."

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

6. "We don't need to worry much about the environment because future generations will be better able to deal with these problems than we are."

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

7. "I would contribute money to environmental organisations."

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

8. "Over the next several decades, thousands of species will become extinct."

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

9. “Pollution generated here harms people all over the earth.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ❑	2 ❑	3 ❑	4 ❑

10. “I would take a job with a company I knew was harming the environment.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ❑	2 ❑	3 ❑	4 ❑

11. “A clean environment provides me with better opportunities for recreation.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ❑	2 ❑	3 ❑	4 ❑

12. “Claims that current levels of pollution are changing the earth’s climate are exaggerated.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ❑	2 ❑	3 ❑	4 ❑

13. “I would sign a petition in support of tougher environmental laws.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ❑	2 ❑	3 ❑	4 ❑

14. “The effects of pollution on public health are worse than we realise.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ❑	2 ❑	3 ❑	4 ❑

15. “Protecting the environment will threaten jobs for people like me.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ❑	2 ❑	3 ❑	4 ❑

16. “I would participate in a demonstration against companies that are harming the environment.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ❑	2 ❑	3 ❑	4 ❑

17. “Environmental protection will help people have a better quality of life.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

18. “Environmental protection will provide a better world for me and my children.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

19. “I would never do voluntary work for nature conservation.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

20. “Claims that poorer countries suffer as a result of importing rich countries’ chemical waste are exaggerated.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

21. “Tropical rain forests are essential to maintaining a healthy planet Earth.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

22. “Restricting the use of chemicals in agriculture will raise the cost of my shopping bill.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

23. “Environmental activists are a public nuisance whom I would never support.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

24. “The loss of a few thousand species of insects is hardly going to affect the way the Earth functions.”

Strongly Disagree	Disagree	Agree	Strongly Agree
1 ☐	2 ☐	3 ☐	4 ☐

SECTION D: SOCIO-ECONOMIC

- Finally, it helps us in our work if we can provide some background information on the person interviewed I have just a few questions about your background that will only be used for statistical purposes.

D1 RECORD SEX

0 ☐ Male 1 ☐ Female

D2 **SHOW CARD 4**

Which of these age groups do you fit into:

1 ☐ Under25

2 ☐ 25-34

3 ☐ 35-44

4 ☐ 45-54

5 ☐ 55+

D3. Please show me on this scale the type of diet which you eat. **SHOW CARD 5**

1 ☐ All types of fish and meat

2 ☐ Some types of fish and meat only.

3 ☐ Vegetarian but not vegan

4 ☐ Vegan

D4. Which of the following have you attended? **SHOW CARD 6**

1 ☐ School to age 13

2 ☐ School beyond age 13 yrs but not sixth form

3 ☐ College / School beyond 16yrs (sixth form)

4 ☐ University or College (degree/diploma)

5 ☐ University or College for higher degree (masters/doctorate)

D5. What is your occupation? _____

PLEASE OBTAIN SUFFICIENT DETAIL TO DETERMINE A CATEGORY

Code	Categories
1	A, B Management, professional, administrative inc. engineers, architects, teachers, local government managers
2	C1 'White collar' workers, junior management, clerical, inc. sales representatives, buyers, nurses, community workers, computer programmers
3	C2 Skilled manual workers, inc. skilled trades relating to metals, electrical, textiles, printing; bakers, butchers, TV repair technicians
4	D, E Semi-skilled/unskilled manual and those on benefits/pensions, inc. security officers, waiters, gardeners, HGV drivers, care workers

D6. **SHOW CARD 7.** On this scale, what is your personal gross income from all sources before tax or anything else is deducted?

1-9❑

D7. Would you be prepared to be contacted in the future to ask you if would take part in a discussion of this survey? We would offer a small payment to participants in the discussion.

1❑ YES ➡*TAKE ADDRESS AND TELEPHONE NUMBER*

0❑ NO

Address_____

_____

_____Telephone_____

D8. Is there anything you would like to add before we close the interview?

_____

_____

_____

SECTION E: TO BE COMPLETED BY INTERVIEWER

F1. Were other people present and listening-in when you interviewed this individual?

1 ❑ YES 0 ❑ NO

F2. Were any particular questions a problem for the interviewee? Please note them here.

F3. Any other comments.

INTERVIEWER MATERIALS

CARD 1 Scale from 1 to 10

MAP The Fens in relation to UK and in detail

PICTURE 1 AND KEY Agriculture on The Fens

PICTURE 2 AND KEY Wetland on The Fens

PHOTOGRAPHS Agricultural Use of Fen Site
Restored Wetland Use of Fen Site

CARD 2 Rights questions C1a

CARD 3 Strongly Agree to Strongly Disagree Scale

CARD 4 Age groups

CARD 5 Diet

CARD 6 Education

CARD 7 Income

CARD 1

NOT AT ALL CONCERNED — VERY CONCERNED

1 2 3 4 5 6 7 8 9 10

CARD 2

"Such endangered species need protection because they have a right to life which cannot be traded against economic considerations."

"Protection of such endangered species must be weighed against economic considerations. In this case, they should be protected, even if the economic performance of the region suffers."

"Protection of such endangered species must be weighed against economic considerations. In this case, they should be protected only if the economic performance of the region is maintained or benefits."

"Too much concern is shown for birds and not enough for humans, so I would rather see the resources used to help humans."

"Can't answer this is too complicated."

CARD 3

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

CARD 4 **AGE**

UNDER 25

25 TO 34

35 TO 44

45 TO 54

55 AND OVER

CARD 5 **DIET**

All types of fish and meat

Some types of fish and meat

Vegetarian but not vegan

Vegan

CARD 6 **EDUCATION**

School to age 13

School beyond age 13 yrs but not sixth form

College / School beyond 16yrs (sixth form)

University or College (degree/diploma)

University or College for higher degree (masters/doctorate)

CARD 7

INCOME BEFORE DEDUCTIONS (£)

	WEEKLY	MONTHLY	ANNUAL
1	**Under 100**	**Under 400**	**Under 4,800**
2	**101 to 200**	**401 to 800**	**4,801 to 9,600**
3	**201 to 300**	**801 to 1,200**	**9,601 to 14,400**
4	**301 to 400**	**1,201 to 1,600**	**14,401 to 19,200**
5	**401 to 500**	**1,601 to 2,000**	**19,201 to 24,000**
6	**501 to 600**	**2,001 to 2,400**	**24,001 to 28,800**
7	**601 to 800**	**2,401 to 3,200**	**28,801 to 38,400**
8	**801 to 1000**	**3,200 to 4,000**	**38,400 to 48,000**
9	**1001 or more**	**4,001 or more**	**48,001 or more**

8. References Cited

Ajzen, I., Brown, T. C., & Rosenthal, L. H. (1996). Information bias in contingent valuation: Effects of personal relevance, quality of information and motivational orientation. *Journal of Environmental Economics and Management, 30*(1), 43-57.

Aldred, J., & Jacobs, M. (1997). *Citizens and Wetlands: What Priority, If Any, Should be Given to the Creation of Wetlands in the Fens* (Report). Lancaster: Centre for the Study of Environmental Change, University of Lancaster.

Andreoni, J. (1989). Giving with impure altruism: Application to charity and Ricardian equivalence. *Journal of Political Economy, 97*(6).

Craig, P. P., & Glasser, H. (1993). Ethics and values in environmental policy: The said and the UNCED. *Environmental Values, 2*(2 (Summer)), 137-158.

Cummings, R. G., Brookshire, D. S., & Schulze, W. D. (1986). *Valuing Environmental Goods: An Assessment of the Contingent Valuation Method*. Totowa, New Jersey: Rowman & Allanheld.

Desvouges, W. H., Johnson, F. R., Dunford, R. W., Boyle, K. J., Hudson, S. P., & Wilson, K. N. (1993). Measuring natural resource damages with contingent valuation: tests of validity and reliability. In J. A. Hausman (Ed.), *Contingent Valuation: A Critical Assessment* (pp. 91-159). Amsterdam: North-Holland.

Dunlap, R. E., & Van Liere, K. D. (1978). The "New Environmental Paradigm". *The Journal of Environmental Education, 9*(4), 10-19.

Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Reading, Massachusetts: Addison-Wesley.

Freeman, A. M. (1986). The ethical basis of the economic view of the environment. In D. van der Veer & C. Pierce (Eds.), *People, Penguin and Plastic Trees: Basic Issues in Environmental Ethics* (pp. 218-227). Belmont, CA: Wadsworth Publishing Company.

Guagnano, G. A., Dietz, T., & Stern, P. C. (1994). Willingness to pay for public goods: A test of the contribution model. *Psychological Science, 5*(6), 411-415.

Hill, R. (1981). Attitudes and behaviour. In M. Rosenberg & R. Turner (Eds.), *Social Psychology: Sociological Perspectives* (pp. 347-377). New York: Basic Books.

Kahneman, D., Ritov, I., Jacowitz, K. E., & Grant, P. (1993). Stated willingness to pay for public goods: A psychological perspective. *Psychological Science, 4*, 310-315.

Malinvaud, E. (1972). *Lectures on Microeconomic Theory*. Amsterdam: North-Holland.

Meadows, D. H., Meadows, D. L., Randers, J., & Behrens III, W. W. (1972). *The Limits to Growth*. New York: Universe Books.

O'Connor, M., & Sang, J. T. K. (1998). *Social Processes for Environmental Valuation* (Final Report to DG XII European Commission Contract ENV4-CT96-0226). St Quentin en Yvelines: Centre d'Economie et d'Ethique pour l'Environnement et le Développement.

Pigou, A. C. (1952). *The Economics of Welfare*. (4th ed.). London: Macmillan.

Sagoff, M. (1988). *The Economy of the Earth: Philsophy, Law, and the Environment*. Cambridge: Cambridge University Press.

Schultz, P. W., & Stone, W. F. (1994). Authoritarianism and attitudes toward the environment. *Environment and Behavior, 26*(1), 25-37.

Sen, A. K. (1987). *On Ethics and Economics*. Oxford, England: Basil Blackwell.

Spash, C. L. (1993a). Economics, ethics, and long-term environmental damages. *Environmental Ethics, 15*(2), 117-132.
Spash, C. L. (1993b). *Estimating the Importance of Inviolable Rights: The Case of Long-Term Damages and Future Generations* (Unpublished): Scottish Economic Society.
Spash, C. L. (1997). Ethics and environmental attitudes with implications for economic valuation. *Journal of Environmental Management, 50*, 403-416.
Spash, C. L. (1998). Investigating individual motives for environmental action: Lexicographic preferences, beliefs and attitudes. In J. Lemons, L. Westra, & R. Goodland (Eds.), *Ecological Sustainability and Integrity: Concepts and Approaches* (Vol. 13, pp. 46-62). Dordrecht, The Netherlands: Kluwer Academic Publishers.
Spash, C. L., & Hanley, N. (1995). Preferences, information and biodiversity preservation. *Ecolgical Economics, 12*(3), 191-208.
Spash, C. L., & O'Neill, J. (Eds.). (1999). *Institutions for Environmental Valuation: Citizens Juries and Contingent Valuation*. Cheltenham: Edward Elgar.
Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues, 50*(3), 65-84.
Stern, P. C., Dietz, T., & Guagnano, G. A. (1995a). The New Ecological Paradigm in social-psychological context. *Environment and Behavior, 27*(6), 723-743.
Stern, P. C., Dietz, T., & Kalof, L. (1993). Value orientation, gender and environmental concern. *Environment and Behavior, 25*(3), 322-348.
Stern, P. C., Dietz, T., Kalof, L., & Guagnano, G. A. (1995b). Values, beliefs and pro-environmental action: attitude formation toward emergent attitude objects. *Journal of Applied Social Psychology, 25*(18), 1611-1636.
Stevens, T. H., Echeverria, J., Glass, R. J., Hager, T., & More, T. A. (1991). Measuring the existence value of wildlife: what do CVM estimates really show? *Land Economics, 67*(4), 390-400.
Stevens, T. H., More, T. A., & Glass, R. J. (1993). Measuring the existence value of wildlife: reply. *Land Economics, 69*(3), 309-312.
Thompson, S. C. G., & Barton, M. A. (1994). Ecocentric and anthropocentric attitudes towards the environment. *Journal of Environmental Psychology, 14*, 149-157.