SPECIAL ISSUE

SOCIAL PROCESSES OF ENVIRONMENTAL VALUATION

Ecosystems, contingent valuation and ethics: the case of wetland re-creation

Clive L. Spash

Cambridge Research for the Environment, Department of Land Economy, University of Cambridge, Cambridge CB3 9EP, UK

Abstract

This paper addresses a current issue in environmental valuation, namely, the extent to which environmental preferences depart from the usual economic paradigm to incorporate some lexicographic elements. After a theoretical discussion the paper reviews attempts to explore this question empirically by supplementing contingent valuation analyses with an exploration of the motives behind willingness-to-pay responses, including zero bids and refusals to answer. This is followed by the presentation of new evidence investigating respondents willingness to pay for the creation of a wetland taken from 713 personal interviews of the British public. © 2000 Elsevier Science B.V. All rights reserved.

Keywords: Contingent valuation method; Environmental ethics; Intrinsic value; Lexicographic preferences; Rights; Wetland ecosystems

1. Introduction

One line of current reasoning in the environmental policy arena stresses that wetlands and other environmental entities must have their value transformed into monetary amounts, and this is the appropriate, or even rational, way to consider interactions with the environment. For example, Costanza et al. (1989 p.354) state that 'the estimation of the economic value of natural wetlands is a difficult and complex task, but it is essential to

rational management', and they go on to conduct a travel cost and contingent valuation method (CVM) study to that end. While such authors seem keen to apply conventional tools of neo-classical environmental economics, and are aware of some of the standard problems, they often neglect wider concepts of value which fall outside of the (neoclassical) economic approach. An exception, in the context of wetlands, is Turner (1988) who reviews arguments from environmental ethics. However, he then concludes in favour of a standard form of utilitarianism modified by some

constraints on the basis of intergenerational equity and uncertainty, and he explicitly excludes any acceptance of 'a number of diffuse and somewhat impracticable notions, such as intrinsic value in nature, a non-sentience criterion for moral rights or systemic rights' (p.124). A range of broadly rights-based or deontological positions do, however, appear to be relevant to the general public when considering the environment (Spash, 1997) and have important implications for the application of monetary valuation to environmental policy. In addition, the choice theory upon which economic exchange values are founded ignores non-compensatory choice (Earl, 1986). Once such possibilities are accepted, exchange values can then be seen in perspective as but one aspect of environmental values (Lockwood, 1996a; Gowdy, 1997). This has important implications for a value theory in ecological economics that wants to go beyond the confines of neo-classical economic theory.

The empirical work reported in this paper is part of a larger programme of research analysing how fundamental ethical positions can influence the intention to undertake actions relating to environmental improvement. Related work on the motives behind stated behaviour is the subject of on-going data analysis. A model of the interaction of ethical positions with environmental attitudes formed the basis for this work and multi-question psychometric scales on environmental attitudes will be forthcoming. The focus of this current paper is on extending and improving the analysis of ethical positions in economic models. More specifically, an attempt is made to categorise an individual's ethical stance so that it might be used to analyse the stated intention to pay for an environmental change. This requires identifying a relevant set of ethical positions, developing associated categories which can be easily identified, and placing the approach within the context of a specified environmental change. Alternative ethical stances used to classify individuals were based upon both consequentialist (utilitarian) and deontological (rights-based) positions with regard to protecting endangered bird species by re-creating a wetland ecosystem.

The case study, carried out as part of the *VALSE* research project (O'Connor, 2000), was related to actual proposals to re-create an area of wetland in the region of eastern England known as The Fens. A small site currently used for crop farming was hypothesised as being purchased by an existing non-governmental organisation (Wet Fens for the Future) concerned with the conservation of wetlands in the region, and the request was for a one-off payment to a trust fund established specifically for the project. This gave a realistic institutional setting to the payment scenario of the CVM study. In terms of neo-classical economics, individuals were effectively being asked to value a marginal change in the supply of a rare ecosystem, i.e. the difference between the common present farming ecosystem and the proposed rare wetland ecosystem. A characterisation of the associated change in flora and fauna formed the basis for the evaluation exercise.

The null hypothesis being tested here was that willingness to pay (WTP) is related to a consequentialist model of reasoning in line with economic theory. More generally, affirmation of the hypothesis would mean the results of environmental evaluation in cost-benefit analysis are adequately explained as indicating the exchange value people place upon environmental entities (e.g. flora, fauna, ecosystems). This represents the environment in terms of goods and services or traded commodities. If non-consequentialist reasons for stated behaviour are prevalent, then a social process of valuation which denies their existence, or at least their relevance, will project a false interpretation of the outcome of the evaluation exercise. That is the monetary values will fail to represent the values individuals associate with the environment, and interpreting responses as trade prices will result in misrepresentation of the motives that lay behind the stated WTP. In such circumstances, people may find the use made of their statements unacceptable (Burgess et al., 1995), which can create problems for policies implemented on the basis of monetary valuation of the environment.

Section 2 covers the theoretical background to the ethical concern of the study, explaining (inter alia) why refusals to trade are relevant to environ-

mental valuation. This is followed, in Section 3, by an overview of existing empirical work on lexicographic preferences in contingent valuation. Drawing partially on Spash (1998), this overview also includes additional material and develops several new points in the context of the current study. The approach to the wetlands case study is then described (Section 4) and the empirical results are presented and the relationship between ethical positions and WTP explored (Section 5). The study was designed to address inadequacies in previous work on lexicographic preferences and to further interdisciplinary research in the areas of economics, philosophy and psychology.

2. Characterising a key issue: refusals to trade and rights

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. Such a trade-off gives an individual's WTP for the improvement, which is often aggregated to obtain a measure of welfare for the aspect of the environment under consideration. Similarly, the minimum quantity of commodities demanded by an individual in exchange for suffering a reduction in environmental quality is their willingness to accept (WTA) compensation. In this case, the increased expenditure on other goods is taken to compensate for the reduction in environmental quality, so maintaining the individual's initial level of welfare. Whether the other commodities are regarded in terms of a single numeraire (money) or remain as a diverse set (or bundle) of goods and services is inconsequential as far as the theory is concerned.

The essential message of this theory is that individuals are able and willing to exchange one bundle or combination of goods for another and can do so without affecting their welfare level. That is, there are numerous bundles of goods that an individual would regard as equivalent to the current combination of goods which they con-

sume. They are indifferent between different bundles, within a set, which can as a result be substituted for one another without reducing their utility. More of one good can compensate for less of another. The ideas of substitution and indifference then underlie the economic theory of demand which is expressed by continuous smooth demand functions.

However, cases can be found where individuals have been noted to act in denial of this principle of 'gross substitution'. For example, Adams (1995) cites the case of a woman who refused DM 1 million and then DM 10 million for her consent to allow a skyscraper to be built because she felt it would spoil the place where she was born and bred. She stated that 'not even if they were to offer me DM 20 million would I change my mind…'. There has also been other evidence of the refusal to accept compensation for trading environmental quality regardless of the amount. For example, in a CVM study Jansen and Opschoor (1973) found 50% of respondents refused compensation for the noise impacts of a new Dutch airport via a lower house purchase price, no matter how low the price (cited in Hoevenagel et al., 1992). Similarly, Rowe et al. (1980) found evidence to support the view that respondents rejected the concept of 'being bought off to permit pollution' in a CVM study. In this case slightly over 50% of the sample 'required infinite compensation or refused to cooperate' (p.9).

If individuals choose between bundles on the basis of ranking the type of goods/properties they contain, and these goods/properties cannot be substituted for each other, then the standard consumer theory is inapplicable (preferences become discontinuous). For example, assume a bundle consists of two goods and there is a set of such bundles containing a variety of the two goods, but that good 1 is always preferred. On sorting the bundles in order of preference, all bundles without good 1 would be ranked lowest and the bundle with the largest amount of good 1 ranked highest, regardless of how much good 2 these or the other bundles contain. This type of hierarchical choice behaviour means there is no substitution between goods regardless of how much of the superior good is consumed (the axiom of non-sati-

ation). For example, food might be ranked above all other goods so that a bundle with more food is always ranked higher, regardless of the quantities of other goods offered in compensation for accepting a bundle with less food. This behaviour is therefore also termed non-compensatory decision making. Neo-classical economists refer to the preferences underlying this type of behaviour as lexicographic, because they give absolute priority to one commodity over all others and therefore imply a strict ordering, as in a lexicon. The lexicographic ordering prevents the existence of a standard utility function by violating the assumption of continuity (Varian, 1984 p.114). There are no bundles of equal utility to the one currently held (all other variations are either better or worse) and indifference curves cannot be constructed.

A range of authors have been concerned with such preferences and/or the role of non-compensatory decision rules. However, the type of behaviour described above is generally regarded as an extreme form of lexicographic preference. Earl (1986 p.233) has termed it a 'naïve' lexicographic procedure as far as consumer choice is concerned. The lack of bounds upon satiation imply always preferring more of one good or characteristic, while a more sensible strategy for many goods would be to limit the range over which superiority operates. Georgescu-Roegen (1954) has discussed such a hierarchy of satiable, but ever increasing number of wants in a critique of neo-classical utilitarianism. Drakopoulos (1994) explains a 'target setting' procedure which allows for a considerable degree of substitution within hierarchical behaviour. An individual may then aim to consume a certain quantity of a given commodity before starting to consume other commodities. There are, in fact, a variety of other non-compensatory decision rules that reject the principle of gross substitution. Fishburn (1974) reviews several possible modifications that have been designed to make the lexicographic approach more widely applicable. Earl (1986) argues that a 'characteristics filtering' approach enables a better understanding of consumer choice. His work reflects upon marketing where the tendency has been to relate lexicographic preferences to characteristics, attributes or properties rather than goods or com-

modities (see, for example, Engel et al., 1993 p.533–556).

Following from this literature, a general category of 'modified' lexicographic preferences (MLP) can be considered and will be referred to throughout this paper. This might be related to a theory of needs where individuals attain and maintain a minimum standard of living prior to being prepared to defend other humans, non-humans or future generations. Pigou (1952 p.759) felt such a minimum could include, but not be restricted to: a defined quantity and quality of housing, medical care, education, food, leisure, sanitation and safety at work. Achieving, say, nutritional needs allows for substitution within the category because there are many ways in which a given level of nutrition can be fulfilled. Wants may be regarded as deriving from needs and may be fulfilled sequentially, as suggested by Georgescu-Roegen (1954 pp. 516–517). He describes universal wants (to avoid thirst and hunger, and obtain leisure and shelter) as taking priority over culturally specific or higher wants. The modified lexicographic position allows for substitution within such categories of needs. As Drakopoulos (1994 p.140) notes, the extent of substitution will vary as to the category of need being considered and some needs can only be satisfied by a very limited number of goods. 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 a 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. 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.' While more attractive in several respects, the definition of living standard for empirical purposes becomes more difficult because the minimum living standard is expected to differ by social group and culture (as do Georgescu-Roegen's higher wants).

Despite the potential for various forms of lexicographic preferences, neo-classical economists

see the necessity to make trade-offs as a self-evident universal rule and are generally dismissive of any hierarchical decision processes. Lexicographic preferences, when discussed, are only considered in the extreme form and often characterised as something of a straw man. Thus, when lexicographic preferences appear in micro-economic texts, this is to highlight that they are unrealistic and unlikely to occur except where people are addicted to a commodity, such as alcohol or hard drugs. An example of the dismissive approach is Deaton and Muellbauer (1980 p.27) who state that: 'Although lexicographic orderings represent a perfectly reasonable system of choice, it is convenient to rule them out', which they then proceed to do by paying no more attention to them.[1] More in the straw man line of attack is Malinvaud (1972 p.20) who states that while 'Such a preference has sometimes been considered, it hardly seems likely to arise in economics, since it assumes that, for the consumer good 1 is immeasurably more important than good 2. We lose little in the way of realism if we eliminate this and similar cases'. He goes on to claim that this allows a 'purely logical' consumer theory where there is no need to consider what motivates preferences. Malinvaud also claims that neo-classical consumer theory does 'not exclude *a priori* any individual ethical system' and is 'philosophically and psychologically neutral''. Earl (1995 p.40) has shown how neo-classical consumer theory clearly takes one side in this debate because the simple refusal by some individuals to consume certain commodities in defence of ethical principles (e.g. certain religions or vegetarians refusal to eat specific animals) is deemed incomprehensible or irrational behaviour. Far from being philosophically neutral, belief in a universal trade-off doctrine, as expressed by modern consumer theory, can be seen as having a very specific moral basis in preference utilitarianism and this position is rein-

forced by a specific type of hedonism where the egoistic selfish motivations of the individual are emphasised. This leads to regarding all complex behaviour as strategic and reducing all behavioural motives to rent seeking.

Most poignantly, Freeman (1986) dismisses lexicographic preferences via the example of freedom expressed on car license plates in the State of New Hampshire, USA, 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. Certainly the woman, cited earlier, who refused a large sum of money to maintain her freedom to live where she was born and bred might seem unusual. However, if the woman had been coerced into accepting DM 25 million in exchange for the loss of her personal history, sense of place and home, this would misconstrue the values she was trying to maintain. The incommensurability between her lost values and the money remains despite any acceptance on her behalf to stop protesting. Thus, such a process might be best described as being bribed to relinquish higher values rather than a triumph for economic logic (e.g. that such behaviour is merely strategic and can be explained as rent seeking). The danger of a political economy that tries to relegate all matters to tradable items can also be seen in the well-documented cases of compensation offered for the loss of freedom and dislocation of whole communities. For example, North American Indians were routinely 'persuaded' to trade their homelands for commodities (by the British, French and Americans). Many did fight and die for their freedom despite desiring peace. They lost their freedom to roam freely, being placed on reservations, in exchange for (often broken) promises of food, clothing and shelter. The result was the destruction of cultures and communities. A strong perspective from the settlers, expressed repeatedly in negotiations, was that their expropriation of land could be morally justified if something had been offered in return (see Brown, 1970). In the near future environmental refugees are a real prospect under the enhanced greenhouse effect, rising sea levels or due to regionally high levels of radiation result-

---

[1] The system of choice is presumably regarded as 'reasonable' because it allows for a complete ranking, sharing the assumption of strong comparability with standard economic theory. Lexicographic preferences fully satisfy the standard neoclassical economic axioms of completeness, transitivity, reflexivity and non-satiation.

ing from ozone depletion (already impacting Southern Chile). Current economic thought would regard acceptance of compensation as a fair and just exchange, implying no change in the welfare of the affected individuals.

The thrust of the argument in defence of standard economic theory is summarised by the old colloquialism that 'everybody has their price'. Under extreme lexicographic theory, the maximum WTP to prevent the loss of a species would be all the available commodities the individual could command (i.e. their entire income) and WTA compensation would be infinite. The implication is that few individuals when pushed would be prepared to make a total sacrifice for the environment (e.g. biodiversity, wetlands, an endangered bird species). The same logic allows neo-classical economists to 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. Yet, as should be clear from the above, even where trade-offs can be observed they need bear no relationship to human well-being, or what would be regarded as just or fair actions. In this sense the economic model fails. That is, the model regards the defence of value concepts resulting in the rejection of trade-offs as irrational and this is shown to be so by the need to coerce a trade. That such a trade can often be achieved does not, however, signify an improvement in well-being. Rather as Holland (1995 p.22) notes '...to be asked to trade one's principles, even hypothetically, is likely to seem inappropriate and even morally disreputable.'

Environmental philosophers, such as Holland (1995), O'Neill (1993) and Sagoff (1988), have attempted to raise awareness of the importance of the refusal by individuals to make trade-offs on ethical grounds. They show how this can make the application of economic efficiency a controversial policy goal. O'Neill (1993) has discussed the different degrees of comparability and commensurability accepted by economic theories of choice. In these terms, while both lexicographic and standard economic preference theories allow for strong comparability, only the former allows for incommensurable values. Lockwood (1996a)

has adapted the work of O'Neill to develop a classification of environmental values which includes both exchange value and lexicographic preferences. He identifies four categories: (i) alternatives are strongly comparable under a hierarchical decision rule, as under extreme lexicographic preferences; (ii) the hierarchical decision rule operates with thresholds, as under modified lexicographic preferences; (iii) weak comparability where a choice between alternatives is made without attributing value (see O'Neill, 1993 p.104); and (iv) commensurability where substitution between alternatives occurs, as in standard economic theory. Exchange value is relevant only to the fourth category, while intrinsic or end values seem to motivate the other three (Lockwood, 1996a).

The prevalence of such non-exchange values and a refusal to trade seem likely to be high amongst those who claim absolute rights of various sorts for humans, other animals, future generations, plants or ecosystems. One aspect of refusal can be a basis of belief in inviolable rights so that actions are intrinsically of value or deontological (Spash, 1997). This might be expressed by the belief that endangered species have to be protected without regard to the cost in terms of other commodities. An individual may then refuse all money/commodity trade-offs which decrease the numbers of an endangered bird species and so threaten species existence. Thus, the species, which would be regarded as an environmental commodity in the neo-classical framework, may be given moral standing and ranked in a hierarchical manner in comparison with other commodities. Such a position is supported by many of those joining animal rights groups. Similarly, the five million signatures gathered by members of the Cousteau Society to petition the United Nations to recognise the rights of future generations shows an expression of the importance given to rights. Protection of habitat by land designation is often expressed in terms that deny trade-offs reflecting intrinsic values (e.g. see Spash and Simpson, 1993). Yet the language of rights and intrinsic values is often seen as more emotive and less acceptable in economic and policy circles than utilitarian arguments. Hence when Craig and

Glasser (1993) interviewed environmental policy makers and found supporting, conversational evidence for a belief in intrinsic values, they also discovered these beliefs were suppressed professionally.

The overall message is that behaviour in accordance with hierarchical and non-compensatory models can form an important part of a theory of decision making. The extreme lexicographic preference cannot be ruled out, but more generally MLP would be observed, where the superiority of a good or characteristic is restricted. Thus, lexicographic preferences are likely to be operative when a good is essential or has a moral or other irreducible form of value (Lockwood, 1996b p.88).

3. Empirical approaches

Edwards (1992 p.121) has argued that additional and potentially more complex preference structures than indifference need to be considered, and that 'we should learn how to identify moral principles (including utilitarianism, of course) and to associate them with choices among states of the world.' He expressed a concern that the motives lying behind responses in CVM require more attention, and this concern has been shared by others. The CVM survey discussed in the next section investigated behaviour incompatible with a continuous preference function. The approach was based upon previous work and the general aim was to obtain more rigorous results than have been shown by previous empirical studies. In order to see how this was achieved this section review, published studies claiming to show the existence of lexicographic preferences in developed countries for wildlife (Stevens et al., 1991), animals, plants and ecosystems (Spash and Hanley, 1995) and endangered species (Lockwood, 1998).

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.[2] 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 these respondents agreed with statements that rejected monetary valuation but were prepared to make WTP 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 a modified lexicographic position. However, those rejecting 1 and agreeing with 3 reject monetary compensation for wildlife, but rank money above wildlife, are 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 and enables greater use of wildlife resources (e.g. site visits). The exact number of lexicographic individuals is therefore uncertain from the data reported in the paper.

Later Stevens et al. (1993) cited 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 was a natural rights viewpoint equated with Kantian ethics and animal existence rights. Third was ambivalence theory where protest bids are found to occur when the values at stake are felt to be hard to

---

[2] The possible importance of lexicographic preferences in CVM was noted by Edwards (1986) and seems to have inspired the study by Stevens et al. (1991).

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., showed some evidence of ambivalence for bids between $50 and $75, the underlying causes remained unexplained.

Spash and Hanley (1995) also attempted to identify lexicographic preferences and found 23.2% of the sample in this category.[3] 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, which is a rapidly disappearing regional ecosystem and a principal habitat for 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.

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 to society, which included 35 who were willing to pay a positive amount and 14 zero bids. The correlation coefficient between a belief in absolute animal 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 to society. 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 ecosystem 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 to society, 33 gave a positive WTP bid (16 zero bids). The correlation coefficient between a belief in absolute biotic rights and WTP was $+0.181$.

Two main groups of individuals refusing to trade-off income against biodiversity protection were revealed by this study:
1. Respondents who stated that animals/ecosystems/plants have rights and should be protected irrespective of the costs to society and who refused to give a WTP amount (46 respondents or 23.2% of the sample).
2. As with 1, but where individuals have a positive WTP (148 respondents or 74.7% of the sample).

In the extreme lexicographic case, theory predicts the WTP to prevent a loss should be the individual's entire income and they would still be worse-off even if the change was prevented. However, the expectation was that, rather than respondents stating such an extreme bid, these individuals would protest against the proposition in the survey and bid nothing. The positive bids associated with the rights-based positions were then regarded as difficult to classify because they were small in terms of disposable income. Several explanations might be offered. The individual may simply be inconsistent and failing to engage with the survey. Alternatively, the absence of an alternative institutional arrangement which respects the rights of non-human entities means they show a token of support for the only option being offered. An MLP position could also explain the small bids if individuals are near their minimum living standard or a threshold and this is all they believe they can afford without dropping below that standard or threshold.

In terms of the zero bid classification, some individuals might hold a lexicographic position, but be classified as placing no value on the aspect

---

[3] Results for the general public sample are reported here, although a student sample was also surveyed in the research.

of the environment under consideration. That is, under a modified lexicographic theory the rights-based individuals may regard themselves as being at their minimum living standard already and therefore unable to pay. They would then have been treated as zero bidders for reason of zero value and not lexicographic, because their stated reason for non-payment would be 'no spare income', regardless of their actual monetary income level. In this study, a zero bid with a protest reasoning was the only category regarded to represent a behaviour consistent with trying to protect rights and, therefore, only those individuals were classified as having lexicographic preferences. However, even then, almost a quarter of the respondents fell into the category.

The study raises several questions. The public sample was obtained by in street interviews rather than at home and this could reduce attention and engagement with the survey, leaving room for inconsistencies and superficial answers. The total public sample was relatively small (194) and based in one area of central Scotland. The results might therefore be argued to be an anomaly and a general population sample might give different results. The prevalence of positive bids while taking a rights position could be seen as a failure to enforce the trade-off a rights position implies. That is, people would back down from their stated rights position if they were probed further about possible implications for them personally, rather than society in general. Other potential ethical positions could have been offered to individuals so they could make a selection rather than just agreeing or disagreeing with one position, i.e. rights. No relationship between the ethical position and WTP was shown beyond the simple correlation coefficients and these were positive in two cases and negative in one. The small sub-sample size and lack of variability in responses on rights prevented further analysis. Thus, the importance of an ethical stance in terms of the bid curve remained unknown. Finally, the payment was to prevent a deterioration in the environment due to the threat of logging and this might be regarded as a contentious issue encouraging protests. If an environmental improvement had been the subject of the valuation exercise the link between rights and protest zero bids may have been substantially reduced.

A more recent study has used a different approach to test for the presence of lexicographic preferences. Lockwood (1998) combined a CVM scenario with an iterative computer programme to collect data for the construction of detailed preference maps. This built on his earlier work in the area which reported a pilot study for a small sample of five people using an intensive preference mapping technique (Lockwood, 1994, 1996b). The policy being assessed in this experiment was the preferred degree of protection from logging for Wet Eucalypt forests in the state of Victoria, Australia. All five respondents stated a belief in their right to the forest reserve and a responsibility to see it increased. They all refused to give a WTA for reduction of the reserve area. The pilot study found one participant had lexicographic preferences within a fixed WTP range and two had thresholds under which they had lexicographic preferences. However, the research process was time consuming, requiring each individual to attend four sessions over eight days and spend an average time of three hours for the completion of the preference map.

In his more recent study Lockwood (1998) simplified and adapted the approach to be compatible with a survey context and managed to reduce the total time required of a respondent to 43 minutes on average. This method uses a large number of paired comparisons to obtain the preference map of each respondent and identify intransitive preferences. The study had a sample of 95 people split into two fairly even sub-samples on the basis of different scenarios. The policy context was loss of the endangered Mountain Pygmy-possum from New South Wales, Australia. The cause of loss was linked to the enhanced greenhouse effect and the prevention strategy was purchasing a new benign vehicle fuel. This scenario seems rather contrived and is noted by Lockwood (p.82) to be less realistic than that of his pilot study. The belief in the right of the possum to exist and be protected from harm was significant and positively correlated with WTP, although this model was otherwise statistically weak. Lexicographic preferences were found for 8.5% of the sample, but they

were also found to bid positively. In addition, other respondents were identified as having 'non-exchange' preferences. This meant 24% of the positive WTP bids were classified as falling outside the standard economic model and potentially expressing a non-compensatory decision process.

4. The wetlands survey design

In the study that will be reported here, conducted in the context of the VALSE Project, the survey was designed to accommodate the presence of lexicographic preferences and to probe those claiming such a position more fully while addressing the potential criticisms mentioned in the last section. This approach allowed for the adjustment of a CVM survey instrument to detect the presence and extent of such preferences in the surveyed population, and also for the inclusion of variables reflecting those preferences for use in bid curve analysis. A rights-based position was taken to signify an ethical stance compatible with lexicographic preferences. A strong category of MLP can be identified when rights are maintained in the face of personal costs which reduce an individual's living standard to a minimum. A weak category of MLP holds if rights are removed when such a cost is threatened, i.e. an undisclosed threshold effect is operative.

The survey was conducted by an independent market research company (Euro Fieldwork) who interviewed respondents at home. The sample consisted of 713 interviews using a random walk method based on selected areas. While a random sample is the normal theoretical aim of such studies this tends to be impossible in practice because a complete list of the population is unavailable. For example, even voting registers are incomplete, and especially so in Britain since failure to register after the aborted attempt to introduce a national poll tax. Thus, a two-stage stratified sampling technique was employed, 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 centred more on towns and cities as opposed to the local sample which was a mixture of town, rural and village locations. The survey was developed via focus groups and pre-tested around Cambridgeshire; the results gave statistically significant and theoretically sound results. During this process adjustment was made in terms of wording and information delivery.

The survey was designed in several sections, which were delivered to respondents in the following order: framing and knowledge questions, the information pack and payment scenario (WTP), ethical and attitudinal questions and socio-economic data. The information pack consisted of an area map, photographs of an actual site before and after conversion to a wetland, an artist's impressions of the two ecosystems, and brief descriptions. A 'neutral' delivery was attempted by making sure a balance of information was presented on each ecosystem, and avoiding any emotive language. Some opposition was expected from locals who had experienced flooding in the past, but only one respondent held such a position.

A description in words gave some of the historical background, i.e. the historical existence of wetlands and marsh land in the area. Then the size of the proposed site (1 mile by 1 mile) was introduced and the existence of a similar site was mentioned (Wicken Fen). This set the context for the re-creation project before giving the more detailed description of the farmland and fenland ecosystems. 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 developed via the focus group and pre-

test results 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 (scientific) ecosystem diagram was also found to be too technical a presentation of facts and failed to give 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 the other the farmland ecosystem. This allowed a general aesthetic description to be introduced visually and was accompanied by a key which could be used to name the flora and fauna 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. 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. During survey development each was shown separately but ease of comparison was aided by combining them on one sheet for the main survey.

In order to categorise ethical positions respondents were 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: rights for animals (in this case endangered bird

species), consequentialism favouring either endangered species or humans (in a utilitarian mode), and superiority of humans. The last position can be regarded as an hierarchical preference placing humans first. In order to try and probe the possibility that people might back down on their animal rights position a follow-up question was asked of those attributing rights to bird species. This involved confronting the respondent with a scenario where protecting endangered birds would mean incurring 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. The result of this procedure was to increase the ethical categories to five which now included two animal rights-based positions, two consequentialist positions and one human priority position. Those holding the rights-based position in face of a reduction in their personal living standard to a minimum are consistent with an extreme lexicographic preference. Strictly speaking, this is only identified as a 'strong' category of MLP, because a minimum living standard is required. Those who back down when confronted with this loss are signifying a threshold effect consistent with a 'weak' category of MLP. This weak versus strong terminology is therefore used in reporting the results.

As discussed above, the expectation of a lexicographic preference is that individuals will bid all their spare income for even a small improvement of the highly ranked good. However, individuals may reject the institution that imposes such a condition on them. This behaviour has the advantage for the individual of avoiding acceptance of an objectionable 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 original choice. Thus, a lexicographic position can be hypothesised to lead to either protests in the form of zero or no bids, or positive bids where these represent all available resources (which will be within a threshold under

Table 1
Lexicographic categories and WTP for protecting endangered species

	WTP	Reason	Explanation/Consistency
Extreme Lexicographic			Rights-based favouring endangered species regardless of personal cost
	Positive		Consistent if rights protected
	No bid		Inconsistent
Strong MLP			Rights-based favouring endangered species even when personal living standard reduced to a minimum
	Positive		Only consistent with strong MLP if believe rights protected or income reduced to minimum living standard. Behaviour unlikely for small threat/ environmental change. Other possible explanations. WTP inconsistent with economic welfare measures.
	No bid	Protest	Consistent with strong MLP. Places value on scheme but gives no monetary amount
	No bid	Too poor	Consistent with strong MLP at minimum living standard
	No bid	No value	Inconsistent with strong MLP
Weak MLP			Relinquish rights if threatened with personal cost reducing living standard to a minimum
	Positive		Consistent with weak MLP if WTP reduces income to threshold
	No bid	Protest	Consistent with weak MLP. Places value on scheme but gives no monetary amount
	No bid	Too poor	Consistent with weak MLP if at threshold
	No bid	No value	Inconsistent with weak MLP
Humans First			Consistent with a lexicographic preference favouring human superiority
	Positive		Inconsistent
	No bid		Consistent

MLP). Data must then be collected on the reasons for zero bids in order to identify protests. This follows the approach taken by Spash and Hanley (1995) where zero bids for non-zero value reasons were identified to see how many of these protest bids were consistent with a rights-based position and so a lexicographic preference. The approach in the current study is thus more refined, allowing greater separation of respondents by ethical category prior to the consistency test. The full range of categories is summarised in Table 1 and Table 2.

5. Results

Of the 713 individuals interviewed, 36 (5%) refused to answer the WTP question and 182 (26%) were unable to answer, responding 'don't know'. This left a sample of 495 positive and zero bidders. Approximately a third of respondents gave a positive WTP. Prior to being given any information on the scheme interviewees were asked if they had a preference for wetlands to be increased or decreased. Eleven people (1.5%) had a prior preference for a decrease, while 70% had no preference or 'didn't know' and the remaining 28.5% were in favour of an increase.

The results for the ethical breakdown by the initial four categories are shown in Table 3. Respondents also had the option of 'Can't answer — this is too complicated' which 6% of the sample chose. As can be seen in Table 3, a large proportion of respondents attributed rights to birds, approximately 37%, while only 9% put humans first regardless of the circumstances. The largest grouping (47%) weighed up the consequences of the case to decide whether protection was valid. These consequentialists are regarded as acting in a way that is compatible with the standard neoclassical economic theory.

The large proportion of the sample adopting a rights-based position may seem surprising and there is the possibility that the individuals con-

Table 2
Consequentialist categories and WTP for protecting endangered species

	WTP	Reason	Explanation/Consistency
Consequentialist Species			Endangered species take priority in this case. Consistent with utilitarianism.
	Positive		Consistent with utilitarian position where consequences for species seen as important. Requires fair and free exchange without welfare loss
	No bid	Protest	Consistent if reason 'judged rational'
	No bid	Too poor	Consistent
	No bid	No value	Consistent if no benefit to species
Consequentialist Humans			Humans take priority in this case. Consistent with utilitarianism.
	Positive		Consistent if benefit to humans seen as important (e.g. jobs, recreation) and there is fair and free exchange without welfare loss
	No bid	Protest	Consistent if reason 'judged rational'
	No bid	Too poor	Consistent
	No bid	No value	Consistent if no benefit to humans

Table 3
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'
Humans 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	

cerned might fail to act in accordance with their stated belief. One concern here is that people may give an accepted social response, especially when others are present. Data were collected on whether others were listening during the interview and this occurred in only 19% of the interviews. In addition, the proportion of these respondents in each ethical category was approximately the same regardless of whether other people had been present or not, i.e. there was no significant relationship.

Next the rights-based respondents were divided by whether they maintained their position in the face of personal costs which reduce their living standard to a minimum. As is clear from Table 4 this effectively split the proportion of those attributing rights, although in both national and local samples a larger number maintained their position than accepted species extinction. The proportions in each category were similar across the two samples.

The above procedure resulted in five categories including strong MLP (22.5%) and weak MLP (17.4%). These responses can be further broken

Table 4
Ethical opinion about bird species rights[a]

	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
Consequentialist, species first in this case	69	21.2	80	23.4	149	22.3
Consequentialist, 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

[a] Excludes 42 don't know, four refuse.

Table 5
Summary of category results and consistency for the case study[a]

	Probable consistency	WTP	%	N
Strong MLP				
	Inconsistent (?)	Positive bid	10	68
	Consistent	No bid: protest	6	41
	Consistent	No bid: too poor	5	31
	Inconsistent	No bid: no value	1	8
		Missing	0	2
Weak MLP				
	Consistent	Positive Bid	5	35
	Consistent	No bid: protest	5	35
	Consistent	No bid: too poor	4	27
	Inconsistent	No bid: no value	3	19
Consequentialist species			22	149
Consequentialist humans			28	187
Humans first			10	65
Total			100	667

[a] Does not add to 100% due to rounding errors. Excludes 42 don't know, four refuse.

down by WTP grouping and protest bidding (no bid for non-zero value reasons). In the current study there were three categories of people giving no monetary valuation but who might hold a positive value for the environmental change; these were zero bidders, refusals and don't knows. This covered 466 (71%) of the respondents, excluding missing observations. Economists generally regard a set of reasons as legitimate explanations for bidding zero, i.e. being too poor, finding the change unimportant, or regarding other things as more important. These reasons were given by 286 (62%) of those giving no monetary value. The remaining respondents were mainly protesting against the bid vehicle and requesting more information. The proportion of these individuals holding the two rights-based positions was 43%. 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 (1995) is 11%. Of these 6% are in the strong MLP group and the remaining 5% show weak MLP.

The results are summarised in Table 5. As can be seen, those claiming a rights-based position

consistent with strong MLP can be split into 10% bidding positively, and 12% observed to place no monetary value on the wetland re-creation scheme, of whom 11% are unable to bid (too poor) or protest. Another, approximately, 17% of respondents claim a rights position consistent with weak MLP of whom 5% bid positively and 9% are unable to bid or protest non-bidders. Those who are regarded as 'legitimate' non-bidders for the purposes of a standard CVM study, because they fail to give a protest reason, should be recognised as potentially holding a position consistent with MLP, especially as the majority are claiming an income constraint. There are in particular 4% of the total sample who do so under weak MLP position and 5% under strong MLP. In summary, this means there are 6% strong MLP protest non-bidders, 5% weak MLP protest non-bidders, 9% weak MLP non-bidders on their threshold if acting consistently, 4% inconsistent non-bidders, and 15% strong and weak MLP positive bidders, some of whom may also be inconsistent. However, despite this greater refinement, the approach partially obscures the type of behaviour being observed, and its full impact on contingent valuation, by focusing attention on the first two groups. This is particularly the case because CVM practitioners will accept positive bids at face value regardless of the motives and ignore non-bidders who fail to fall into a protest category. However, further analysis shows the importance of going beyond this focus on protest non-bidders.

If the various ethical positions are categorised by bid type, a chi-squared test can be run to check for non-random associations; that is, to check whether the ethical positions cause a non-random 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 6 shows the results which reveal a highly significant chi-squared.[4] 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. There is a clear trend associated with the position on the ethical spectrum, from species rights to placing humans first, and the different bid categories. More generally, the ethical approach of respondents seems to explain participation in the contingent valuation process.

That the ethical position an individual holds affects the whole approach to the survey can be seen by looking more closely at the zero bids, refusals and don't knows. The reasons people give for adopting these positions and giving no value may be related to their ethical position. If so, ethical positions can be expected to influence the outcome of the contingent valuation process both in terms of those who decide to bid and the treatment given to protest bids. As shown in Table 7, the chi-squared results are again significant and there is a trend according to ethical position. The rights-based individuals are more likely to want more information, protest against the bid vehicle, claim a lack of income and are less likely to find the change unimportant and other things more important.

In investigating the significance of the different ethical positions, including the consequentialist ones, a bid curve proves instructive. Of the 713 individuals there were 495 positive and zero bidders for use in the bid curve analysis, the remainder either refusing to answer or stating 'don't know'. The requirements of the regression analysis further reduces the sample because various people refuse to answer all the other survey questions. Where non-response occurs for an explanatory variable in the regression, the observation is dropped 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. Thus, sample size will vary depending upon the variables in the equation.

Table 8 gives the results for three model runs using a semi-log linear function, i.e. the dependent variable is the log of WTP. A nominal amount (£0.001) was added to the bids to enable the log to be taken of the zero bids. The variables in Model

---

[4] 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.

Table 6
Right to life for bird species and WTP for wetlands[a]

	Willingness to pay category				
	Positive	Zero	Refuse	Don't know	N (%)
Right regardless of personal living standard					
Actual	68.0	35.0	0.6	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	(23.3)
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)

[a] 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.

1 are those socio-economic factors which are typically expected to predict WTP. In this study 25% of respondents refused to give an income category answer and there was evidence of under-reporting amongst those that did give an income response. Income data proved to be unreliable, the variable was insignificant when included in regression analysis and the sample size was dramatically reduced due to item non-response. Education and gender can act as surrogates for income and both were included in the model. Likelihood of visiting the wetland site in the future (VISITF), environmental concern/knowledge (ENVKNOW) and education to 16 years of age (EDU16) all proved highly significant. The impact of being a local (LOCAL) was significant at the 90% level while gender (FEMALE) was insignificant. Model 1 is reasonable for a contingent valuation study with

an adjusted R^2 of 16.4%. In Model 2 only the ethical variables were included and this showed all to be significant at the 90% level. Three of the variables were highly significant (i.e. 99% level), namely the strong MLP position (RLEXI), the utilitarian favouring animals in the case of the wetlands project (UANIMALS) and those who place humans first regardless of the circumstance (HUMANS). The weaker variable was for those who held rights but would give them up if their living standard were to be reduced to a minimum (RSOFT), weak MLP. There was a positive correlation between the rights positions and WTP and a negative one for those favouring humans. The model was significant on the F-test and had an adjusted R^2 of just under 12%. This shows the ethical variables to be competitive with the standard socio-economic ones in terms of explaining

Table 7
Ethics and reasons for failing to value the wetland re-creation project[a]

	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)

[a] 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 8
Regression analysis of ethics and WTP

	Coefficient (significance T)		
	Model 1	Model 2	Model 3
RLEXI		3.066267	2.534754
		(0.0000)	(0.0000)
RSOFT		1.190374	1.176216
		(0.0558)	(0.0435)
UANIMAL		1.608330	1.344046
		(0.0045)	(0.0115)
HUMANS		−2.458980	−1.578690
		(0.0006)	(0.0207)
ENVKNOW	2.842543		2.337026
	(0.0000)		(0.0000)
VISITF	0.393205		0.331766
	(0.0060)		(0.0216)
EDU16	−1.055929		−1.060778
	(0.0059)		(0.0055)
LOCAL	0.870280		0.860050
	(0.0535)		(0.0566)
FEMALE	0.604635		0.638577
	(0.1153)		(0.0960)
(Constant)	−5.466111	−3.923871	−5.876637
	(0.0000)	(0.0000)	(0.0000)
F-test (significance)	20.18 (0.0000)	16.45 (0.0000)	16.60 (0.0000)
R^2	0.17248	0.12564	0.24968
Adjusted R^2	0.16394	0.11801	0.23464
N	489	462	458

variability in WTP. In Model 3 the two sets of variables were combined. The adjusted R^2 increased to 23.5% and the model was significant. As shown in Table 8, all the variables in Model 3 are significant at the 90% level and the ethical variables at the 95% level. The strong MLP position (RLEXI) remains one of the most significant variables. Overall this shows how ethical positions can play an important role in determining WTP and that the stronger rights position can prove to be important.

6. Conclusions

Hierarchical or non-compensatory decision rules have been neglected by neo-classical economists but, because they allow for incommensurability, are more general than the economic theory of choice which may be considered a special case. The properties associated with 'goods and services' (or entities) may be hierarchically ordered so those goods and services (entities) with the highest level properties are always preferred, as under extreme lexicographic preferences. Alternatively, the hierarchical ordering of properties may only be fixed over specified ranges giving MLP. Such MLP can also allow for substitutability over certain ranges, although this is not required. As Lockwood (1996a, 1997), argues, and shows, the applicability of different decision rules will vary between individuals. This is reinforced by the results reported here. A choice of decision rule can be taken to reflect the dominant values an individual associates with a good or service (or entity) and the circumstances of the decision. Where exchange values are dominant a standard economic model may operate, but where intrinsic or end values operate (as reflected in the

attribution of rights) this approach loses theoretical justification and can mislead policy.

Respondents were asked to state the extent to which they saw various ethical positions (deontological/rights, consequentialist/utilitarian) 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 of the contention that 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 the rights-based positions being adopted by the respondents and their compatibility with either extreme or modified lexicographic preferences. Approximately 6% of the sample could then be identified as protest non-bidders holding a strong MLP position and 5% a weak MLP position. These individuals are seen to be acting consistently with their rights position and threshold lexicographic preferences of differing strengths.

In addition, some of the non-protesters may also be acting in a fashion consistent with MLP. For example, those who state they have no spare income, bid nothing and claim their rights are subject to a threshold above a minimum living standard (strong MLP), or weaker threshold (weak MLP), are perfectly consistent with MLP and constitute another 9% of the sample. Thus a survey procedure with consistency checks identifies 20% of the sample with MLP who make no bid, of whom 11% believe rights for endangered bird species should be protected even at a personal cost which places them on a minimum living standard.

The information on ethical positions (including categories for utilitarian and human superiority) also indicates the willingness of respondents to participate in the CVM exercise. Chi-squared tables revealed that people bring their fundamental ethical beliefs to bear on their decision whether to engage in the monetary valuation process with which they are being confronted. The rights positions were found to result in a greater than expected frequency to bid positively. This may seem surprising in view of notions about protest behaviour, but the literature reviewed in this paper shows that lexicographic and rights positions have been associated with positive bids. Also, amongst the rights categories there was a greater tendency to want more information, protest against the bid vehicle and claim a lack of income. The observed relationship of ethical positions to the reasons for failing to give a positive bid suggests that the standard approach of using these responses to classify valid zero bids from protests zero bids is likely to unintentionally favour certain ethical groups.[5] The bid curve analysis showed that ethical positions are important determinants of WTP and a belief in animal rights is positively correlated with WTP.

A qualification is then necessary in order to explain why a positive bid by a believer in rights can be consistent with a lexicographic preference. The extreme model of lexicographic behaviour would predict being prepared to exchange 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 strong MLP position is adopted as an explanation, then positive bids are expected to be the amount above a threshold such as a minimum standard of living. An additional complication is then that while the position seems more reasonable, because it is less extreme, the 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 strong MLP also seems an inaccurate interpretation of these positive bids. Thus, for consistency to hold, the positive bids might be regarded as conforming with weak MLP where the threshold is very close. Another alternative is that the threat to species is seen as relatively minor and/or the payment offered is felt to be sufficient to ensure the rights are protected and more would be offered if required. This latter

---

[5] The allowance was made in this study for refusals and don't knows, noting that these have often not been formulated as separate categories in CVM and merely treated as zero bids.

position would be consistent with defending a principle at least cost.

Elsewhere, evidence has been presented that environmentalists have a tendency to favour a belief in inviolable rights and adopt a deontological position (Spash, 1997). One concern that arose from that work was that CVM might disenfranchise environmentalists by presenting them with a social process of valuation which they would reject. However, the empirical evidence here shows a more complex story. For some individuals a positive payment is seen as consistent with their attribution of rights (15.5%). In the current case, among those maintaining that endangered bird species have a right to life even if this lowers their personal living standard to a minimum (strong MLP), 45% gave a positive bid. In addition, a positive and highly significant relationship was found with WTP. Thus, a more detailed assessment of hierarchical decision rules and environmental attitudes seems appropriate.

In summary, while the lexicographic model appears to offer an explanation for some of the observed positive bid behaviour, this cannot be confirmed and the model interprets the remainder as inconsistent. However, the general hypothesis is upheld in the sense that fundamental ethical positions are found to influence significantly the outcome of a contingent valuation survey. A significant minority of individuals reject neo-classical choice axioms yet, simultaneously, are observed to show behavioural intentions which can easily be misinterpreted as consistent with mainstream economic theory because they give a WTP amount. Lockwood (1998) has reported similar results.

In terms of CVM the current research suggests that the motive to give a WTP amount can have as much to do with a concern to contribute for the defence of the environment and species rights as expressing a consequentialist preference. Of the positive bids, 51% were given by those claiming rights for endangered bird species. The implication of using the monetary value obtained as (or 'as if') a trade price for wetland ecosystems, or components of it such as bird species, is that this mis-represents the motive and values being expressed. There should then be little surprise that

revealing the use being made of these numbers can result in moral outrage (Burgess et al., 1995). Only 47% of the sample confirmed a position consistent with the utilitarian model of neo-classical economics. This study supports previous work in showing that ethics and non-compensatory choice rules can be expected to play a key role in decisions affecting endangered species and ecosystems.

Acknowledgements

References

Adams, J.G.U., 1995. Cost-benefit analysis: Part of the Problem, Not the Solution. Centre for Environmental Policy and Understanding, Green College, Oxford.

Brown, D., 1970. Bury My Heart at Wounded Knee: An Indian History of the American West. Holt, Rinehart and Winston, New York.

Burgess, J., Clark, J., Harrison, C., 1995. Valuing Nature: What Lies Behind Responses to Contingent Valuation Surveys? University College London, London.

Costanza, R., Farber, S.C., Maxwell, J., 1989. Valuation and management of wetland ecosystems. Ecol. Econ. 1 (4), 335–361.

Craig, P.P., Glasser, H., 1993. Ethics and values in environmental policy: The said and the UNCED. Environ. Values. 2 (2), 137–158.

Deaton, A., Muellbauer, J., 1980. Econ Consumer Behavior. Cambridge University Press, Cambridge, England.

Drakopoulos, S.A., 1994. Hierarchical choice in economics. J. Econ. Surv. 8 (2), 133–153.

Earl, P., 1986. Lifestyle Economics: Consumer Behaviour in a Turbulent World. Wheatsheaf, Brighton, England.

Earl, P.E., 1995. Microeconomics for Business and Marketing: Lectures, Cases and Worked Essays. Edward Elgar, Aldershot, England.

Edwards, S.F., 1986. Ethical preferences and the assessment of existence values: Does the neoclassical model fit? Northeast. J. Agric. Resour. Econ. 15 (2), 145–150.

Edwards, S.F., 1992. Rethinking existence values. Land. Econ. 68 (1), 120–122.

Engel, J.F., Blackwell, R.D., Miniard, P.W., 1993. Alternative evaluation. In: Engel, J.F., Blackwell, R.D., Miniard, P.W. (Eds.), Consumer Behaviour. Dryden Press, Fort Worth, Texas, pp. 533–556.

Fishburn, P.C., 1974. Lexicographic orders, utilities and decision rules: a survey. Manag. Sci. 20 (11), 1442–1471.

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

Georgescu-Roegen, N., 1954. Choice expectations and measurability. Q. J. Econ. 68 (2), 503–534.

Gowdy, J.M., 1997. The value of biodiversity: markets, society, and ecosystems. Land. Econ. 73 (1), 25–41.

Hoevenagel, R., Kuik, O.J., Oosterhuis, F.H., 1992. The Netherlands. In: Navrud, S. (Ed.), Pricing the European Environment. Scandinavian University Press, Oslo, pp. 100–107.

Holland, A., 1995. The assumptions of cost-benefit analysis: a philosopher's view. In: Willis, K.G., Corkindale, J.T. (Eds.), Environmental Valuation: New Perspectives. CAB International, Wallingford, pp. 21–38.

Jansen, H.M.A., Opschoor, J.B., 1973. Valuation of the effects of aircraft noise on residential areas around the potential locations of a second Dutch national airport. Inst. Environ. Stud. Ser. A. 4/5, 95.

Lockwood, M., 1994. Complex Preference Structures in Natural Area Valuation. Presented at Forestry and the Environment: Economic Perspectives. Banff, Canada.

Lockwood, M., 1996a. End value, evaluation, and natural systems. Environ. Ethics. 18 (3), 265–278.

Lockwood, M., 1996b. Non-compensatory preference structures in non-market valuation of natural area policy. Aust. J. Agri. Econ. 40 (2), 85–101.

Lockwood, M., 1997. Integrated value theory for natural areas. Ecol. Econ. 20 (1), 83–93.

Lockwood, M., 1998. Integrated value assessment using paired comparisons. Ecol. Econ. 25 (1), 73–87.

Malinvaud, E., 1972. Lectures on Microeconomic Theory. North-Holland, Amsterdam.

O'Connor, M., 2000. Pathways for Environmental Valuation: A Walk in the (Hanging) Gardens of Babylon. Ecol Econ, 34(2) 175–193.

O'Neill, J., 1993. Ecology, Policy and Politics: Human Well-Being and the Natural World. Routledge, London.

Pigou, A.C., 1952. The Economics of Welfare. Macmillan, London.

Rowe, R., d'Arge, R., Brookshire, D., 1980. An experiment on the economic value of visibility. J. Environ. Econ. Manag. 7 (1), 1–19.

Sagoff, M., 1988. The Economy of the Earth: Philosophy, Law, and the Environment. Cambridge University Press, Cambridge.

Sen, A.K., 1987. On Ethics and Economics. Basil Blackwell, Oxford, England.

Spash, C.L., 1997. Ethics and environmental attitudes with implications for economic valuation. J. Environ. Manag. 50 (4), 403–416.

Spash, C.L., 1998. Investigating individual motives for environmental action: Lexicographic preferences, beliefs and attitudes. In: Lemons, J., Westra, L., Goodland, R. (Eds.), Ecological Sustainability and Integrity: Concepts and Approaches. Kluwer Academic Publishers, Dordrecht, The Netherlands, pp. 46–62.

Spash, C.L., Hanley, N., 1995. Preferences, information and biodiversity preservation. Ecol. Econ. 12 (3), 191–208.

Spash, C.L., Simpson, I.A., 1993. Protecting sites of special scientific interest: intrinsic and utilitarian values. J. Environ. Manag. 39 (3), 213–227.

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. Econ. 67 (4), 390–400.

Stevens, T.H., More, T.A., Glass, R.J., 1993. Measuring the existence value of wildlife: reply. Land. Econ. 69 (3), 309–312.

Turner, R.K., 1988. Wetland conservation: economics and ethics. In: Collard, D., Pearce, D., Ulph, D. (Eds.), Economics, Growth and Sustainable Environments. Macmillan, London, pp. 121–129.

Varian, H.R., 1984. Microeconomic Analysis. WW Norton, New York.