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Wildlife Enhancement Scheme

A contingent valuation study of the Pevensey Levels

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A Contingent Valuation Study of the Pevensey Levels

A report prepared for English Nature
by

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An annex containing the questionnaires used in
the study is also available from the above address.

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EXECUTIVE SUMMARY

Aims and Objectives of the Study

- To assess the change in use and non-use values of the Pevensey Levels Site of Special Scientific Interest (SSSI) arising from the implementation of the Wildlife Enhancement Scheme (WES). The results of this analysis are then used to estimate the additional benefits accruing to the general public from the WES in the Pevensey Levels SSSI.

- To assess whether such an evaluation can be achieved by contingent valuation methods (CVMs) and whether this methodology will provide robust, reliable and acceptable results which will be useful to policy makers.

- To link with researchers at University College London in exploring how respondents had formulated their responses to the CVM survey.

Respondents' Preferences and Opinions

- Over 75% of respondents said that nature conservation in England was now an urgent problem.

- Over 70% of respondents were willing to pay higher taxes to protect the environment.

- Woodlands were respondents' most preferred habitats, and wetlands their least preferred.

- There was little overall agreement among respondents about the levels of threat facing wetland habitats.

Methodology

A contingent valuation questionnaire was used to elicit respondents' willingness to pay (WTP) for WES in the Pevensey Levels. The questionnaire also provided information about the Levels and about WES, and sought to elicit respondents' preferences about habitats and recreation as well as details about their use of the Levels for recreation.

Respondents were asked first whether or not they were willing to continue paying the few pence a year which each household contributes in taxes towards WES in the Pevensey Levels.

A CVM bidding game was used to find out how many times as much as today respondents were willing to pay for the scheme.

Thus, respondents who were willing to pay an additional amount of taxes were asked the following question:

> "Recall that the majority of households pay a few pence a year for the Wildlife Enhancement Scheme in the Pevensey Levels. Bearing in mind that there are many worthwhile nature conservation programmes in England which you might wish to support, what is the MAXIMUM your household would be willing to pay for the Wildlife Enhancement Scheme in the Pevensey Levels compared with today? Twice as much? Three times as much? Four times as much?... "

All bids were subsequently examined to check their validity, and any that were found to be made as a protest, or for strategic reasons, were rejected for the purposes of analysis.

All aspects of methodology were adopted in order to provide conservative estimates of willingness to pay which when aggregated would form a lower-bound of the additional benefits which the general public obtains from WES in the Pevensey Levels.

The Sample Survey

Samples were taken from each of the following groups:

Local residents in and around the Pevensey Levels: from settlements in and around the Pevensey Levels (usable sample size = 151, sampled at home)

Visitors to the Pevensey Levels: casual visitors, members of organised parties with wildlife interests, anglers and ramblers (usable sample size = 163, sampled on-site and off-site)

Non-Visitors: a general public survey in the 60 km zone surrounding the Levels found households who lived outside the Pevensey Levels and had not visited the area in 1994 (usable sample size = 278, sampled at over 20 interview sites)

Recreational Use of the Pevensey Levels

- Walking, looking at wildlife, visiting pubs and angling were found to be the most popular recreational pursuits on the Pevensey Levels.

- It was estimated that over 80,000 households visit the Pevensey Levels each year.

- Visitors sampled as part of the general public survey of 60 km area around the Levels were found to make on average 3.7 visits per year to the area.

- Respondents sampled in the visitor survey however, made an average of 22.3 trips to the Levels during the previous 12 months. This figure was inflated by a number of local people making casual visits to the area on a daily or weekly basis, so it is likely that the true mean number of visits per household lies somewhere between the two figures.

- Within the visitor sample 19.3% of respondents had made only one visit in the last 12 months, with 63.1% making ten or less.

- Day trips accounted for 72.5% of visits in the sample, with the remainder made by holidaymakers staying near to the Levels (e.g. in Pevensey Bay on the fringes of the Levels).

- Close to 90% of visits were made by car, but the high incidence of local users meant that over 7% of respondents walked to the Levels.

- The average distance travelled to get to the Levels was just over 21 miles (34 km), but the median distance was only 10 miles (16 km): over 70% of visitors travelled 20 miles (32 km) or less.

- Over 82% of respondents in the general public sample had heard of the Pevensey Levels, and only 17.6% had not. However, only 37.3% had ever visited the Levels, compared with 62.1% who were certain that they had not.

Willingness to Pay by Resident, Visitor, and Non-Visitor Households for the Pevensey Levels WES

In each sample over 97% of respondents said they were willing to continue making their current payments towards WES in the Pevensey Levels.

Many respondents were also found to be willing to pay an additional annual sum towards WES in the Levels. The proportion of these respondents in each sample was: residents 75.16%; visitors 70.22%; and non-visitors 53.64%.

The WTP estimates given in the table below are based on those respondents who were willing to pay an additional annual sum towards WES in the Levels

Mean WTP for WES in the Pevensey Levels for Respondents Willing to Pay More for the Scheme than they Currently Pay

	Multiples of existing contributions			
	mean	**truncated mean**	**median**	**mode**
Residents	120.10	78.18	4	2
Visitors	112.16	22.21	5	2
Non-visitors	54.94	23.01	4	2

Aggregate Benefits of the Pevensey Levels Wildlife Enhancement Scheme

The aggregate benefit of WES in the Levels is comprises the sum of:

(1) The use and non-use benefits arising from all households willing to continue paying what they currently pay for the scheme in the Levels (about £0.01 per year).

(2) Any additional consumer surplus benefits arising from those households willing to pay an additional sum for WES in the Levels.

For the purposes of project appraisal, the preferred estimate of the consumer surplus benefits of WES in the Pevensey Levels should be the mean multiple WTP of respondents willing to pay an additional sum towards the scheme, minus what they currently pay. However, small sample sizes meant that these estimates are influenced by the few highest bids. In order to counteract this phenomenon, the highest and lowest bids were removed and a truncated mean estimated.

The aggregate benefit estimates for each sample shown below, are based on the following.

(1) Total WTP of households willing to pay an additional annual sum for WES on the Levels. This was based on truncated means and annual current household contribution towards the Levels of either £0.01 or £0.02. These figures were then multiplied by the number of households in each population who were estimated to be willing to pay an additional sum for WES in the Levels:

- Residents: 4,869 from a total of 6,478 households (1991 Census of Population)
- Visitors: 59,962 from a total of 85,386 households (general public survey verified by data from the UK day visit survey)
- Non-visitors: 396,746 from a total of 739,695 households (1991 Census of Population coupled with data from the general public survey)

(2) The benefits accruing to those households only willing to pay the amount they currently pay for the Levels, i.e. the current payment of either £0.01 or £0.02 multiplied by the following population proportions:

- Residents: 1,448 from a total of 6,478 households
- Visitors: 23,520 from a total of 85,386 households
- Non-visitors: 325,032 from a total of 739,695 households

Aggregate Estimates of the Benefits of the Pevensey Levels WES

Sample	Annual Contribution	Aggregate Benefits
Residents	£0.01	£3,821
	£0.02	£7,643
Visitors	£0.01	£13,554
	£0.02	£27,108
Non-Visitors	£0.01	£94,527
	£0.02	£189,054
Total Benefits	£0.01	£111,902
	£0.02	£223,805

Conclusions

The rigorous and conservative truncated mean values were adopted as the most appropriate measure of the consumer surplus benefits of WES in the Pevensey Levels.

Based on an existing payment of £0.01 per household per year, the total annual benefits of the Pevensey Levels WES were estimated as £111,902. This excluded passive use values for all households living more than 60 km from the Levels.

Payments to farmers and landowners under the Pevensey Levels WES amounted to £136,000 in the financial year 1993/94. Staff and some infrastructure costs increased this total to £147,700.

Benefit-cost ratios were therefore 0.117 for use values and 0.758 for use plus passive use values.

There was little detectable decline in passive use value with distance from the Pevensey Levels, and hence no logical reason why passive use benefits of the wildlife enhancement scheme on the Pevensey Levels should stop at 60 km. Thus, assuming passive use values accrue to a similar proportion of non-visiting households in the UK as observed in the survey, this would increase truncated mean aggregate benefits to £2,696,471; and produce a B/C ratio, even for truncated mean use plus passive use benefits, of 18.26, more than enough to justify current levels of expenditure.

Chapter 1

AIMS AND OBJECTIVES OF THE STUDY

1.1: The Wildlife Enhancement Scheme

The Wildlife Enhancement Scheme was launched by English Nature in November 1991. The objective of the Wildlife Enhancement Scheme (WES) is to develop a more positive way of securing wildlife interests on Sites of Special Scientific Interest (SSSIs) by introducing positive financial incentives to encourage land management that favours wildlife.

WES reflects a change in perspective and emphasis from the mechanism implemented under the Wildlife and Countryside Act 1981 which compensated farmers for not engaging in activities damaging to wildlife. WES adopts the more positive approach of paying landowners and tenants to promote schemes to favour wildlife habitats, rather than compensating them for foregoing economic opportunities.

The Pevensey Levels SSSI in East Sussex was one of the first two areas to benefit from WES, the other being the Culm Grasslands in Devon.

1.2: The Objectives of the Project

The objectives of this project, which were set by English Nature, are:

1. To assess the change in use and non-use values of the Pevensey Levels Site of Special Scientific Interest (SSSI) arising from the improvements occurring under the implementation of WES. The results of this analysis are then used to estimate the additional benefits accruing to the general public from the WES designation in the Pevensey Levels SSSI.

2. To assess whether such an evaluation can be achieved by contingent valuation methods (CVMs) and whether this methodology will provide robust, reliable and acceptable results which will be useful to policy makers.

3. To link with Drs Jacquie Burgess and Judy Clark of University College London in exploring responses to the CVM questionnaire through subsequent discussions with respondents in a mixture of focus group meetings and in-depth interviews.

This report is confined to the first two objectives.

1.3: The Methodological Approach Adopted

In making policy and expenditure decisions, the government requires advice on the costs and benefits of particular programmes. The Department of the Environment (1991) in **Policy Appraisal and the Environment** indicated its desire to see the monetary valuation of environmental impacts, describing the available techniques and how they might be applied. The scope for a more systematic approach to the ways in which environmental costs and benefits of policies could be assessed in government departments, led to a number of studies across a wide range of topics.[1] This study is firmly lodged within this framework and evolutionary approach to measuring the environmental benefits of public goods such as wildlife protection, in monetary terms, so that the benefits can be compared with the costs of providing the good.

1.4: Contingent Valuation Methods

In any policy appraisal there are a number of approaches which can be employed to estimating the benefits of an environmental good:

1. Preventative expenditure, replacement cost, and opportunity cost approaches: in which expenditure to maintain the Pevensey Levels WES, or replace the habitat, is assumed to be at least as large as the benefits produced by the habitat, else why was the money spent this way?.

2. The travel-cost method (TCM) estimates the demand for wildlife and landscape benefits of the Pevensey Levels WES by observing how many people visit, or how many visits, are made to the area at a range of prices, compared to visits to the area in

[1] In 1994 the Department of the Environment (1994) published an assessment of a representative cross section of the work that was being done by and for government departments in the environmental media of air, land and water, and the principal industries - agriculture, construction, energy, manufacturing, and transport - which affect the environment.

the absence of WES. The net benefit to society of WES is the difference between the cost of visiting the site and the maximum amount people would be willing to pay as estimated by the demand curve.

3. The hedonic price method (HPM) measures the benefits of WES by estimating how much the price of a private good affected by WES changes as a consequence of the existence of that programme.

4. Contingent valuation methods measure the benefits of the WES by setting up a hypothetical market - i.e. the continuation of the scheme - and then asking people directly how much they would be willing to pay in taxes to support the Pevensey Levels WES.

There are advantages and disadvantages to all these approaches. The preventative expenditure approach assumes that experts can accurately judge the benefits to society which WES produces and that this determines expenditure on the WES programme. In fact benefits could be considerably greater than expenditure costs, but this is not known nor determined under this approach. TCM can only measure the use benefits of WES to recreational visitors, and fails to measure non-use or passive use benefits, and quasi-option benefits from preserving biodiversity on the site. The HPM in theory measures use values (through people being willing to pay a higher house price near the site to gain access to it); and some passive use values such as amenity value from preserving a traditional landscape which attracts people to reside in the area. However, in the case of WES in the Pevensey Levels HPMs do not measure these values fully. This is because there are only farms and one house within the designated area, with planning permission being denied for other housing developments, and with existing housing merely surrounding the area. CVM is the only technique which is theoretically capable of measuring the use and passive use values of the Pevensey Levels WES.

1.5: Outline of the Report

The structure of the report is as follows. Following this introduction, Chapter 2 briefly describes WES and its implementation in the Pevensey Levels. Chapter 3 discusses a number of issues related to measuring the benefits of the Pevensey Levels WES: welfare changes as a consequence of WES; the importance of measuring total economic value; the nature of existence values; problems to avoid in contingent valuation; the need to measure WES as a marginal contribution to wildlife protection; and the contingent

valuation approach adopted in the study and its conformity to National Oceanic and Atmospheric and Administration USA government guidelines on the conduct of contingent valuation appraisals.

In Chapter 4 the contingent valuation sampling frame is outlined, along with the design of the questionnaire and the results of the pilot survey. Appendices are also provided incorporating the questionnaires and the factsheets on WES presented to respondents as part of the contingent valuation approach.

Chapter 5 outlines the characteristics of the respondents in the residents, visitors, and general public surveys, their preferences for wildlife habitats, and activities undertaken in the countryside. Chapters 6 and 7 present the results of the CVM surveys, detailing respondents willingness to pay (WTP) for the Pevensey Levels WES.

Chapter 8 presents estimates of the population of residents, visitors, and the general public having an interest in contributing to WES on the Pevensey Levels, and aggregates these populations by their respective WTP estimates in order to derive an estimate of the total benefits produced by WES. Chapter 9 outlines the general conclusions of the study and sets the benefits of the WES against its costs.

Chapter 2

THE PEVENSEY LEVELS SITE OF SPECIAL SCIENTIFIC INTEREST AND THE WILDLIFE ENHANCEMENT SCHEME

2.1: Introduction

The Pevensey Levels lies between Eastbourne and Bexhill, and a part of the area has been designated as a Site of Special Scientific Interest by English Nature, the official Government advisory body for nature conservation in England. The wildlife interests of the Levels include a wide variety of flowering plants, insects, birds, and other plants and animals, some of which are rare or are declining nationally. The conservation of these diverse interests depends, in the long-term, on the ways in which the land is managed, particularly for agriculture.

English Nature are running a pilot Wildlife Enhancement Scheme on the Levels, and are making payments to farmers and landowners to manage the levels in ways designed to conserve and enhance the wildlife interests.

This chapter provides some background information on the Pevensey Levels and on the Wildlife Enhancement Scheme.

2.2: Some Ways in Which Wildlife is Protected

Nature conservation and wildlife interests are protected and conserved in a variety of ways. One of these is by protecting specific sites and managing them to conserve the wildlife interests they contain. Some of these protected sites include Sites of Special Scientific Interest (such as the Pevensey Levels), National Nature Reserves (owned or managed by English Nature), Wildlife Trust Reserves (owned or managed by the voluntary County Wildlife Trusts such as Sussex), Local Nature Reserves (owned and managed by local authorities such as East Sussex County Council) and Royal Society for the Protection of Birds Reserves; other land is also managed to conserve its wildlife interest, including land managed by the National Trust, Woodland Trust, Forestry Commission or land in designated as Environmentally Sensitive Areas.

Sites of Special Scientific Interest (SSSIs) are notified under the Wildlife and Countryside Act 1981 (as Amended), and previously under the National Parks and

Access to the Countryside Act 1949. The designation does not change the land ownership, but brings into force a series of rules and procedures designed to protect wildlife interests; for example, the existence of such sites must be taken into consideration during a wide range of official 'planning' procedures, and landowners are required to notify English Nature if they intend to undertake any of a range of 'potentially damaging operations', which can include changes or improvements in farming practice. This can then lead to English Nature offering a 'management agreement' to the landowner, in which a detailed programme of conservation and land management work is agreed, and if appropriate the landowner receives 'compensation payments' for any lost profits or for other conservation work carried out. At the end of September 1993 there were 3,749 SSSIs in England covering an area of 861,341 hectares.

The Wildlife Enhancement Scheme is an experimental scheme initiated by English Nature (EN) in 1991 at two SSSIs in order to test new ways of developing more positive relationships with managers of SSSIs (English Nature, 1991, 1992). The schemes aim to couple manager's skills and local knowledge with EN's experience in management of wildlife, by providing positive financial incentives to encourage land management that favours wildlife. The initial schemes were at the Pevensey Levels and the Culm Grasslands in North Devon, since then further sites have been added including the Craven Limestone Grasslands in the Yorkshire Dales and the Coversand Heath and Peatland Sites in Humberside and Yorkshire.

2.3: The Pevensey Levels

The SSSI in the Levels covers 3,501 hectares (nearly 9,000 acres or about 14 square miles) of wet grassland and marshland between Eastbourne and Bexhill. A small area of 53 hectares (128 acres) on the Pevensey Bridge Level is owned by English Nature and has become the Pevensey Levels National Nature Reserve. The Sussex Wildlife Trust also owns land in the area, and this has been designated as a Wildlife Trust Reserve. The Levels are an internationally important wetland and may be designated under the Ramsar Convention.

2.4: The History and Land Use of the Levels

The sea once covered the whole area as far north as Herstmonceux. In Mediaeval times the eastward drift of shingle along the coast formed a bank, allowing first a saltmarsh

and then a freshwater marsh to develop.

Centuries of husbandry has created a system of grazing meadows separated by natural and man-made watercourses which drain through Pevensey and Waller's Havens to the sea. Over a period of many centuries, drainage dykes were dug, cattle grazing was established, and the pattern of summer grazing combined with winter flooding allowed marshland wildlife to flourish (National Rivers Authority, 1991).

The core of the Levels now consists of low-lying wet grazing meadows intersected by a complex system of drainage ditches. Traditionally the ditches have helped drain the land but have also acted as a system of 'wet fences' and to provide drinking water for stock.

2.5: The Objectives of the Wildlife Enhancement Scheme

Wildlife has survived and thrived both in the wet conditions which exist on the Levels and under the extensive farming methods which have been employed there over the years. Such extensive farming practices are traditional in the Levels, and the increased drainage and agricultural intensification which took place in the area in the period between the mid-1940s and the mid-1980s has now ceased.

The change in the farming regime in the Pevensey Levels towards increased intensification was also characteristic of other wetland areas in the south east of England where, for example, a very high proportion of coastal grazing marshes and wet grasslands disappeared between 1930 and 1982 (Williams and Hall, 1987). On the Pevensey Levels these forces have also been at work, whilst the prolonged drought in the region also seems to be contributing to a gradual drying process.

Drainage, re-seeding, reclamation and intensification all contribute to a slow but steady process which reduces the wildlife interest of the Levels. If ditches dry up and are replaced by fences, species which depend on the wet ditches are forced to smaller and smaller areas. Heavy applications of fertilisers can affect water quality and its suitability for sensitive species. If grazing levels increase, ground nesting birds may be disturbed.

The main objectives of the scheme are therefore to encourage farmers and landowners to farm the land in a more traditional and sensitive way by:

i. maintaining the ditches by dredging and clearance on a rotational basis

ii. keeping high water levels in the ditches

iii. not applying fertilisers

iv. grazing animals at a low level of intensity

v. carrying out ditch maintenance after July to avoid disturbing ground nesting birds

vi. dumping the dredged spoil away from the ditch to prevent nutrients flowing back into the ditch, and to reduce contamination of water courses from the use of herbicides

vii. cutting for hay and silage after July

In addition, some extra work is encouraged where appropriate, such as the construction of small, shallow 'scrapes' or ponds in very wet areas to act as wildlife habitats.

The result of the scheme over the longer term will be to secure and conserve the diverse wildlife interests of the Levels. The scheme could also lead to an enhancement of these wildlife interests.

Payments to those landowners who join the scheme include a sum of £30 per acre per year (£72 per hectare) for carrying out the works set out in the management guidelines (summarised above), with additional fixed cost payments available for items such as water control sluices or blocks, and associated protective fencing.

2.6: Wildlife Interests on the Levels

The traditional management practices have allowed wildlife diversity to flourish (English Nature [NCC], 1990), including:

- 21 species of dragonfly and damselfly

- the rare fen raft spider

- 110 species of aquatic flowering plants

- rare water snails and water beetles

- in summer, one fifth of the British breeding population of yellow wagtail

- in winter, birds such as lapwing, snipe, widgeon, teal, and golden plover

- birds such as the hobby, short eared owl, barn owl, marsh harrier and hen harrier

If recent trends continued, without management for conservation, the wildlife diversity of the Levels would undoubtedly change and some species could become much less common or disappear altogether.

Chapter 3

MEASURING THE BENEFITS OF THE PEVENSEY LEVELS WILDLIFE ENHANCEMENT SCHEME

3.1: Welfare Changes as a Consequence of WES Policy

The additional economic benefits of WES can be measured as the net changes in the utility of individuals as a consequence of the scheme.

The change in utility from the provision of an unpriced good can be measured by enumerating changes in individuals' consumer surplus, the benefit the individual derives from the good over and above the price which is paid for it.

Problems arise where a change in the provision of an environmental good induces income effects. This would occur where an environmental good formed a significant element of the individual's welfare, or his/her real 'income'. In such a case, a simple Marshallian consumer surplus (the surplus measured by travel-cost models of the recreational value of wildlife provision) will be an inaccurate measure of welfare change. How inaccurate, in theory, depends on the size of the income effect, which in turn depends upon the importance of the environmental good in the individual's budget, and consequently is reflected in the size of the consumer surplus, and the income elasticity of demand. If the product of income elasticity and the ratio of surplus change to total income divided by two is less than 0.05 in absolute value, no more than about a 5 percent error is made by adopting a Marshallian consumer surplus as a measure of either Hicksian compensating or equivalent variation. As Willig (1976) argued this condition is likely to hold in most cases. The provision of one WES is unlikely to affect a person's real income to any significant amount. Nevertheless, a Hicksian income compensated demand function is a theoretically more accurate measure of welfare change, since it holds real income constant. Ascertaining how much an individual would be willing to pay, to ensure that WES on the Pevensey Levels did actually occur, produces a theoretically correct measure of welfare change, in that it allows for any income effect. Such a measure is the amount of income an individual would be willing to give up for WES on the Pevensey Levels and still maintain his/her initial utility level.

For WES, which increases the provision of wildlife from q_0 to q_1, the compensating surplus (CpS $_{WTP}$) measure of this welfare change is the adjustment in income (Y) necessary to keep an individual at his initial level of utility (U_0).

$$CpS = [E(p, q_0, U_0) = Y_0] - [E(p, q_1, U_0) = Y_1]$$

$$= Y_0 - Y_1$$

If q_1 amount of wildlife is preferred to q_0, then an individual will be WTP CpS for the change, i.e. Y_1 will be less than Y_0.

3.2: Total Economic Value

The value of wildlife is often derived from the demand for recreation visits (see, for example, Everett, 1979; Willis and Benson, 1988; Willis, 1990), using a simple utility function of the form:

$$u = u (X, R, L)$$

where utility (u) depends on the consumption of private goods (X), on-site recreation use (R), and on wildlife quality (L). Maximising utility subject to a budget constraint gives an ordinary demand function for visits to a wildlife site with specific quality characteristics. Integrating under this demand curve for a site with and without wildlife characteristics gives an estimate of the recreational benefits of wildlife protection.

Such an approach can be expanded to measure the total contribution of wildlife to national welfare by incorporating several motivations in addition to recreational access. This bundle of off-site satisfactions are termed preservation benefits and are assumed to include option, existence and bequest demands. A more general form of the utility function is, therefore,

$$u = u[f_1(X, R, L)+f_2(O, E, B)]$$

where individuals derive benefit from the consumption of private goods (X) and on-site recreation use (R) of wildlife quality (L); for benefits from off-site consumption of option value (O) to guarantee the opportunity of future recreational visits to the site under conditions of uncertain demand or supply; existence value (E) from the

satisfaction an individual derives from knowledge that a particular protected area exists; and bequest value (B) from the knowledge that other individuals and generations will benefit from the environmental protection.

This total economic value (TEV) concept is the approach adopted to measure the benefits of the Pevensey Level WES. The TEV approach thus encompasses

(1) on site consumption benefits of recreational activity associated with WES

(2) off-site consumption of the flow of information about WES protection of wildlife consumed as preservation benefits, i.e. WTP for the knowledge that the Pevensey Levels are protected (option, existence and bequest values).

The latter knowledge may be experience based or education based. Individuals may have either visited the Levels (on-site use) or learnt about them (off-site use). From this knowledge individuals report a total value of WTP for both types of satisfaction, including the probability of future use as an option value, plus non-use (passive use) values (existence and bequest).

This TEV approach has been employed in the USA and Britain to assess the WTP for a diverse range of public goods including: visibility (Schulze *et al.,* 1983); grizzly bears and bighorn sheep (Brookshire *et al.,* 1983); endangered species (Boyle and Bishop, 1987); water quality (Smith and Desvousges, 1986); wilderness areas (Walsh *et al.,* 1984), and wildlife habitats (Willis, 1990).

The objective of this study is to estimate a TEV function reflecting the individual's marginal WTP for WES in the Pevensey Levels, within the limits of the individual's WTP for all wildlife protection in general. Economic theory predicts that the marginal utility of an additional unit of wildlife protection will decline as the quantity of units increases (Figure 3.1). From this it follows that total utility from wildlife protection must increase at a decreasing rate (Figure 3.2). The aggregate total WTP curve is the vertical summation of individual values over the relevant population. Figure 3.2 shows two hypothetical aggregate benefit curves both increasing at a decreasing rate with the number of Wildlife Enhancement Schemes (or, from the perspective of number of schemes being additional to the quality of protection offered by SSSIs). The lower curve documents the impact of only considering visitor (use) benefits. The upper curve documents the maximum amount society would be willing to pay for WES including both visitor use and preservation benefits.

Figure 3.1: Marginal Benefits With and Without Wildlife Preservation Benefits from WES Scheme

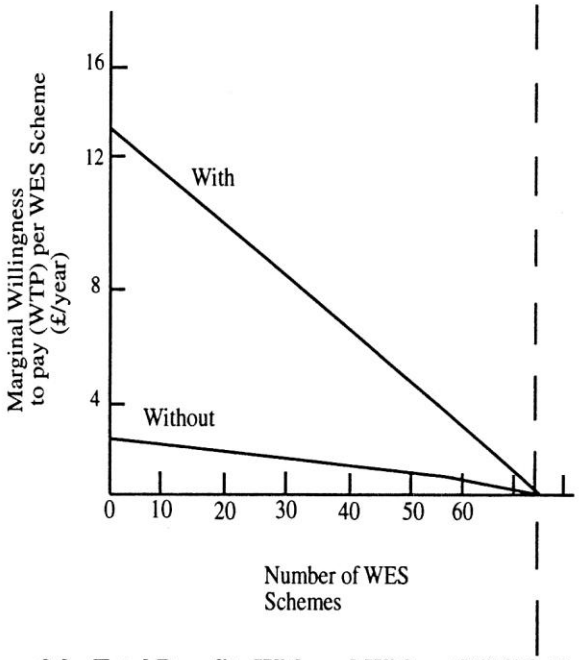
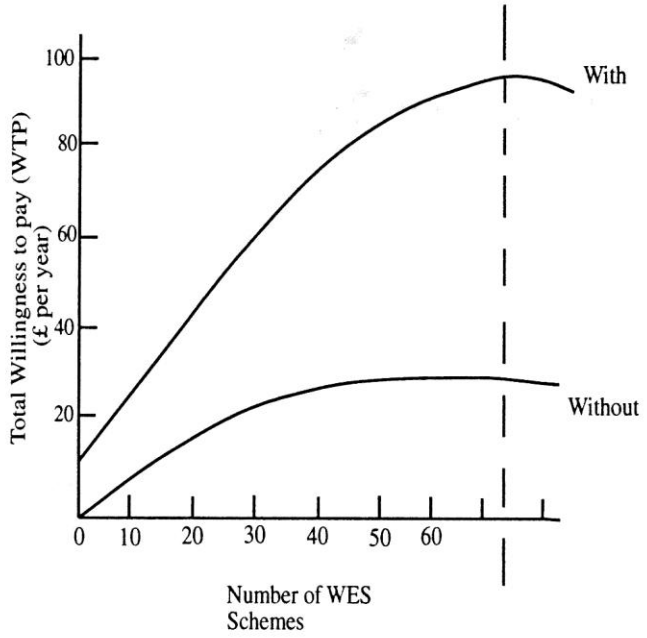


Figure 3.2: Total Benefits With and Without Wildlife Preservation Benefits from WES



Equating marginal benefits with marginal costs indicates that substantially fewer Wildlife Enhancement Schemes, either in number, size, or quality, will be justified on the basis of visitor benefits alone, compared to visitor plus preservation benefits. The optimal number of schemes which should be designated on social efficiency grounds is therefore the point where aggregate total economic value is maximised relative to aggregate cost, i.e. where the marginal benefits including preservation values equal marginal costs.

The preceding discussion may suggest that human preferences are the only source of value in the environment. Of course there are a number of equally valid value systems which exist in addition to this human-centred, utilitarian perspective. From an economist's point of view however, it is this perspective which is the most meaningful, and it is because of this that they concentrate on the calculation of TEV, rather than attempt to measure any broader total value of ecological systems.

3.3: Existence Values

In everyday decisions consumers take ethical use, passive use and existence values into account in deciding what to consume (e.g. to buy vegetarian food, 'natural' organic products, body lotions not tested on animals, religious tracts, etc.) and what not to consume (e.g. animal fur coats, fox hunting, alternative religious tracts, etc.). Many landowners maintain their country estates to preserve their natural, historical, and cultural significance, and to maintain their existence for the enjoyment of future generations. People also donate money to causes which preserve things which they themselves will never directly use or experience (e.g. the protection of whales; elephants; etc.).

Thus any wildlife enhancement scheme based only on the benefits of visitors to, and residents of the Pevensey Levels, would represent a sub-optimal amount of wildlife designation and environmental protection. Moreover, there is empirical evidence that the public's preferences for nature conservation are more strongly weighted to non-use (existence) values than to use (recreation) values. In a survey of public preferences about the importance attached to different features in deciding which nature reserves should be preserved, Green (1992) discovered relatively low weights were attached to visitor features of sites, and conversely high weights to public good benefits: the public appeared to value such sites for what the public perceived as their environmental values

and passive use values rather than their recreational values.

Formal attempts to specify and measure existence values have begun to enter into government decision-making. The US Court of Appeals for the District of Columbia formally acknowledged and sanctioned the inclusion of existence values in decisions concerning natural resource damage assessment regulations under the Comprehensive Environmental Response, Compensation and Liability Act 1980. State and Federal governments in the US now file claims against polluting firms on the basis of lost existence value. The Exxon Valdez settlement of $1.1 billion dollars on this basis is perhaps the most notable and publicly known example of such a claim for damage to the wildlife and environment in Alaska. Organisations such as the Ministry of Agriculture, Fisheries and Food (MAFF) and the National Rivers Authority (NRA) now regularly include passive use values into assessments of investment schemes to enhance the environment.

It is thus important that both use and passive use values for WES are measured. Passive use values are not directly valued in the market place, nor are they associated with the consumption of a complementary private good (e.g. travel costs incurred to view wildlife) and hence cannot be valued even indirectly in a revealed preference way. Hence, the only techniques capable of measuring both use and passive use values using the same format are expressed preference techniques.

Contingent valuation methods are a well recognised set of expressed preference techniques, which have been used extensively to value both use and passive use values of wildlife and other natural resources.

3.4: Contingent Valuation Methods

Contingent valuation methods have been shown in practice to provide an accurate estimate of the value of environmental goods and services in certain situations. Bowers (1994) has argued that, in principle, it should be possible to determine values for environmental goods where:

1. Markets exist: that is where people experience and purchase the good on a regular basis; since consumer experience is with use values, and that is what markets exist to determine.

2. The good is not a public good.

3. The environmental good is a public good, as is the case with wildlife protection, and collective action is required for its provision to current and future generations, then market values are irrelevant and in addition individual expressed values may be biased.

4. Consumers have relevant information. When respondents are provided with information about the environmental good, then the value of the good will be dependent upon the quantity, context and quality of information provided.

A number of practical concerns have been expressed about CVMs, in particular whether or not passive use or existence values can be accurately measured through their use. Other concerns have focused on issues of public goods and strategic bidding; the effect of the design of the valuation study, and the hypothetical nature of the issue, on estimated values obtained; and on questions of embedding and context.

Strategic Bidding

If respondents believe that bids for wildlife protection will actually be collected they may under-estimate their WTP for goods which are non-excludable. This is the typical free-rider problem. On the other hand, if respondents believe that WTP bids are purely hypothetical and will not be collected, they may over-estimate their WTP for an environmental good, as this increases the probability that it will be provided with someone else paying for its provision. Strategic bidding is difficult to detect. There is some evidence, both theoretical and based on laboratory experiments, which suggests that strategic bias is not strong. In addition, empirical evidence suggests that some level of public goods provision is supplied by people for the enjoyment of others. Moreover, there are practical steps in the application of CVM, advocated by Mitchell and Carson (1989), which can be used to minimise any strategic bidding when eliciting WTP estimates. These procedures are discussed later in this chapter when the precise CVM principles adopted in the study are outlined.

Design Issues

Principal concerns in questionnaire/survey design in this study centre around starting point bias, choice of the bid vehicle or payment vehicle, the hypothetical nature of the market, and the information provided about wildlife on the Levels.

The cost of the Pevensey Levels WES to households ranges from less than £0.01 to

£0.02 or so per year, depending upon the tax position of the respondent. CVM questions do not usually attempt to elicit and predict which households will pay such small amounts, and which households will not.[2] This is a consequence of the very real problems which CVM has when it comes to eliciting values from the public for very low cost environmental improvements.

For example, an open-ended CVM question could well result in a respondent giving a WTP estimate of £0.10, £1, or £10 for the Pevensey Levels WES. These are whole orders of magnitude different from what they currently pay. Some respondents may really be willing to pay such amounts in practice because they value the Pevensey Levels so highly. However, such expressed responses are also likely if these are the values/answers that respondents think they were being asked to provide, or if they feel foolish or uneasy about responding with much smaller (but more realistic) values. If the latter was the case, then such WTP answers would obviously be inaccurate. Clearly, it was necessary to try to avoid this problem.

An alternative procedure would have been to adopt a CVM referendum approach. However, to ask an individual a yes/no question on whether they would be WTP 0.5p, 1p, 2p, 3p, 4p, 5p, etc., up to say 20p, would also probably have elicited 'yes' responses to all of these values, since they are fairly inconsequential amounts. However, to extend the range of values in the referendum to a level high enough to enable an estimate of the relationship between bid size and probability of a 'no' response would have meant including values orders of magnitude above the sums currently paid. These problems mean that it would be impossible to determine a reasonable WTP estimate from the referendum approach.

The effect of a starting point in eliciting a respondent's WTP has long been recognised in CVM, and this bias has consistently been shown to have a real impact in its effect on WTP estimates (Boyle *et al.*, 1985). Hence, it was necessary to deal with the starting point problem in some novel way in the Pevensey Levels WES study.

The approach adopted to avoid the above problems was to inform respondents what the Pevensey Levels WES currently cost them; to recognise that the value to them of wildlife conservation might be considerably greater than this; but to constrain any eagerness to suggest enormously large and unrealistic amounts. The latter was important, since if large suggested values ascertained for a single WES were applied to

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[2] Nor does any other economic technique. With an average household income of £18,000 per year, to predict an 1,800,000th part of that figure is beyond the scope of social science techniques.

or derived for all SSSIs and future wildlife enhancement schemes, respondents would clearly be unable to pay the aggregated total amount because of their budget constraint. Thus the WTP question was couched in terms of whether they would be willing to pay two times, or three times, or four times, or five times, ... or one hundred times, ... or one thousand times, what they currently paid. This approach, in terms of multiples of an existing payment, emphasised the magnitude of the change in payment level, made people think more about their responses, and hence acted as a constraint on any cavalier attitude to expressing any substantially increased WTP amount for such small values.

The bid vehicle used in a CVM survey can influence WTP values: the general principle for adopting a bid vehicle in a CVM study is to employ either a vehicle which has a plausible connection with the amenity it is being used to value, or the vehicle which would be used in practice if any charges had to be levied. WES funding is derived from general taxation, thus the WTP questions were couched in terms of tax increases. Negative feelings about some kinds of taxes, e.g. property taxes, may strongly influence the resulting WTP amounts. However, whilst trust funds might be seen as being more neutral and less controversial, Bateman *et al.* (1992) in a study of preservation benefits of the Norfolk Broads found that people's WTP was higher under a general income tax vehicle payment format than a trust fund payment vehicle format: some people do not trust trust funds! Hence, in this study general taxation (income) was used as the payment vehicle.

The CVM approach is based upon a hypothetical market and intended behaviour. Thus, its approach relies on the theoretical foundations implicit in the Fishbein-Ajzen (1975) attitude behaviour model. Because the final action, viz actual payment, does not typically occur in CVM applications, and the expressed WTP question merely measures intention to perform the specified behaviour, the robustness of a particular survey instrument can be evaluated in terms of the Fishbein-Ajzen model. The Fishbein-Ajzen model suggests accuracy in respondents' estimates will be greatest where there is:

1. Correspondence between the question asked and the intended inference drawn from the answer.

2. Proximity: i.e. how close the WTP question is to the valuation scenario motivating it.

3. Familiarity with the consequences of changes in the quantity and quality of the environmental good in question.

These criteria suggest that the degree of accuracy of WTP responses for an environmental good such as WES will vary between types of respondents, and that it will be higher for some respondents than others. Visitors are likely to be more familiar with changes that will arise as a consequence of WES; but even with visitors the correspondence and proximity between expressed WTP and actual contributions specifically to the Pevensey Levels WES may not be high.

Davis and O'Neil (1992) found lack of familiarity with the hypothetical scenario led to problems with reliability of responses, but conflicting evidence is provided by Kealey *et al.* (1990) who found that familiarity had little influence on the reliability or validity of CVM estimates. Kealey *et al.* (1990) concluded that CVM design, and especially the respondent's belief in an explicit payment obligation, is more important for high intention-behaviour consistency.

Embedding and Context

Embedding occurs where the assessed value of a public good is demonstrably arbitrary, because WTP for the same good can vary over a wide range of values, depending on whether the good is assessed on its own or is embedded as part of a more inclusive package of goods (see Kahneman and Knetsch, 1992). Kahneman and Knetsch showed, for a number of different types of good, that WTP for a given environmental good can vary widely depending upon the degree of embedding. They explained this effect by suggesting that what individuals were actually doing was purchasing 'moral satisfaction' and that this purchase was not dependent upon the resulting change in the level of provision of the good in question.

One example cited by Kahneman and Knetsch was a study of Ontario Lakes. Here, two samples were taken. Respondents in the first sample were asked their maximum willingness to pay to maintain fish stocks in all Ontario Lakes. Respondents in the second sample were asked their WTP to maintain fish stocks in only a small part of the province. Mean WTP for maintaining fish stocks was very similar across both samples, suggesting that CVM could not distinguish between public preferences for a small proportion of lakes in Ontario and preferences for all of them

In another experimental study exploring a budget context for contingent valuation estimates, Kemp and Maxwell (1992) attempted to reduce non-commitment biases by establishing a broader and more realistic budget context to the survey questions. The method used, termed "top-down disaggregation," starts with asking about WTP for a

broad spectrum of public goods, then disaggregates the elicited amounts in stages, to focus progressively on the commodity of greatest interest. In the experiment described in the Kemp and Maxwell report, the top-down disaggregation method resulted in estimates of WTP for a particular commodity that were approximately 300 times smaller than those obtained for the same commodity in a comparable, single-focus CVM survey. This finding, which had a less than 0.01 percent probability of occurring by chance, was robust to all tested variations in assumptions and methods. The authors interpreted this finding as confirmation of the vulnerability of the results of typical CVMs to large non-commitment biases. They argue (by analogy with the accumulated experience with similar survey methods) that the top-down disaggregation approach is likely to provide a more realistic estimate of non-use values, although they would not endorse the use of this disaggregation value of a good as a correct estimate. The value obtained may be sensitive to the specifics of the disaggregation structure adopted, but the experiment clearly showed that it would be wrong for the regulatory and legal processes to sanction the use of limited-focus direct-question methods for measuring non-use values.

The argument that the value of a good is determined by the context, or theatre, in which the good is presented is not surprising. Ascertaining respondents' WTP for an additional conifer forest habitat, for example, is likely to be much lower than respondents' WTP for habitat protection in Keilder Forest in order to protect the Red Squirrel, even though the end result (protecting an additional conifer forest habitat) is the same under both scenarios. Indeed, this is precisely what Garrod and Willis (1994) found in a study of WTP of members of the Northumberland Wildlife Trust for additional habitat protection. The change in context (i.e. informing respondents about the Red Squirrel's need for a protected conifer habitat) has actually changed the nature of the good respondents are being asked to value. Hence, it should not be expected that CVM will estimate similar WTP values in different contexts. The same contextual effects are present in the sale of private goods: respondents' value or utility of a good changes when a salesman or brochure informs a prospective purchaser that good X has some feature which is absent in an otherwise identical good Y. The manner in which goods are presented and described (contextual information) impacts on sales, and price differences. Indeed if such effects were absent they would violate Lancaster's (1966) theory of consumer behaviour.

Criticism of embedding can be countered in a similar way to that of context and theatre: as more substitute goods are added to the choice set a respondent is asked to value, the value of any one individual component decreases. Thus, it can be argued that the

valuation results derived from embedding studies are precisely what would be predicted from simple consumer theory: as the number of substitutes increases, so the consumer surplus on any one particular good declines. Indeed, it has been suggested that the absence of the embedding phenomenon, not its presence, is an indictment of CVM.

In the current study of the benefits of WES, the approach to embedding follows the methodology of Kemp and Maxwell (1992), which in turn is consistent with the practice adopted by the authors in previous CVM studies of landscape values (Willis and Garrod, 1992; Bateman *et al.*, 1992; Bateman *et al.*, 1993), namely that the top-down disaggregated approach is likely to provide a more realistic estimate of non-use value. A disaggregated approach asks respondents:

1. how much they would be willing to pay for social and environmental programmes (i.e. environmental protection) in general;

2. and within this, the amount they would devote to major categories of environmental protection, e.g. to protection for natural areas/wildlife;

3. and then the amount to be spent on preventing major harm to natural areas and wildlife;

4. and from the amount of money identified in 3, the amount they would be willing to devote to specific sites or schemes, e.g. WES.

This is a time consuming approach. To circumvent this, respondents were provided with information on the cost to their households of the Pevensey Levels WES to avoid problems of embedding and context. After being informed approximately how much their households spent, through taxes each year, on the preservation of the Pevensey Levels through the cost of the WES, respondents were then asked if their household valued its preservation more highly, and if so the maximum sum their household would be willing to pay each year to finance the Pevensey Levels WES, bearing in mind that any money they devoted to WES from their household budget could not be spent on other activities.

This mental accounting approach, taking into consideration the household's other preferences and activities on their budget, is likely to provide a more realistic estimate of the value of WES. By contrast, simply informing people about the purpose of WES in protecting the traditional wildlife and landscape of the Levels, and then asking their

maximum WTP for such a programme would almost certainly result in an over-estimate of the benefits produced by WES. This presumption is based on observed behaviour of respondents to CVM surveys: within the confines of completing a questionnaire, and despite assurances to the contrary, respondents often feel they have to hurry, and therefore do not have sufficient time to fully consider their other recreational and environmental preferences; nor do they fully take into account the existence of other substitute sites, activities, and visits to other attractive landscape areas which they could or do undertake.

3.5: The Marginal Benefits of WES in the Pevensey Levels

The marginal benefit of WES in the Pevensey Levels is additional to the benefits accruing from the existing SSSI designation in the area. The economic value of the Pevensey Levels SSSI is its marginal benefit in relation to wetland habitats including other SSSIs and nature reserves in this category, and also in relation to all other SSSIs and nature conservation areas in Britain.

The most traditional form of economic appraisal would be to value the Pevensey Levels SSSI conditionally on the continued benefits provided by other SSSIs. This could be done in a number of ways.

(1) By asking respondents their WTP (i.e. their total value) for the existing 3,748 SSSIs and then their WTP for 3,749. The difference would be the value of the Pevensey Levels SSSI.

(2) By asking respondents their WTP for the existing 3,748 SSSIs, and then asking respondents their WTP for the Pevensey Levels, given that it is additional to the other 3,748.

Both of these approaches essentially consider the Pevensey Levels as marginal to the set of SSSIs; i.e. the Pevensey Levels are valued at the margin. If there are strong diminishing returns from additional wildlife enhancement then the total value of SSSIs, plus the SSSI in the Pevensey Levels, would be only slightly higher than for SSSIs alone. As the number of SSSIs increases, the increase in total WTP will decline (Figure 3.2), reflecting the decline in marginal utility (marginal WTP) for each additional SSSI unit quantity (Figure 3.1).

At the time of this survey, because only two sites were designated under WES, it was not practical to use the above approach to estimate the marginal benefits which accrue from WES in the Pevensey Levels.

The Pevensey Levels WES could however, be valued in isolation from the other such schemes and SSSIs: for example, by asking the respondent the maximum amount he or she would be WTP for the Pevensey Levels WES, compared with the diminished wildlife protection which would have ensued in its absence from a continuation of less environmentally sensitive farming. Framed in this way, respondents might judge the value of WES in the Pevensey Levels to be the same as if this WES was the first and only scheme which protected wildlife. If each SSSI and WES were to be valued by this procedure and then aggregated, it is clear that the combined value of wildlife enhancement schemes in general would be over-estimated. To prevent the benefits of the Pevensey Levels WES being over-estimated, and to avoid embedding, it is important not to value the Pevensey Levels in isolation either from other SSSIs and WESs or from other potential commitments on households' budgets. In order to avoid its aggregate benefits being over-estimated, the value of WES in the Pevensey Levels should be elicited in the context of all of the wildlife protection provided by English Nature.

Therefore, some other way had to be found to estimate the value which WES added to the Pevensey Levels SSSI. The approach finally adopted involved respondents being informed of the current cost of Pevensey Levels WES to them, and then asked, bearing in mind the many other worthwhile nature conservation programmes in England they might wish to support, the maximum the household would be willing to pay for the Pevensey Levels WES compared with what they currently paid. This approach incorporates features recommended by the National Oceanic and Atmospheric Administration (NOAA) in the US, such as reminding respondents of the availability of substitute wildlife programmes and sites, and emphasising the limitations of the respondent's budget when indicating WTP amounts. The NOAA principles for conducting a CVM survey are outlined in the next section.

3.6: CVM Principles Adopted

Because of the many problems and controversies surrounding the measurement of existence values through CVM which were highlighted through the Exxon Valdez case, NOAA in the USA set up a 'blue ribbon' panel of economists, chaired by two Nobel

Prize winners (Arrow and Solow), to assess the validity of CVM in estimating passive-use or existence values.

The NOAA Panel gave qualified recognition to CVM in their Report, stating that such:

> 'studies convey useful information as reliable by standards that seem to be implicit in similar contexts, like market analysis for new and improved products, and the assessment of other damages normally allowed in court proceedings'.

However, the NOAA Report also made a series of recommendations about the practical implementation of the CVM technique. These recommendations were that:

1. probability sampling was essential;

2. non-response should be minimised, otherwise results would be unreliable;

3. face-to-face interviews were preferable, since mail CVM surveys were likely to produce unreliable estimates;

4. CVM studies should assess whether interviewer effects affected the results;

5. the sampling frame, sample size, questionnaire, etc., should be clearly stated and incorporated in the report;

6. the questionnaire should be pre-tested;

7. the study should have a conservative design to eliminate extreme responses that can enlarge estimated values;

8. that willingness-to-pay for the supply or continued provision of an environmental good, rather than willingness-to-accept compensation for its loss, should be used;

9. the valuation question should be posed as a vote on a referendum;

10. an accurate description of the policy or programme should be provided;

11. the impact of photographs should be pre-tested, since photographs can have a great emotional impact;

12. respondents should be reminded of undamaged substitute sites available;

13. adequate time should have lapsed between an environmental event and a CVM study, so that respondents are aware of the real long term environmental steady state effect;

14. temporal averaging should be used to reduce noise, and detect any time trend;

15. no-answer options should be available, to allow for indifference, inability to answer without more information, etc.;

16. yes/no follow ups be employed, to ascertain why respondents answered yes or no to a WTP question;

17. cross tabulations are produced to interpret WTP responses;

18. cross checks are incorporated to check on understanding and acceptance of the environmental descriptions;

19. respondents are reminded that their WTP for this environmental good will reduce their alternative expenditure possibilities; and

20. the survey should be designed to deflect warm glow effects.

The Pevensey Levels CVM survey conformed to most of these recommendations. It employed random probability sampling; attempted to minimise non-response in the construction of the questionnaire; undertook face-to-face interviews; pre-tested the questionnaire; used WTP; provided a description of the Pevensey Level WES programme and its impact; reminded respondents of alternatives; provided no-answer options; and employed yes/no follow-ups to ascertain why respondents answered yes or no to WTP questions.

Chapter 4

SAMPLING AND SURVEY DESIGN

4.1: The Sampling Frame

Assessing the additional use and non-use values of the Pevensey Levels as a consequence of the implementation of the Wildlife Enhancement Scheme required the identification of the populations of relevance or interest groups affected by the change. Three broad interest groups were defined:

1. residents within and overlooking the WES boundary area;

2. those who lived outside and out of sight of the Levels, but who visited the Levels; and

3. those who lived outside the Pevensey Levels and who did not visit the Levels.

The survey sought to cover these three groups, and a sampling frame was designed for each.

Residents within the area designated as eligible for WES payments on the Pevensey Levels comprise the occupants of several farms and one private house. Since farmers have a vested interest in WES in their own employment capacity, and since this group had already been extensively interviewed and analysed by Jacquie Burgess and Judy Clark, they were excluded from the sampling frame. However, a number of households live in areas surrounding the Pevensey Levels, and in properties overlooking the Levels from the surrounding higher ground. Hence, the amenity of these households can be deemed to be affected by changes on the Levels, whether they visit the Levels or not. In view of this, the sampling frame for residents was extended to include those settlements adjacent to the Levels.

The sampling frame for visitors to the Pevensey Levels was defined simply as those households who had visited the Levels over a specified period: the previous 12 months.

Non visitors - those who lived outside the Pevensey Levels and who did not visit the Levels - required the largest sampling frame. Such a sampling frame could potentially cover the whole of Great Britain and beyond. To rationalise this problem and to reduce

costs, the sampling frame for non-visitors, to determine non-use or passive use values, was defined as the population living within 60 kilometres of the Pevensey Levels.

4.2: Choice of Survey Instrument

The preferred survey instrument to estimate WTP for the Pevensey Levels WES was a series of face-to-face interviews covering the respondents sampled from each element of the sampling frame. Such an approach, whilst costly, had the best chance of conveying the necessary information to respondents to enable them to make a choice, and to ensure that non-response was kept to a minimum. The one-to-one approach is especially useful in presenting visual material of the impact of the WES to respondents.

The only area in which this survey instrument was not fully employed was in the visitor sample, where respondents already had some knowledge of the Pevensey Levels. For example, anglers who were members of the Hailsham Angling Club, or the Uckfield Angling Club, both of which own fishing rights on the Levels, were already familiar with the Levels; and some anglers were aware of the WES as well as proposed changes by the National Rivers Authority (Southern Region) to the water regime on the Levels. For anglers, 23 questionnaires were completed by respondents themselves at angling club meetings, but because meetings were not attended by all members, 11 additional interviews were completed over two days on river bank sites at the main fisheries on the Levels. Individuals in other specialist interest groups who had visited the Levels were surveyed in a similar way, by a mixture of both face-to-face interviews and self completed questionnaires which contained some information about the WES on the Levels. Such interest groups comprised different groups on guided walks organised by English Nature and led by a warden or ranger, and by other organisations such as rambling clubs.

4.3: Questionnaire Design

Three separate questionnaires were designed, one each for residents (Appendix 4.1), visitors (Appendix 4.2), and the general public (Appendix 4.3). Each of the questionnaires was designed to elicit much the same information as the others, in order to ensure consistency and avoid any framing bias between the samples. Thus, the three groups of questionnaires had a majority of questions in common, with additional questions being included solely as a response to the need for additional information

about a particular group. For example, the visitor questionnaire included a section of questions on visits to the Levels and visits to substitute sites within approximately 20 miles of the Levels.

The questions common to each group comprised attitudinal questions relating to the environment, nature conservation, preferences for particular habitats, and perceived threats to particular habitats. Very similar WTP questions were applied to each group, as well as identical socio-economic questions.

Respondents were first asked questions on their opinions about the environment in general, their preferences for, and their perception of the threats to different habitats; and in the case of visitors, for information about their visits to the Pevensey Levels. They were then shown a factsheet giving information on the following: a description of WES on the Pevensey Levels; the wildlife interest of the Levels; the impact of WES on wildlife; and what the future might hold for the area without WES (Appendix 4.4). From this information respondents were able to form their own judgement about the net additional impact that WES made to the Levels. After digesting this information, respondents were then told approximately how much WES in the Pevensey Levels cost each household per year, and asked whether they would continue to pay for the WES through their taxes if given a choice. If they were willing to pay for the scheme, they were then asked if they would be willing to pay more, and if so how much more they would be willing to pay as a multiple of what they already pay.

The study employed a bidding-game format to elicit WTP responses. The bidding format was employed for a number of reasons as a compromise between open-ended and a dichotomous choice format. Kealey and Turner (1993), for example, found that responses given by the same individuals to the open-ended and then the dichotomous choice format were significantly different from each other for public goods, although no difference was found in private markets. Kealey and Turner suggested that these results for public goods were due to the respondent's lack of familiarity with the open-ended question format, and that open-ended questions introduced an incentive for strategic behaviour. However, a dichotomous choice format, as recommended by the NOAA for the estimation of passive use values, may also be subject to error in estimating WTP values, through 'yea' saying to suggested 'prices' in a hypothetical market. If respondent's 'true' WTP is 70p per year, but they are presented with a choice of £1, they may rationalise 70p is closer to £1 than nothing which they might interpret as the alternative answer which will be recorded. This is a case of a difference in epistemic reasoning between the respondent's and the investigator/interviewer's

interpretation of the question, and represents a lack of correspondence between the question asked and the inference drawn in the Fishbein-Ajzen model. In applying a dichotomous choice format, Hanemann *et al.* (1991) and Kanninen (1993) advocate a double-bounded format, as statistically more efficient. In this case the second, and final bid, is derived from a starting point dichotomous choice bid, which is then varied up or down depending on whether the respondent accepted the starting bid, and then varied again depending upon the respondent's answer to the first variation. Bateman *et al.* (1992) extended this to a triple-bounded bidding format. The triple-bounded format produced a mean WTP response which was only 11.5% higher than the open-ended mean WTP result, but 53.6% lower than the simple dichotomous choice WTP result. But by adding on iterations to the discrete choice acceptance, the dichotomous choice format shades off into a bidding format, as employed in this WES study; and the bidding format appears to produce reasonably accurate WTP estimates compared to other formats.

The WES incurs annual costs. Because of this, and to compare benefits with costs and avoid the need to use a discount rate, WTP estimates were obtained in terms of annual values.

4.4: Pilot Survey

A pilot survey using the interviewers who were subsequently employed on the residents sample survey, was conducted during November 1993 in the Cooden and Little Common areas of Bexhill which fringe onto the Pevensey Levels. Following the pilot survey, a number of modifications were made to the questionnaire and to the information brochure.

Minor changes were the reordering of several questions, and the implementation of show cards throughout the brochure: previously some questions only had options for respondents to choose printed within the question on the questionnaire. Minor changes were made to the introductory wording of one question; whilst a don't know option was included in another question. The two major changes to the questionnaire as a result of the pilot survey were:

1. The simplification of the brochure information: information about WES in the pilot brochure was spread over four pages with colour photographs and line drawings on two pages; and information of the objectives of WES in terms of agricultural and

wildlife changes with and without WES on the two following pages, including outline drawings of the principal insects, birds, and plants affected. Because respondents found there was too much information to assimilate, the information brochure was simplified, and the with and without WES information was presented on two pages side-by-side to enable respondents to make a comparison between the two alternative policy options (see Appendix 1). The information was also made more visual, with one colour photograph of ditches with and without WES; and line drawings of insects, birds, and plants which WES would protect, and questions marks over these species on the Levels if there was no WES.

2. The alteration of the WTP question from a simple open-ended question to one based on multiples of current cost to households of the Pevensey Levels WES. Respondents experienced difficulty in determining a reasoned response to an open-ended WTP value for such small amounts, with 'don't know' responses frequently being made. In addition, a number of WTP bids were made which were relatively large in relation to the existing costs of the scheme to the household (e.g. 10p, 20p, 50p, £1, etc.). The latter responses may have occurred either because respondents found it difficult to articulate small amounts, or because they did not want to appear parsimonious in the amount which they offered. This led the WTP question being expressed in terms of multiples of existing household contributions to the Pevensey Levels WES (as described earlier). The WTP question format was also amended so that people could explicitly choose a 'not willing to pay anything' option.

4.5: Sampling Strategy

Mitchell and Carson (1989) devised a system to determine an appropriate sample size which relied upon what was regarded as an acceptable deviation between 'true' willingness-to-pay (WTP) and estimated WTP. For any given level of provision a sample size can be chosen which ensures that the estimated WTP will be within X per cent of the 'true' WTP, either 90 or 95 per cent of the time. The smaller the value of X then the larger the sample size required to achieve it. The relationship between overall precision, sample size, and deviation from the 'true' mean is shown in Table 4.1, which lists the sample sizes needed to obtain desired levels of accuracy.

The total size of the residents' sample was 161, as specified in English Nature's contract for the study. With a sample size of 161, estimated WTP can be expected to deviate from the 'true' WTP by 20% or less, on 90% of the occasions, assuming the

relative error or coefficient of variation (standard deviation/mean) is only 1.5. While this can be determined for an open-ended WTP question, a coefficient of variation cannot be determined for a dichotomous choice, nor the bidding WTP format as used in the WES questionnaire. The change in the question format, from an open-ended to a bidding format, occurred after the pilot survey, and hence the study remained constrained by the original sample size. However, whilst confidence limits for a specified sample size cannot be determined for dichotomous choice and bidding formats without knowledge of the final distribution of choices, a sample size of 161 provides a reasonable sample for any result for which the final WTP distribution is not too closely bunched.

Census enumeration districts (EDs) were used to calculate the number of people and households in the residents' sampling frame and the distribution of interviews in settlements around the Pevensey Levels. A random sample of households indicated a distribution of interviews as outlined in Table 4.2.

Visitors interviewed comprised samples:

1. on site: both casual visitors, and members of organised parties with wildlife interests

2. off site: anglers and ramblers.

Some off-site interviewing was necessary because of the sparsity of visitors to the Levels, and because of security concerns of approaching single individual visitors in isolated locations both for the visitor and the interviewer. Moreover, it was simply not cost effective to station an interviewer on the Levels to sample the occasional walker and angler in isolated locations. Hence, anglers and ramblers were sampled by approaching the local angling and rambling clubs, with the secretaries of these clubs asked to obtain a random sample of members who had visited the Levels at some time during the preceding 12 months.

For the general public survey a larger sample size was thought to be desirable in order to reflect the greater diversity of the sampling frame. A target of 286 usable questionnaires was specified in order to ensure that 90% of the time estimated WTP would be within 15% of true mean WTP. To give some margin for non-response, the target sample size was increased by 15%, to give an overall target of 329 completed responses.

The general public survey was undertaken in order to sample households who lived outside the Pevensey Levels and had not visited the area in 1994, but who might still have a positive WTP for WES in the Levels. To accomplish this, interview sites for the survey were chosen to be representative of those settlements within 60km of the Pevensey Levels, an area encompassing much of East Sussex, West Sussex and Kent. This area was chosen not only to keep interview costs down, but because it was considered that beyond this, households would find the issue of WES in the Pevensey Levels increasingly unimportant, with a consequent unwillingness to participate in the survey and a lack of motivation to consider the bidding game seriously. Within the 60 kilometre zone most households face only a relatively short journey to take up the option of visiting the Levels, and many households resident in this area may consider the site as having local significance regardless of whether or not they intend to ever visit it.

It is likely, however, that many non-visitors resident outside of the 60km zone would also have a positive (though probably smaller) WTP for WES in the Levels. Therefore, though this sampling strategy may provide an upper bound on non-visitors' mean WTP for WES in the Levels, when aggregated across the target population it will almost certainly give a lower-bound estimate of the total WTP of non-visitors. In terms of long-term policy appraisal however, it is important to remember at this point, that substitution effects arising from the inclusion of further sites under WES could reduce the marginal WTP of non-visitors for the scheme in the Pevensey Levels.

A total of 20 main interview sites were chosen, covering the majority of settlements in the area with populations greater than 5,000 people. Sample sizes at these sites were determined roughly on the basis of population, though to save on interviewer costs the proportions utilised were not precise (see Table 4.3). In addition to the main interview sites, a further 25 respondent households were to be drawn from villages within the 60 kilometre zone. The sample was stratified on socio-economic characteristics in order to ensure that a representative sample from the area was drawn.

Table 4.1: Recommended Sample Sizes for Given Levels of Precision

	Δ= 0.05	Δ = 0.10	Δ = 0.15	Δ= 0.20
V = 1.5, a = 0.10	2,571	643	286	161
V = 1.5, a = 0.05	3,458	865	385	217
V = 2.0, a = 0.10	4,570	1,143	508	286
V = 2.0, a = 0.05	6,147	1,537	683	385
V = 2.5, a = 0.10	7,141	1,786	794	447
V = 2.5, a = 0.05	9,604	2,401	1,608	601

Where:

V = Relative Error or coefficient of variation (standard deviation / mean)

a = 0.10 indicates that 90% of the time estimated mean WTP will be within Δ of true mean WTP

a = 0.05 indicates that 95% of the time estimated mean WTP will be within Δ of true mean WTP

Δ = difference between x_1 and x_2 (of the two CVM samples) expressed as a percentage of x_1.

Source: Mitchell and Carson (1989)

Table 4.2: Location of Resident Interviews

A.	East Hailsham, Downash, Magham Down	42
b.	Hankham, Stone Cross, Blackness, Jenkins Green	8
C.	Rickney, Chilly Green, Pevensey CP	3
D.	Westham, Pevensey	21
E.	Pevensey Bay	18
F.	Beachlands	11
G.	Norman's Bay, Hooe Level, including area south of the A259	4
H.	Cooden	10
I.	Little Common, including Whydown and area north of the A259, extending from Little Common to HM Prison	16
J.	Hooe, Hooe Common, Hazard's Green	8
K.	Boreham Street to Wartling	6
L.	Windmill Hill area	4
M.	Herstmonceux/Flowers Green area	10

Table 4.3: Location of General Public Interviews

TOWN	DISTANCE (KM)	POPULATION (APPROX)	SAMPLE SIZE
Hythe	60	12,900	6
Lewes	23	15,000	6
Newhaven	19	10,800	6
Rye	33	4,300	6
Seaford	17	16,600	6
Tenterden	37	6,200	6
Burgess Hill	35	25,700	11
East Grinstead	40	25,000	11
Haywards Heath	36	28,200	11
Sevenoaks	49	24,600	11
Tonbridge	40	30,400	11
Ashford	53	46,000	14
Horsham	52	38,600	14
Tunbridge Wells	32	45,300	14
Crawley	48	80,700	24
Hastings	19	81,900	24
Eastbourne	9	90,700	28
Maidstone	51	91,400	28
Worthing	50	95,000	28
Brighton and Hove	33	138,000	39

In addition a further 25 respondents were sampled, one per village, from villages between the Pevensey Levels and the sample sites, giving a total sample of 324.

Chapter 5

CHARACTERISTICS OF RESPONDENTS

5.1: Introduction

This chapter provides some basic descriptive statistics about respondents in the sample surveys. Such descriptive statistics permit a judgement to be made about the representativeness of the sample, as well as providing some background information about the characteristics of residents, visitors, and the general public.

In addition, the demand for, or participation in, recreational activities related to wildlife at any particular site can be hypothesized as being determined by a number of factors, namely: household income: age of the participant; preferences for particular types of nature conservation; preferences for recreational activities at the site; and the supply of substitute sites available. Thus, it is important that any sample survey collects information on the personal characteristics of respondents, so that they can be incorporated into a theoretical model which can be used to assess the degree to which the findings of the study are consistent with theoretical expectations.

5.2: Perceived Need and Expressed Preferences for Nature Conservation

The perceived need by respondents for nature conservation in England is shown in Table 5.1. There are slight differences in perceived need between residents, visitors and the general public, but these are not statistically significant. Over three-quarters of all respondents regarded the protection of wild plants and animals in Britain as a urgent and immediate problem; whilst around 15% regarded it as a problem for the future. Few respondents thought there was little need for nature conservation in England. These general perceptions were reflected in the results of an attitude question which asked respondents whether:

(a) governments should do more to protect the environment even if it meant higher taxes,
(b) governments should keep taxes low even if this sometimes meant doing less to protect the environment.

Table 5.1: The Perceived Need for Nature Conservation in England

	Percentage of Respondents		
	Residents	**Visitors**	**General Public**
Urgent problem now	78.0	82.0	75.7
Problem for the Future	14.5	12.4	15.5
Not a problem	3.1	3.9	6.1
Don't know	4.4	1.7	2.7

Table 5.2 reveals that over 70% of all respondents thought the government should do more to protect the environment even if it meant higher taxes; whilst only 17% of residents, 9% of visitors and 14% of the general public preferred lower taxes even if it meant less environmental protection.

Table 5.2: Respondents' Trade-offs Between the Economy and the Environment

	Percentage of Respondents		
	Residents	**Visitors**	**General Public**
Gov't should protect environment and would be willing to pay higher taxes	70.3	78.4	75.1
Gov't should keep taxes low and less environmental protection acceptable	16.5	8.5	14.3
Don't know	1.9	1.7	4.0
Unable to answer	11.4	11.4	6.7

In eliciting preferences, respondents were shown a list of different habitats and asked to rank them in terms of how much they liked and enjoyed each. A score of one was given to the habitat liked the most by the respondent: midranks were assigned if respondents had no preference between habitats. Tables 5.3 (a, b, and c) shows the

mean preference ranking (column 3), as well as the comparative proportions of respondents who allocated scores of one to five to each habitat. Clearly, most respondents preferred coasts, cliffs, and beaches as landscapes and habitats, closely followed by woodlands. Wetlands were unanimously the least preferred landscape and habitat even amongst residents around the Levels, with less than 5% of respondents indicating that this was their most preferred landscape. Conversely, for 63% of residents, 53% of visitors and 72% of the general public, wetlands were the single least preferred habitat. Mean preference rankings are similar for all landscapes with the exception of wetlands, where for all respondents this habitat had a distinctly lower rating.

Respondents were also asked to rank the five habitats in terms of their perceptions of which had suffered most losses or damage, and which least. A score of one implied the most losses and a score of five the least. Again Tables 5.3 (a, b, and c) summarize the responses. Compared with preferences for habitats, the perception of which habitats were under most threat was much more evenly divided between all habitats. Along with cliffs, coasts and beaches, wetlands were generally regarded as one of the habitats least under threat: visitors to the Levels however, consider wetland habitats to be rather more at risk than do the other two groups. Tables 5.3a clearly demonstrates that people living in the vicinity of the Pevensey Levels were neither particularly fond of wetland habitats nor of the opinion that these habitats were threatened.

Table 5.3a: Residents' Preferences for Various Habitats and their Perception of the Relative Threat Offered to Each

Habitat	Single Most Preferred (%)	Single Least Preferred (%)	Mean Preference Rating	Single Most Threatened (%)	Single Least Threatened (%)	Mean Threat Rating
Coasts, cliffs and beaches	33.33	13.43	2.68	19.85	30.89	3.16
Woodlands	28.99	7.46	2.52	21.32	8.13	2.70
Meadows, fields and heaths	21.74	5.97	2.63	29.41	14.63	2.65
Rivers, lakes and ponds	13.77	10.45	3.02	14.71	17.07	3.04
Wetlands (fens, bogs and marshes)	2.17	62.69	4.13	14.71	29.27	3.35

Table 5.3b: Visitors' Preferences for Various Habitats and their Perception of the Relative Threat Offered to Each

Habitat	Single Most Preferred (%)	Single Least Preferred (%)	Mean Preference Rating	Single Most Threatened (%)	Single Least Threatened (%)	Mean Threat Rating
Coasts, cliffs and beaches	25.4	20.9	2.88	13.5	37.6	3.54
Woodlands	23.2	5.6	2.50	17.6	8.2	2.74
Meadows, fields and heaths	17.5	9.0	2.92	20.6	7.1	2.77
Rivers, lakes and ponds	23.2	5.6	2.60	16.5	12.4	2.98
Wetlands (fens, bogs and marshes)	4.5	52.5	4.09	28.2	23.5	2.96

Table 5.3c: General Public's Preferences for Various Habitats and their Perception of the Relative Threat Offered to Each

Habitat	Single Most Preferred (%)	Single Least Preferred (%)	Mean Preference Rating	Single Most Threatened (%)	Single Least Threatened (%)	Mean Threat Rating
Coasts, cliffs and beaches	28.9	9.4	2.67	14.5	28.9	3.43
Woodlands	25.2	2.1	2.44	23.0	8.5	2.72
Meadows, fields and heaths	15.8	4.6	2.77	18.6	6.9	2.78
Rivers, lakes and ponds	17.0	1.8	2.59	18.9	6.6	2.70
Wetlands (fens, bogs and marshes)	1.5	71.7	4.53	19.2	32.8	3.35

5.3: Recreational Activities

There is a general overall similarity between residents' and visitors' use of the Pevensey Levels and the public's participation in various activities in the countryside in general (Tables 5.4, a, b, and c). Recreational activities are dominated by walking, observing wildlife, visiting historic sites and buildings, and visiting local ale houses. Conversely,

most respondents never engaged in cycling, horse riding, painting and sketching, or angling. One exception to this is found in the visitor survey, where the inclusion of respondents interviewed at local angling clubs raised the proportion of anglers interviewed. Considering that angling is one of the best recreational opportunities offered by the Levels, the high visitor participation rate in angling did not seem unreasonable.

However, there are some notable differences in recreational participation on the Levels and in the countryside elsewhere (Tables 5.4, a and b, compared with Table 5.4c). Participation rates for walking in the Levels were observed to be considerably lower than those found in the general public survey which relate to all country walks. This is probably to be expected given the less scenic nature of the Levels. Cycling, painting and sketching, and photography were also less frequently undertaken on the Levels than elsewhere. In addition a higher proportion of respondents never looked at wildlife on the Levels compared with the proportion of the general public who never looked at wildlife in the countryside.

Table 5.4a: Residents Participation in Various Activities on the Pevensey Levels

Activity	Often (%)	Sometimes (%)	Never (%)
Walking more than 2 miles	26.7	32.3	41.0
Walking less than 2 miles	35.0	35.0	30.0
Cycling	6.8	16.1	77.0
Horse riding	2.5	1.2	96.3
Birdwatching	11.8	27.3	60.9
Looking at wildlife	21.1	41.6	37.3
Painting or sketching	1.3	5.6	93.1
Angling/ fishing	4.3	10.6	85.1
Visiting historic sites or buildings	12.5	63.8	23.8
Visiting local pubs	19.3	55.9	24.8
Photography	8.8	45.6	45.6

Table 5.4b: Visitors Participation in Various Activities on the Pevensey Levels

Activity	Often (%)	Sometimes (%)	Never (%)
Walking more than 2 miles	33.0	38.0	29.1
Walking less than 2 miles	36.3	28.5	35.2
Cycling	10.6	16.2	73.2
Horse riding	0.6	1.1	98.3
Birdwatching	14.5	30.2	55.3
Looking at wildlife	24.6	36.3	39.1
Painting or sketching	3.4	9.5	87.2
Angling/ fishing	22.3	5.6	72.1
Visiting historic sites or buildings	14.5	44.1	41.3
Visiting local pubs	19.0	45.8	35.2
Photography	11.2	33.0	55.9

Table 5.4c: General Public's Participation in Various Activities in the Countryside

Activity	Often (%)	Sometimes (%)	Never (%)
Walking more than 2 miles	42.1	36.4	21.5
Walking less than 2 miles	49.4	33.6	17.0
Cycling	10.0	14.5	75.5
Horse riding	1.5	5.2	93.3
Birdwatching	11.2	30.0	58.8
Looking for wildlife	22.7	52.1	25.2
Painting or sketching	4.8	9.4	85.8
Angling/ fishing	5.5	10.0	84.5
Visiting historic sites or buildings	30.0	54.2	15.8
Visiting local pubs	21.5	50.6	27.9
Photography	16.4	42.4	41.2

Thus, the surveys revealed some notable differences between the use of the countryside in general and the use of the Levels by local residents and visitors.

5.4: Characteristics of Respondents

The residents and general public surveys were designed as random sample surveys. However, because the surveys covered different geographical areas there are some differences between the characteristics of respondents. The nature of visitor behaviour in the Pevensey Levels meant that the survey was not conducted in a totally random manner, but even so the characteristics of the sample should not differ too systematically from those of the overall population of visitors.

Table 5.5: Economic Activity of Respondents

	Percentage of Respondents		
	Residents	**Visitors**	**General Public**
Employed	54.0	57.0	62.1
Economically non-active	46.0	43.0	37.9
i.e. Unemployed	8.1	5.2	10.6
Retired	70.3	85.7	74.0
Other economically non-active (e.g. students, homemakers, etc.)	21.6	9.1	15.4

Table 5.5 shows that only 54.0% of the respondents in the residents sample were in employment, compared to 57% of visitors and 62.1% of respondents in the general public survey. The frequency of respondents who were currently unemployed was least for visitors, which is unsurprising given that households are less likely to make recreational trips if one wage earner is unemployed. However, this group exhibited the highest proportion of retired people (36.9%) which compared with 32.3% in the residents sample and 28.0% in the general public sample. The percentage of retired respondents in the residents survey was almost identical to the proportion of heads of households in the Pevensey Levels area of East Sussex who were classified as retired in the 1991 OPCS decennial population census (33%).

Table 5.6: Age Distribution of Respondents

	Cumulative Percentage		
	Residents	**Visitors**	**General Public**
16-24	5.0	2.8	5.2
25-34	18.8	12.4	21.2
35-44	37.5	36.0	41.5
45-54	56.9	53.9	62.1
55-64	73.1	74.7	76.7
65-74	88.8	96.1	93.9
75+	100.0	100.0	100.0

Table 5.6 shows the age distribution of respondents (the head of household) in the three samples. There is a greater proportion of the general public sample in the younger age groups (<54 years) compared to the other samples. Conversely, a much higher percentage of residents were concentrated in age groups 55+; and especially in the 65+ age group, which contained 11.2% of the residents sample compared with only 6.1% of the general public sample and 3.9% of the visitor sample.

Table 5.7: Respondents' Levels of Education

	Percentage of Respondents		
	Residents	**Visitors**	**General Public**
Left school at 16	61.3	53.4	54.2
Completed Secondary Education	8.1	10.1	11.8
Went on to Further Education	13.1	14.6	16.7
Went on to Higher Education	17.5	21.9	17.3

Possibly because of the differences in age distributions, higher proportions of the respondents in the general public and visitor samples had stayed on at school after the age of 16, and higher proportions had gone on to secondary and further education

(Table 5.7).

Possibly because of the greater concentration of the resident sample in the higher age categories, and the greater proportion of households and members of each household classified as retired, the income distributions of the three samples differed somewhat (Table 5.8). The residents sample contained the highest proportion of lower income households, while the general public sample exhibited considerably more high income (over £40,000 per annum) households. This was not unexpected, higher income households are probably more likely to want to live in and visit areas in Southern England that are more scenic and convenient than the Pevensey Levels.

Table 5.8: Respondents' Household Income Groups

	Cumulative Percentage of Households		
	Residents	**Visitors**	**General Public**
< 3,500	4.9	0.6	3.4
< 4,999	17.9	8.9	14.6
< 7,499	26.8	16.6	26.8
< 9,999	36.6	28.4	35.8
< 14,999	50.4	46.7	45.5
< 19,999	67.5	61.5	60.7
< 29,999	90.7	84.6	78.5
< 39,999	96.7	97.0	87.2
< 49,999	98.4	98.2	93.8
< 50,000+	100.0	100.0	100.0

There were similarities and some differences in household size between the samples. The typical adult household consisted of two adults in each survey (Table 5.9). However, fewer resident and visitor households consisted of more than five adults compared to those in the general public; and single person households were slightly more common in the general public sample. But these differences were small and not statistically significant. A higher proportion of residents' households had no children compared to households in the general public sample, again probably reflecting the higher proportion of retirement households in the residents sample.

Table 5.9: Household Size

	Percentage of Households With					
	ADULTS			CHILDREN		
No. per HH	Residents	Visitors	General Public	Residents	Visitors	General Public
0	-	-	-	73.8	69.8	67.9
1	18.8	15.7	21.2	8.8	12.3	13.6
2	61.3	61.8	58.8	12.5	11.7	13.6
3	13.8	11.8	11.8	5.0	5.6	4.2
4	5.0	10.1	5.8	0.0	0.6	0.3
5+	1.2	0.6	2.4	0.0	0.0	0.3

Preference for conservation was measured by a general question on membership of environmental and conservation groups, and a more specific question on how important the respondent thought the Pevensey Levels was for wildlife. Visitors were most likely to have a household member in such a group, though membership levels overall were higher than might be expected. The National Trust and the RSPB had members in more than 10% of all households in the survey (Table 5.10). Households were more likely to have a member in a national or international wildlife organisation such as Greenpeace, than a local organisation such as the Sussex Wildlife Trust. The high incidence of members of visitor households belonging to the latter, emphasises the high proportion of local visits to the Levels and the area's wildlife interest.

Around 80% of residents and visitors thought the Pevensey Levels was very important for wildlife compared with less than 1% who thought the area was unimportant. Because the general public were assumed to not to have visited the Levels they were not asked this question, but were instead asked about their use of that is visits to substitute sites in south east England. Respondents in the residents' sample around the Levels appeared to be very stable residentially: they had lived on average 23.1 years around the Levels (median 18.6 years) and held strong views about conservation on the Levels.

Table 5.10: Percentage of Respondents Belonging to Various Environmental or Conservation Groups

Organisation	Residents	Visitors	General Public
National Trust	17.5	26.8	24.8
Sussex Wildlife Trust	0.6	7.8	1.5
Greenpeace	6.3	5.6	5.2
Friends of the Earth	5.6	4.5	5.2
World Wide Fund for Nature	6.3	6.7	6.4
RSPB	11.3	15.1	10.0
Council for Protection of Rural England	1.3	2.2	0.3
RSPCA	6.9	3.9	5.8
British Trust for Conservation Volunteers	0	1.1	0.3
Angling Club	7.5	23.5*	5.8

* Visitor survey deliberately sought respondents from angling clubs

5.5: Frequency of visits

The 176 respondents in the visitor sample had made an average of 22.3 trips to the Levels during the previous 12 months. This figure was boosted by the 4.5% of respondents who had visited over 100 times: three respondents living close to the Levels said that they visited daily. However, 19.3% of respondents had made only one visit, and 63.1% had made ten or less visits: the median number of visits was only six. Day trips accounted for 72.5% of visits, with the remainder made by holidaymakers, most staying in Pevensey Bay on the fringes of the Levels. Close to 90% of visits were made by car, but the high incidence of local users meant that over 7% walked to the Levels. The average distance travelled to get to the Levels was just over 21 miles (34 km), but the median distance was only 10 miles (16 km): over 70% of visitors travelled 20 miles (32 km) or less.

Over 82% of respondents in the general public sample had heard of the Pevensey Levels, and only 17.6% had not. However, only 37.3% had ever visited the Levels, compared with 62.1% who had not, and 0.3% who were uncertain.

Table 5.11a: General Public Sample Visit Rates to Selected Wildlife and Nature Sites in and Around Sussex

WILDLIFE/NATURE SITE	Mean Visits in 12 Months	Respondents Visiting (%)
0. Pevensey Levels	0.46	12.4
1. Beachy Head Nature Trail	0.79	28.8
2. Chailey Common	0.49	9.4
3. Castle Hill	0.06	2.7
4. Ditchling Beacon	1.47	28.8
5. Ditchling Common Country Park	0.98	14.2
6. Flatropers Wood	0	0
7. Fore Wood	0.06	2.4
8. Guestling Wood	0.08	4.2
9. Hastings Country Park Nature Trails	1.27	17.3
10. Lullington Heath	0.11	3.9
11. Rye Harbour	1.82	43.0
12. Selwyns Wood	0.02	0.9
13. Seaford Head	0.95	20.3
14. Cuckmere Haven	1.78	28.2
15. Stanmer Park Nature Trail	0.80	10.3

Tables 5.11 a and b indicate how the general public and visitor samples revealed their preferences for certain types of habitats through their visits to particular sites. Only 12.4% of the general public sample had visited the Pevensey Levels in the last 12 months. Moreover, as Table 5.11a reveals there were many substitute sites which respondents visited in preference to the Levels.

Overall, the mean number of visits to the Levels was only 0.46 per respondent household, compared to 1.78 visits per respondent household for Cuckmere Haven, 1.47 for Ditchling Beacon, and 1.27 for Hastings Country Park nature Trails. However, respondents in the general public sample who had actually visited the Levels

made on average 3.73 visits per year: the frequency of visits was, however, greater at many of the other wildlife sites. The visiting pattern of those who visited the Levels did not suggest that these respondents had a strong intensity of preference for the Levels, compared to intensities of preference for other sites, as exemplified by frequency of visits elsewhere.

Table 5.11b: Visitor Sample Visit Rates to Selected Wildlife and Nature Sites in and Around Sussex

WILDLIFE/NATURE SITE	Mean Visits in 12 Months	Respondents Visiting (%)
0. Pevensey Levels	22.29	100.0
1. Beachy Head Nature Trail	2.09	60.9
2. Chailey Common	0.37	19.0
3. Castle Hill	0.14	8.4
4. Ditchling Beacon	1.67	34.6
5. Ditchling Common Country Park	0.77	16.2
6. Flatropers Wood	0.03	2.2
7. Fore Wood	0.28	13.4
8. Guestling Wood	0.26	15.6
9. Hastings Country Park Nature Trails	1.29	31.3
10. Lullington Heath	0.75	22.9
11. Rye Harbour	3.02	60.3
12. Selwyns Wood	0.03	1.1
13. Seaford Head	1.53	50.8
14. Cuckmere Haven	3.74	65.4
15. Stanmer Park Nature Trail	0.20	9.5

Respondents in the visitor survey made an average of 16.2 visits per year to the sites shown in Table 5.11b: this compared with an annual rate of 10.7 visits to these sites by respondents in the general public sample. Given that being captured in the visitor survey suggests a predisposition for countryside recreation, it was not surprising that

the visit rates in Table 5.11b generally exceeded those for respondents in the general public survey. The most popular sites were, however, common across both samples, with visit rates for the visitor sample up to twice as large as for the general public sample. One proviso[3]

[3] Visit rates to Beachy Head Nature Trail and Hastings Country Park Nature Trail may be over-estimated through some respondents being unable to distinguish between these attractions and the wider sites containing them.

Chapter 6

ESTIMATES OF USE AND PASSIVE USE WTP VALUES FOR THE PEVENSEY LEVELS WES

The results presented in this section relate to each of the following three categories of respondent: households resident in or near the Pevensey Levels; households visiting the Pevensey Levels in 1993/94; and household living outside the Levels who did not visit them in 1993/4.

Having read the information provided about WES in the Pevensey Levels, each respondent was asked a series of questions relating to their valuation of the scheme in the Pevensey Levels.

Table 6.1: How Much More Respondents Would be Willing to Pay for WES in the Pevensey Levels Compared with Today: All Responses

Multiple	Residents	Visitors	Non-Visitors
Zero	23	29	79
2X	45	41	63
3X	9	17	26
4X	13	10	15
5X	6	12	22
10X	14	20	22
20X	9	10	12
50X	7	7	15
100X	7	12	8
200X	3	4	9
500X	5	1	3
1000X	5	1	3
> 1000X	5	5	1
Don't Know	9	10	11
Refused	1	0	0

It was pointed out to respondents that the money used to pay for WES scheme in the Pevensey Levels came from taxes, and that for most households this payment would

only amount to a few pence per year. Respondents were then asked whether, in the light of the information they had just read, they were still willing to pay for WES in the Pevensey Levels. Respondents who were willing to pay were then asked whether their household would be willing to pay additional taxes towards WES in the Levels. Respondents who said that they were not willing to pay in either of these cases were recorded as having zero additional WTP for WES (see Table 6.1).

Respondents who were willing to pay an additional amount of taxes were asked the following question:

> "Recall that the majority of households pay a few pence a year for the Wildlife Enhancement Scheme in the Pevensey Levels. Bearing in mind that there are many worthwhile nature conservation programmes in England which you might wish to support, what is the MAXIMUM your household would be willing to pay for the Wildlife Enhancement Scheme in the Pevensey Levels compared with today? Twice as much? Three times as much? Four times as much?... "

This bidding game utilised the bid amounts given in the first column of Table 6.1, and continued until respondents reached an amount which they would not be willing to pay: 'Don't Know' and refusal options were included. The frequencies of each response are shown in columns two to four. Respondents were then asked, using an open-ended question, to estimate exactly how many times as much as today they would be willing to pay for WES in the Pevensey Levels. However, this question did not provoke substantially different responses from the bidding game with very few respondents specifying a bid lying between the ordered bid amounts (e.g. only three respondents in the resident survey; 16 respondents in the general public survey). This suggested that responses were heavily anchored to the bid amounts used in the questionnaire.

Respondents' motivations for making a particular bid were investigated in a series of questions that asked which of a given set of motives best explained why respondents had made their bids. Table 6.2 shows the results of examining respondents' motives for not being willing to pay for WES. The upper half of the Table relates to respondents not willing to pay for the scheme at all, while the lower half examines the motives of those not wishing to pay any additional taxes for the scheme. Some reasons might be considered not to be legitimate in terms of a contingent valuation exercise, and these could be rejected in the context of estimating mean WTP. These reasons relate to free-riding, strategic bids and refusal to bid because of unwillingness to pay more taxes. This last reason may be rejected as being a response to the payment vehicle

rather than to WES. It is possible that these respondents have a positive WTP for WES but would rather not pay through increased taxes, and to include these bids as true zeros may bias WTP estimates downwards.

Table 6.2: Analysis of Zero Bids

	Residents	Visitors	Non-Visitors
Not Willing to Pay for WES	4	2	7
Reasons			
a. I do not derive any benefit from the Levels, so I do not want to pay for them	0	0	2
b. I think it is a waste of taxpayers' money	1	1	0
c. I would rather my money was spent on other wildlife/conservation initiatives	0	1	1
d. I would rather my money was spent on something more worthwhile	0	0	1
e. I'd rather someone else paid for it	1	0	1
f. The Pevensey Levels are fine as they are and don't require the WES Scheme	2	0	0
g. Other Reasons: Acceptable h. Other Reasons: Unacceptable	0 0	0 0	2 0
Total Rejected Bids (Σ e + h)	**1**	**0**	**1**
Not Willing to Pay any more for WES	19	27	72
Reasons			
a. I do not derive any benefit from the Levels, so I do not want to pay for them	0	1	9
b. I pay enough taxes and should not have to pay more	5	9	16
c. I would like to pay more but cannot afford to	10	6	27
d. I already pay enough to support wildlife/ conservation initiatives	1	2	5
e. I'd rather someone else paid for it	0	0	0
f. The Pevensey Levels are fine as they are and don't require the WES Scheme	0	2	0
g. Other Reasons: Acceptable h. Other Reasons: Unacceptable	2 1	6 1	14 1
Total Rejected Bids (Σ b + e + h)	**6**	**10**	**17**

Table 6.3 classifies non-zero bids into various categories, four of which could be regarded as 'illegitimate': two of these, b and f, are rejected for obvious reasons, while the bids given for reason h are rejected as not directly relating to WTP for the Levels, but rather to WTP for a broader set of 'green' goods. The motivation for such a bid could either be the so-called 'warm-glow' effect (Kahneman and Knetsch, 1992) where

respondents make a positive bid in order to feel good about themselves, or could be attributed to an embedding effect where the respondent's valuation is for a much larger set of environmental goods than the one he or she is being questioned about. Reasons for making a bid which are not included in the lists in Tables 6.2 and 6.3 were classified as being acceptable or unacceptable in terms of their relation to the CVM exercise. For instance, several bids were rejected as protest bids when respondents specified their opposition to the valuation exercise as the reason for their zero bid. The bulk of the acceptable 'other' reasons (particularly for non-visitors) revolved around the respondents' desire to share money around a wide range of conservation projects and their unwillingness to favour any particular scheme.

Table 6.3: Analysis of Non-Zero Bids

Reasons	Residents	Visitors	Non-Visitors
a. The Pevensey Levels are a valuable wildlife habitat and should be maintained	62	36	38
b. I would not pay this amount, I am just suggesting the Levels are important	0	0	0
c. I am in favour of preserving nature and the environment	36	48	126
d. I value the Pevensey Levels for a number of reasons and would be prepared to pay extra taxes to enhance them	21	33	12
e. I wished to show my support for green issues in general	6	9	21
f. It was just a wild guess, I would not really be willing to pay this much	0	0	0
g. Other Reason: Acceptable h. Other Reason: Unacceptable	2 1	14 0	2 0
Total Rejected Bids (Σ b + e + f + h)	**7**	**9**	**21**

Table 6.4 demonstrates the distribution of WTP bids when all 'illegitimate' zero and non-zero bids are removed. Overall, the removal of these bids had only a small effect on the bid distributions. In the case of Pevensey residents, the removal of illegitimate bids narrowly moves the median bid from a multiple of three to a multiple of four: for visitors the median bid multiple increases from a multiple of three to a multiple of 3.5. Similarly, for non-visitors, removal of these bids moved the median bid amount up from a multiple of two to a multiple of three.

The use of the median bid in any decision making process would be analogous to the decision made in a referendum, as the median is the additional amount which at least half of the respondents would be willing to pay for WES.[4] The use of the median bid

[4] This decision rule ignores respondents who do not make a firm bid in the same way as a referendum

may have some advantages over the use of a simple mean, for example not being so affected by any outlying bids. Furthermore, the anchoring effect introduced by using set bid amounts should not prove as influential in determining the median bid as the mean . In fact, because median bids for all cases were less than five, the anchoring effect was indeed of very little practical significance in determining median bids.

Table 6.4: How Much More Respondents Would be Willing to Pay for WES in the Pevensey Levels Compared with Today: Illegitimate Bids Removed

Multiple	Residents	Visitors	Non-Visitors
Zero	16	19	61
2X	43	38	56
3X	9	15	23
4X	11	9	12
5X	6	12	20
10X	13	18	19
20X	8	10	11
50X	7	7	15
100X	6	12	6
200X	3	4	9
500X	5	1	3
1000X	5	1	3
> 1000X	5	4	1
Rejected Zero Bids	7	10	18
Rejected Bids (>0)	7	9	21
Don't Know	9	10	11
Refused	1	0	0

The fact that the WTP amount elicited from the bidding game is frequently identical to the specific multiple elicited from respondents in the follow-up open-ended question, meant that this multiple can be used to investigate the relationship between bids and the socio-

would ignore, but report, any spoilt ballot papers

economic and other characteristics of respondents.

Tables 6.5 a and b give summary statistics for the distribution of bid multiples both including and excluding illegitimate bids. Mean bid multiples are reported along with the associated truncated means which were generated by removing the highest and lowest 5% of bids from each distribution. The removal of extreme high bids reduces the mean bid multiples considerably, particularly in the case of visitors, where a few very high bids (legitimate and illegitimate) account for the bulk of the unadjusted mean. In general, residents are found to have the highest WTP for WES in the Levels, particularly in terms of truncated mean, followed by visitors, with the WTP of non-visitors somewhat lower. The all-bids mean for visitors in Table 6.5a is inflated by a single high, illegitimate bid.

Table 6.5a: Mean Bid Multiple (All Bids Included)

	Residents	**Visitors**	**Non-Visitors**
Number of Usable Observations	151	163	278
Mean	97.18	147.59	36.22
Standard Deviation	258.68	902.41	134.54
Truncated Mean*	49.44	16.03	11.68
Median	3	3	2

* generated by the removal of the highest and lowest 5% of observed bid multiples

Table 6.5b: Mean Bid Multiple (Illegitimate Bids Removed)

	Residents	**Visitors**	**Non-Visitors**
Number of Usable Observations	136	144	239
Mean	106.86	97.36	40.69
Standard Deviation	270.80	488.39	144.21
Truncated Mean*	61.74	17.85	13.83
Median	4	3.5	3

* generated by the removal of the highest and lowest 5% of observed bid multiples

Mean bid multiples are far higher than the median bid multiples, illustrating the skewed nature of the bid distribution. This effect is further highlighted by the differences between the mean and the truncated mean, particularly in the case of the visitor sample. The

question of which mean bid multiple to adopt for aggregation purposes is a vexed one, and will be discussed in more detail in the following chapter.

Economic theory suggests that respondents' WTP bids should be positively related to income, membership of environmental groups and use of the Levels for recreational purposes. However, in the case of very low WTP bids, some of these expected relationships, particularly with regard to income, may not be observed.

Thus, the low monetary amounts represented by the majority of bid multiples in this study may not be easy to explain in theoretical terms. However, simple two-way correlation analysis based on all responses demonstrated that some of the expected relationships were indeed present. For example, in the case of residents, the bid multiple was significantly and positively correlated with respondents' household income being over £20,000 per annum, and significantly negatively correlated with the fact that the respondent was retired (and on a lower income). Bid amounts were also significantly and positively correlated with membership of the RSPB and the World Wide Fund for Nature (WWFN). Those respondents who considered wetland habitats to be threatened were also found to be willing to pay more for WES. For non-visitors the results were not so clear, with no obvious income effect in evidence, only a strong relationship between bid level and membership of the WWFN and Friends of the Earth.

The discrete, ordered nature of the WTP data means that it is unsuitable for analysis using conventional ordinary least squares regression. In addition, even though the outcomes are discrete, multinomial logit or probit models would not take account of the ordered nature of the data. The most appropriate technique for modelling this kind of ordered response data is ordered probit analysis (see Zavoina and McElvey, 1975). However, while theoretically appropriate, the model may still have problems given the possibly weak relationships between bid multiples and explanatory variables.

In this study, there were a total of 13 separate usable responses to the bidding game including zero WTP (see Table 6.1), each successive response representing a relative increase in WTP for WES. For the resident sample these 13 responses were aggregated into a set of seven ordered responses as shown in Table 6.6. This reduced the information available from the sample, but with the limited observations available and a large number of ordered responses there were problems with estimation which could only be surmounted by reducing the number of categories from 13 to seven.

Some observations were lost through the absence of important explanatory factors

particularly data on household income, reducing total usable observations to 106 for residents. These responses were used as the dependent variable in an ordered probit model, with explanatory variables based on the socio-economic characteristics, recreational preferences and attitudes of individual respondents.

Table 6.6: Deriving Ordered Responses from Resident WTP Data

Original WTP Response	Ordered Probit Response	Number of Observations
Zero	0	12
2X or 3X as much as today	1	39
4X or 5X as much as today	2	15
10X or 20X as much as today	3	14
50X or 100X as much as today	4	11
200X or 500X as much as today	5	7
At least 1000X as much as today	6	7

The model revealed little about the underlying reasons for the bid amounts, with only income-related factors proving to be statistically significant in terms of explaining increasing bid levels. Furthermore, the fact that nearly 40% of responses took the same value (i.e. one) had the effect of causing the estimated model to take a form which predicted that all responses took that value. This result suggested that very little information could be gathered by way of the ordered probit approach. Similar results were obtained for data based on the visitor survey, where depending on specification nearly all responses were predicted to be one.

Better results may be obtained when the observed bid frequencies are not so heavily weighted to a single response. This was partly the case for the non-visitor sample, where the presence of over half the observations in the first two OP response categories led the model to predict that all respondents would fall into these categories (achieving a hit rate of 35%). The model showed a significant relationship between age and bid multiple: older and younger respondents (e.g. student and retired people) were found to bid higher amounts than middle aged respondents.

Chapter 7

AGGREGATE BENEFITS OF THE PEVENSEY LEVELS WES

7.1: Introduction

The random sample survey of residents, visitors and the general public, produced estimates of benefits, through a Hicksian WTP measure, per household per annum, for the Pevensey Levels WES. Estimation of the total benefits produced by the Pevensey Levels WES requires these annual WTP values to be aggregated across all households in the populations from which the samples were drawn. The total economic value (TEV) of WES in the Pevensey Levels comprises use values of visitors and residents, and non-use or preservation values held by non-visitors. In practical terms TEV is made up of the sum of:

(1) The use and non-use benefits arising from all households willing to continue paying what they currently pay for the scheme in the Levels (about £0.01-£0.02 per year).

(2) Any additional consumer surplus benefits arising from those households willing to pay an additional sum for WES in the Levels.

A conservative approach to the estimation of these consumer surplus benefits would involve aggregating annual mean WTP across only those households who indicated that they would be willing to pay an additional sum for WES in the Pevensey Levels. The aggregation process reported in this section will adopt this more conservative procedure.

Next, WTP estimates for the Pevensey Levels WES are summarised. This is followed by sections discussing the enumeration of the relevant populations over which these benefit estimates are to be aggregated, before the final section which documents the aggregate benefits of the Pevensey Levels WES.

7.2: Summary of the WTP Benefits Produced by the Pevensey Levels WES.

i. Theory

A standard utilitarian, or a Kaldor-Hicks criterion, sums gains and losses, and judges a welfare improvement to have taken place if the net difference between the two is positive. However, in this study it was assumed that respondents' utility for the Pevensey Levels WES was either zero or positive: it was assumed that individual households would not prefer the alternative - a more intensive agricultural production landscape.[5] Hence, in the questionnaire respondents were not given the opportunity to express a WTP not to have the Pevensey Levels WES, and benefits are thus aggregated as if the Pareto principle operated. But even if unanimity about WES did not occur, under a voting procedure those favouring WES would outvote any minority opposed to it, and under majority voting those in favour would vote to spend up to the median WTP value on the Pevensey Levels WES. Theoretically, under a first past-the-post voting system, as in Britain's electoral system, or majority voting as in Parliament, policy would be implemented up to that point determined by the value held by the modal and median voter respectively, in favour of the Pevensey Levels WES.

ii. Benefits Arising from Respondents Willing to Pay an Additional Sum for WES

The mean benefits generated by the Pevensey Levels WES for residents, visitors, and non-visitors willing to pay an additional sum for WES are summarised in Table 7.1. The Table reports sample mean WTP for all respondents making legitimate non-zero bids: these are somewhat larger than the benefit estimates reported in Section 6 because they exclude all respondents with zero WTP. A range of benefit measures are presented: means, truncated means (means with the upper 5% and lower 5% of observations removed), medians, and modes. All verifiable strategic bids, zero protest bids, and other illegitimate bids, are excluded from the calculation of means.

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[5] In a study of a similar landscape, the Somerset Levels and Moors ESA, only 13.7% of residents, and 4.2% of visitors, preferred the more intensive alternative agricultural landscape to the ESA landscape. The Somerset Levels and Moors ESA includes some 9,300 households living on the Levels many of whom have jobs associated with intensive agriculture, peat extraction, and other non-ESA compatible activities. Hence a higher proportion of residents voted against the ESA scheme in the Somerset Levels than in the South Downs ESA where only 3% of residents and 2% of visitors preferred the non-ESA landscape (Willis et al, 1993). The situation on the Pevensey Levels is different, only one house and a number of farms are located on the Levels themselves. The jobs of respondents in this sample were not affected by the implementation of WES

Table 7.1: Non-Zero WTP by Resident, Visitor, and Non-Visitor Households for the Pevensey Levels WES

	Multiples of existing contributions				
	mean	**truncated mean**	**median**	**mode**	**obs**
Residents	120.10	78.18	4	2	121
Visitors	112.16	22.21	5	2	125
Non-visitors	54.94	23.01	4	2	177

iii. Benefits Arising from Respondents Not Willing to Pay an Additional Sum for WES

While a large proportion of respondents were willing to pay an additional amount for WES in the Levels many were not. However, nearly all respondents were willing to continue making the same payments as they do today. Table 7.2 summarises these responses. The benefits arising from respondents not willing to pay an additional sum for WES is merely the sum of their current payments.

Table 7.2: Respondents Willing to Pay for WES in the Pevensey Levels

	Population Size	**Willing to Pay Same as Today**	**Number Willing to Pay Same**	**Willing to Pay More**	**Number Willing to Pay More**
Residents	6,478	97.52%	6,317	75.16%	4,869
Visitors	85,386	97.77%	83,482	70.22%	59,962
Non-visitors	739,695	97.58%	721,778	53.64%	396,746

7.3: Resident Population

The total number of residents within any area is relatively easy to enumerate, using the Office of Population Censuses and Surveys' (OPCS) decennial census of population. The boundaries of the Pevensey Levels WES were matched to OPCS enumeration districts (EDs), and the number of households within the WES area determined. Because the Pevensey Levels only contains one house and a number of farms, households living in areas surrounding the Pevensey Levels, and overlooking the Levels were also included, on the grounds that the amenity of these households can be deemed to be affected by changes the Levels, whether they visit the Levels or not. In view of this the sampling frame for residents was extended to include the EDs of those settlements adjacent to the Levels.

Thus the total number of households classified as 'residents' affected by the Pevensey Levels WES was estimated to be 6,478. Whilst there is a small amount of under-enumeration in the 1991 Census of Population, this is mainly confined to inner city areas (Britton and Birch, 1985), so the above estimates are robust provided the definition of 'residents' is accepted.

7.4: Visitor Population

Compared to residents around the Pevensey Levels WES area, the total number of visitors is extremely difficult to measure, and is subject to a greater degree of error. No surveys have been initiated by local authorities, or other bodies such as the Countryside Commission, or MAFF, to enumerate the annual number of visits or visitors to the Pevensey Levels.

Alternative sources of information relate to specific recreation sites within, or close to, the Pevensey Levels. Table 7.2 shows annual visitor numbers to sites fringing the Pevensey Levels. These estimates were derived from returns to English Tourist Board questionnaires sent out to owners and managers or operators of recreational sites. The estimates indicate that a number of purposeful visitors are attracted to one recreational site near to the Levels - Herstmonceux Castle.

However, many more visitors are likely to visit the Pevensey Levels than those paying to gain access to a specific recreational site near them, or those who are attracted to the area to undertake specific types of recreation such as angling or birdwatching. Many people visit the countryside simply to walk or take the air. However, the Pevensey

Levels is not noted for its footpaths and walking opportunities. Few footpaths or bridleways cross the Levels, with the exception of a bridleway from Pevensey north to Herstmonceux following the Pevensey Haven, Yotham and Hurst Havens (rivers). Other footpaths tend to skirt the Levels. joining settlements along the higher ground surrounding the Levels. Other types of open access non-priced recreation exist within the Pevensey Levels such as cycling, observing wildlife, and photography.

Visitors to some of the recreational sites in Table 7.3 may have also driven across the Levels on one the few minor roads which cross the area. Such informal recreational visits and visitor numbers are difficult to be determine by sampling visitors across all routes over the Levels. In addition the number of visitors needs to be translated into numbers of households, since it is the latter quantity against which WTP estimates from the random sample surveys have to be applied. Clearly, trying to sample visitors to the Pevensey Levels as a means of estimating the number of households who visit the Levels in any one year is fraught with difficulties.

Table 7.3: Visitor Numbers to Sites Fringing the Pevensey Levels in 1993

Site	Visitor Number
Andertum Roman Fort, Pevensey	NR
Herstmonceux Castle	20,000
Northeye Village (site of)	NR
Pevensey Castle	NR
The Trug Shop, Herstmonceux	1,230
Windmill, Windmill Hill	NR

(NR = no record)

Source: English Tourist Board.

Hence, the estimate of the number of households who had visited the Pevensey Levels was derived from the random sample survey of the general public. Recall from Chapter 5 that respondents were asked if they had visited the Pevensey Levels during the preceding 12 months, and a proportion of respondents indicated that they had visited the area. Thus a probability distribution of visiting the Pevensey Levels can be derived.

Table 7.4 shows the distribution of households by distance bands from the Pevensey Levels. Multiplying these numbers of households by the proportion of respondent households in the random sample survey of the general public who indicated that they had visited the Levels in 1994/94, produced estimates of the number of households from each distance band who visit the Pevensey Levels in any one year. Summing by distance band, reveals that the annual number of households who visit the Levels each year is approximately 85,400.

Table 7.4: Estimated Number of Households Visiting the Pevensey Levels in 1994

Distance Band (km)	Number of Households in Band	Probability of Visiting from Band	Estimated Number of Households in Band who Visit
[00, 10[	54,870[6]	35.29%	19,364
[10, 20[	74,442	30.77%	22,906
[20, 40[	260,333	8.60%	22,389
[40, 60[	435,436	4.76%	20,727
[00,60[	825,081	10.35%	85,386

It remains to be seen whether this distribution is an accurate reflection of overall visit rates, particularly given that it was derived using a very small number (n=39) of observations. These respondents visited an average of 3.73 times per year compared with an average of 22 visits per year from the visitor sample, suggesting that the general public survey may have picked up too few local, frequent visitors to give a representative coverage.

An alternative estimate of the number of visiting households can be derived from the

[6] This number excludes 6,478 households who are classified as residents

results of the 1993 national leisure UK Day Visits Survey (UKDVS) (Walker, 1994). This shows that in that year some 2,200 million day visits were made, over 900 million of these to the countryside. The national survey focuses on leisure day visits from home, during April - October 1993, to towns and cities, the countryside, the seaside and coast, forests and woodlands and canals and navigable rivers, and is based on household interviews. Respondents are adults in Great Britain (aged 15 or over), and the data is weighted taking into account age, sex, social class, country and region of residence.

The estimates for the total number of visits to the countryside in England is 591 million; but this includes 185 million visits to forests/woodlands in the countryside (excluding visits to forests/woodlands in towns/cities or at the coast) and 23 million visits to canals/rivers in the countryside (excluding visits to canals/rivers in towns/cities or at the coast). The total number of countryside visits, excluding visits to forests/woodlands, is therefore 406 million, and this base figure is taken as appropriate for comparisons with the Pevensey Levels where forests/woodlands are generally absent but canals/rivers (watercourses) are a key feature.

In order to make the subsequent calculations more relevant to the Levels, the area is defined as the south-east region (used by OPCS and others for the compilation of regional data). It is assumed that because the estimate of visits from the UKDVS is weighted, data for the total resident adult population in the south east can be used without further modification. For 1989, this population was 13.949 million (aged 16 or over; no correction is estimated for this slight discrepancy with the UKDVS). It is assumed that this population, which represents 37% of the adult population of England (38.164 million), made 37% of the leisure day visits to the countryside; the total estimate for the number of countryside visits in the south east is therefore 150 million (0.37 x 406). The UKDVS shows that the average distance travelled from home was 15 miles, but this was 11 miles for forest/woodland visits, 17 miles for countryside visits and 37 miles for seaside/coast visits.

The total area of agricultural land ('countryside') in the south east region is 1,708,000 hectares (this figure excludes land classified as urban and as forest or woodland, but includes woodland on agricultural holdings). If it is assumed that the 150 million visits are distributed evenly over the 1.708 million hectares, then the average number of countryside visits per hectare per year (April-October) in the south east in 1993 was 88. This estimate is obviously rather crude, and is constructed from a large number of assumptions, including: (a) that residents in the south east have similar patterns of

countryside recreational behaviour to other English residents, and (b) that the 'countryside' shows no differential attractions or opportunities for recreational visits.

Nevertheless, the estimate then leads to the final calculation, that on the Pevensey Levels, occupying a total area of approximately 3500 hectares, annual (April-October) recreational day visits of the order of 308,000 might be expected. Using the visit rate observed in the general public survey (3.73 visits per annum) as more representative of households in the south-east region, this suggests that approximately 82,600 households visited the Levels in 1994. This compares well with the 85,400 household estimate from the General Public Survey.

7.5: General Public Population

The 1991 Census of Population enumerated 21,802,994 households in the UK. By definition, the number of households at different distances from the Pevensey Levels who are not classified as residents of or visitors to the Pevensey Levels comprise the total number of households minus the number of households who have visited the Pevensey Levels during the year (1994/94) and the number of households resident around the Levels. It is this population which is categorised as non-users, and therefore who value Pevensey Levels by way of option value: the amount they are willing to pay to preserve the option of the current WES natural habitat of the Levels, given their present uncertainty about their future demand; and preservation value: the existence and bequest value motives of households willing to pay to preserve the Levels for others including future generations.

The estimates of WTP for this group of non-users are those expressed by the general public who did not visit the Levels in 1994. These WTP values for individual households in the general public sample are shown in Table 7.1. Table 7.4 shows that of the 825,081 households living outside of the Pevensey Levels but within 60 km of the area, 739,695 had not visited it within the previous year.

7.6: Estimation of Total Economic Value of WES in the Pevensey Levels

i. Benefits Arising from Respondents Willing to Pay an Additional Sum for WES

Residents

In the sample 75.16% of residents were willing to pay an additional non-zero sum for WES in the Pevensey Levels: this translates to 4,869 households living around the Levels. This number of households was used to estimate the aggregate gross benefits which residents derive from WES in the Pevensey Levels. The WTP of this group was measured as a multiple of what they already pay, and expressed in terms of the mean, truncated mean, mode and median.

The average cost of the Pevensey Levels WES per household in the UK is around £0.01 per year; although for some households who pay little or no income tax, the cost will be less, while for some households who pay higher rates of income tax, the cost could be £0.02 per year or more.

Table 7.5: Aggregate Benefits of WES in the Pevensey Levels for those Willing to Pay More for the Scheme than they Pay Currently (£ per year, 1994 prices)

		Mean	Truncated Mean	Median	Mode
Residents	(1)	5,848	3,807	195	97
	(2)	11,696	7,614	390	195
Visitors	(1)	67,256	13,319	2,998	1,199
	(2)	134,512	26,638	5,996	2,398
Non-Visitors	(1)	217,969	91,277	15,870	7,935
	(2)	435,939	182,553	31,740	15,870
Totals	(1)	291,073	108,403	19,063	9,231
	(2)	582,147	216,805	38,126	18,463

Estimates of the gross benefits to residents from this method are reported in Table 7.5. Two benefit values are estimated: one (1) in relation to a £0.01 annual cost per

household, and the other (2) relating to a £0.02 annual cost (some households contribute £0.02 or more each year in tax towards the Pevensey Levels WES Scheme). Clearly, under the assumption of a £0.01 annual cost, benefits to those preferring the WES landscape habitat are relatively low, varying from £97 to £5,848 per year. The median WTP value also produces a very low aggregate estimate of £195.

Mean, truncated mean, median and modal value estimates are calculated so that they can be compared with the cost of the WES: if the benefits of a policy at some lower bound, or the lowest benefit estimates of a policy still exceed its costs, then the decision-maker can be more confident about the efficiency of the public expenditure. However, we argue at the end of this section that a potential Pareto-optimal efficiency condition is the appropriate one to apply in determining the provision of public goods. Mean values represent the sum of cardinal utilities across individuals for the Pevensey Levels WES.

Visitors

The aggregate benefits visitors derived from the Pevensey Levels were calculated in a similar manner to residents. In the sample 70.22% of visitors were willing to pay an additional sum for WES in the Levels: in terms of the sample population this translates to 59,962 of the estimated 85,386 visiting households. Aggregate benefits are calculated from the former figure.

The benefits to visitors from the Pevensey Levels WES are much higher than those accruing to residents, reflecting the fact that many more households visit the Levels than live around its margins. The majority of the economic user benefits (utility) of the Pevensey Levels WES are clearly generated by visitors. Benefits to residents from the Pevensey Levels WES are less than one third of the benefits to visitors.

The gross benefit estimates in Table 7.5 do not take into account any negative utility suffered by any households who might have preferred the alternative, intensive agricultural production, landscape. However, as stated at the beginning of this Chapter, we believe that any disbenefits arising from the Pevensey Levels WES landscape will be negligible.

General Public

Only 53.64% of non-visitors made legitimate positive bids for WES on the Levels. Based on a 60 km radius around the Levels this suggests that 396,746 households have a positive WTP for the scheme: it was over these households that aggregate benefits were estimated.

Owing to the greater population size involved, aggregate benefits for those households not visiting the Pevensey Levels in 1994, i.e. passive use values, are much larger than those of residents and visitors, indeed the passive use values are nearly two orders of magnitude greater than the benefit to residents. For the Pevensey Levels WES it is the benefits to the general public, i.e. the passive use benefits, which justify the current level of expenditure on the Wildlife Enhancement Scheme.

ii. Benefits Arising from Respondents Not Willing to Pay an Additional Sum for WES

Table 7.6 below gives details of the benefits generated from that part of the population willing to continue making payments for WES at their current levels, but not willing to pay any more for the scheme. The principle source of benefits here is in terms of non-use values from non-visitors. Here, nearly 44% of households were found to be only willing to pay the current amount of around £0.01 or £0.02 per year. However, because so many households were involved this aggregated to at least £3,250 per year.

Table 7.6: Aggregate Annual Benefits of WES in the Pevensey Levels for Respondents Only Willing to Continue Making Current Payments
(£ per year, 1994 prices)

	Proportion of Respondents	**Number of Respondents**	**Benefits (Based on £0.01)**	**Willing (Based on £0.02)**
Residents	22.36%	1,448	14.48	28.96
Visitors	27.55%	23,520	235.20	470.40
Non-visitors	43.94%	325,032	3,250.32	6,500.64

iii. Choice of Estimate

If a policy was determined by majority voting, either as a single issue across all voters, or as part of a package of policies within a political party by majority voting of party members, then in theory the level of expenditure on the WES policy would be determined by the median voter or median beneficiary in that party (Willis, 1980).

However, for a particular project within the WES policy, such as the scheme in the

Pevensey Levels, use of the mean or truncated mean in decision making provides a more appropriate measure of WES's value or utility to society. Employing the median to estimate benefits produces a much lower estimate of aggregate value than that derived by measuring cardinal utility across all households who had a preference for the Pevensey Levels WES. The large difference between means and medians shows that there would be substantial welfare losses if the median voting rule recommended rejection of the scheme. Therefore in welfare terms, a decision based on the mean or truncated mean would be most efficient. Use of the truncated mean is the most conservative option, taking account of all but the very largest and smallest preferences, and minimising the effect of responses influenced by strategic or compliance biases.

7.7: Sensitivity Analysis.

The number of households who visit the Pevensey Levels in any one year is perhaps the most important factor in determining the user benefits of the Pevensey Levels WES. The estimated number of households who visit the Pevensey Levels in any one year from the general public survey might appear to be larger than intuitive judgement would suggest. Various errors may have contributed to a higher estimate of visitor households than the 'true' number, but the two most important errors are likely to be:

(1) sampling error in the general public survey
(2) failure of the questionnaire.

Visitor numbers to Pevensey Levels were estimated from a random sample survey of the general public up to 60 kms from the centre of the Levels. From this survey households who had visited the Levels 1993/94 were identified, the remaining households, apart from residents, being in the non-user category. Such a random sample survey is open to sampling error, but confidence limits to this sample can be calculated. The confidence limits depend upon the size of the sample and the proportion of households who said they had visited the Pevensey Levels. The lower bound estimate of the number of households who visited the Pevensey Levels in 1993/94 is 47,948 at a 99 percent confidence level.[8] This number of visitor households is considerably smaller than that derived from either the general public survey or the UKDVS survey data. However, given the assumptions required to derive a visitor household estimate from both sources, the mean household visitor estimates from the general public survey and from the UKDVS are remarkably close.

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[8] That is, there is only 1 chance in 100 that a random sample drawn from the general public would have a mean value lower than this figure.

The impact of applying lower bound estimates to the visitor numbers is to reduce aggregate mean WTP proportionately. The effect of using lower-bound estimates of the number of visitor households from the random sample survey is significant: mainly because the sample size was small, the proportional error in the sampling is relatively large.

Failure of the questionnaire is a much more likely cause of any over estimation of visitor numbers to the Pevensey Levels. Failure of the questionnaire could arise from:

(1) varying meanings of the word visit to different groups of people: visit could include a purposeful holiday, day trip; or part of another multi-site/area trip; stopping for refreshments in a lay-by in the area; or simply driving through the area. For example, the North York Moors National Park Authority estimate the Park receives 12 million visitors[9] or more per annum. But many of these are probably people driving through the area to the North Yorkshire coastal resorts, or to visit other major attractions in the area such as Flamingoland, steam railways, etc. The number of households purposefully visiting the North York Moors National Park for its own sake, is probably much smaller.

(2) errors in response, through memory bias, guessing, answers arising from pride or 'prestige bias' in which the respondent upgrades his expressed concern for the countryside and his consumption of it.

The magnitude of these errors are extremely difficult to gauge. They enter the realms of pure uncertainty, rather than some quantifiable risk which can be parameterised. Their impact could be gauged by sensitivity analysis, but any assumed visit or rate change lower than those reported earlier in this Chapter, would be arbitrary.

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[9] This figure is more than 50 percent greater than the estimated number of visitors to the Yorkshire Dales National Park as estimated by the Yorkshire Dales National Park Authority; despite the Dales being recognised as a more popular attraction than the Moors, with the West Yorkshire conurbation on its door step!

Chapter 8

CONCLUSIONS

8.1: Framing of the Study

The objectives of this study were to assess the use and non-use values of the Pevensey Levels WES; and to assess whether CVMs can provide robust, reliable and acceptable results useful to policy makers to appraise the benefits of WES.

The framework adopted in this study for estimating the benefits of the Pevensey Levels WES was based upon the recognition that English Nature currently has to fund and maintain a growing number of such schemes; and an extremely large number of SSSIs, 3,749 in total. It was an infeasible mental task to ask individuals to value the Pevensey Levels WES in relation to their value for thousands of other nature conservation sites. But equally to ask respondents to contingently value the Pevensey Levels WES as if it was the only nature conservation site requiring resources, and to which individuals were being asked to contribute extra taxes to government, could have resulted in their values being moulded by considerations of embedding and 'purchase of moral satisfaction'. It is clearly necessary to avoid these problems in the application of any contingent valuation technique.

To avoid problems of embedding and context with any other areas designated under WES or as SSSIs, respondents' were informed how much their household contributed in taxes each year towards the preservation of the Pevensey Levels through the operation of the WES. Respondents were then asked, if they would be willing to continue to contribute this amount to the preservation of the Pevensey Levels if they had a choice; and if so, whether they would be willing to pay more, together with the maximum sum their household would be willing to pay each year to finance the Pevensey Levels WES.

The maximum WTP was elicited in terms of multiples of households' existing payments, which emphasised the magnitude of the change in payment level; made people think more about their responses; and also constrained any cavalier attitude to expressing a substantially increased WTP amount in relation to the current small cost of the Pevensey Levels WES to each household per year. Maximum WTP values for the

Pevensey Levels WES were obtained primarily using a bidding game format, with an open-ended WTP question of the end of the game to ascertain the final WTP amount between the final acceptable and unacceptable bid levels.

Most CVM studies are a partial equilibrium analysis of a specific environmental change, in which everything else is held constant: that is, although respondents have consumer surplus or utility for other environmental areas or habitats over and above that which they pay for these goods, they are not required to pay this difference between the maximum that the would be WTP and what they currently pay, and these other areas are assumed not to require additional funding. Hence there is no income effect. This is one factor contributing to the phenomenon of embedding or the 'purchase of moral satisfaction'. This study of the benefits of the Pevensey Levels WES, follows the approach of Kemp and Maxwell (1992), namely a top-down disaggregated approach. By specifying what households already pay to maintain the Pevensey Levels, and by eliciting WTP values in relation to these, the CV estimates derived in this study are more equivalent to a general equilibrium model, in which respondents are forced to recognise that there are other wildlife enhancement schemes and SSSIs for which they have preferences and values, and which also require funding, and for which they would also be willing to contribute.

The sampling frame adopted to assess the additional use and non-use values of the Pevensey Levels as a consequence of the implementation of the Wildlife Enhancement Scheme covered residents within and overlooking the Pevensey Levels WES boundary area; households who had visited the Levels over the previous 12 months; and households who lived outside the Pevensey Levels and who had not visited the Levels. Sample sizes were set at 161 each for resident and visitor households, whilst the general public sample of non-visitor households living within 60 kms of the Pevensey Levels was fixed at 286. These sample sizes provided a reasonable level of accuracy and a minimum acceptable deviation between WTP as estimated by the sample survey and 'true' WTP.

8.2: Total Economic Value of WES in the Pevensey Levels

WTP values provide an appropriate welfare economic measure of the benefits individuals derive from the Pevensey Levels WES; whilst mean WTP provides a Pareto measure of the utility society as a whole gains from WES.

As stated in the last chapter, the TEV of the Pevensey Levels comprises the sum of:

(1) The use and non-use benefits arising from all households willing to continue paying what they currently pay for the scheme in the Levels (i.e. where WTP ≈ £0.01 per year).

(2) Any additional consumer surplus benefits arising from those households willing to pay an additional sum for WES in the Levels (i.e. where WTP > £0.01 per year).

(3) The remaining proportion of the population derive zero utility from WES on the Levels (i.e. where WTP = 0).

To provide a conservative estimate of aggregate consumer surplus benefits, only that part of the population making legitimate positive WTP bids were incorporated into that analysis. However, because mean values can be sensitive to polar values in the WTP distribution, truncated mean WTP values are also reported. Truncated means are mean WTP values with the upper and lower 5% of individuals' WTP bids removed. Truncated means provide a rigorous and conservative measure of benefits.

Table 8.1 summarises mean WTP for those households willing to pay more for WES than they do today.

Table 8.1: Mean WTP Estimates for Households Willing to Exceed Current Payments for WES in the Pevensey Levels, as a Multiple of Existing Tax Payments (£ per year, 1994 prices)

	Mean	**Truncated mean**
Residents	120.10	78.18
Visitors	112.16	22.21
Non-visitors	54.94	23.01

The aggregate total benefits of the Pevensey Levels WES is the sum of the mean WTP for all households who were willing to pay for the scheme, whether they were willing to pay more than today, or just the same as today.

Table 8.2 reports the results of summing the aggregate benefits for WES in the Pevensey Levels as shown in Tables 7.5 and 7.6, and thus documents the aggregate benefits of the scheme.

Table 8.2: Aggregate Benefits of the Pevensey Levels Wildlife Enhancement Scheme (£ per year, 1994 prices - based on a £0.01 current payment)

	Mean	Truncated mean
Use value: residents	5,862	3,821
Use value visitors	67,491	13,554
Passive use value	221,219	94,527
Totals	294,572	111,902

Aggregate benefits to residents were low; although the use value of the Pevensey Levels WES to visitors were substantial. However, the main benefits of the Pevensey Levels WES were not use related, but rather passive use benefits of knowing that the Levels exist as a traditional habitat and are being preserved.

8.3: Benefit-Cost Ratios and Efficiency of WES Expenditure

Payments to farmers and landowners under the Pevensey Levels WES amounted to £136,000 in the financial year 1993/94. Staff and some infrastructure costs increased this total to £147,700.

Accepting the conventional mean WTP value as the appropriate measure of benefits, this gives a benefit/cost (B/C) ratio of 0.497 for use value of WES in the Pevensey Levels; and 1.994 for use plus passive use values for expenditure under WES.

If the more rigorous and conservative truncated mean values are employed as a measure of benefits, then B/C ratios fall to 0.117 for use values and 0.758 for use plus passive use values.

However, there was little detectable decline in passive use value with distance from the Pevensey Levels, and hence no logical reason why passive use benefits of WES on the Pevensey Levels should stop at 60 km. This distance zone was simply dictated by sampling requirements: the limited sample size for the general public survey and the need to assess whether passive use values did indeed decline with distance from the Levels. Thus, assuming the same level of passive use values are held by a similar proportion of all non-visiting households in the UK as observed in the survey (i.e. 53.64% of 21,711,130 households = 11,645,060 households), this would generate a total passive use value of £2,679,096 per year; and produce a B/C ratio for truncated

mean use plus passive use benefits, of 18.26. Even if the addition of further WES sites across the country led to a steep decline in mean marginal non-visitor WTP for the scheme in the Levels, the B/C ratio should still well outstrip costs.

8.4: Robustness and Accuracy of CVM WTP Estimates

CVM is based upon a hypothetical market and individuals' expressed behaviour in response to that market. The accuracy and robustness of CVM study depends on whether expressed WTP in the CVM survey is a good indicator of subsequent behaviour: if the WTP question merely measures intention which is not translated into actual behaviour, then robustness and accuracy may be questionable. The Fishbein-Ajzen model suggests accuracy in respondents' estimates will be greatest where there is correspondence between the question asked and the intended inference the respondent draws from the answer; close proximity between the intention and behavioural intention stages; and familiarity: with the consequences of changes in the quantity and quality of the environmental good.

These criteria suggest that the degree of accuracy of WTP estimates for an environmental good such as WES will vary between types of respondents (visitors, residents, and the rest of the general public), and that it will be higher for some respondents than others. Some visitors, e.g. anglers, are likely to be more familiar with changes as a consequence of WES; but even with other types of respondents the correspondence and proximity between expressed WTP and any actual contributions specifically to the Pevensey Levels WES may not be high because of divergence between intended and actual behaviour.

Discussions in a group meeting, held once a week over four weeks, by eight residents, each of whom were respondents in the sample survey (see Clark and Burgess, 1994), seemed to indicate that there was a substantial dispersion of views about the value of WES in the Pevensey Levels. Even with four meetings, which improved the amount and quality of information each respondent had about the Levels, there was little to suggest a convergence of consciousness towards a single WTP measure or value of the scheme to each individual, or to the group as a whole.

Much of the discussion in the residents' group about value of and WTP towards the Pevensey Levels WES, focused on the efficiency of institutions (English Nature) in providing the conservation good; equity considerations of one group (farmers)

receiving the money; concerns over free-riding; and other issues, rather than the utility of the conservation good to the group participants themselves.

The group meeting demonstrated the tortuous complexity of how individuals attempt to arrive at a value as more information is unfolded to them. Unfortunately, whether more information leads to better decisions and value judgements is an empirical question, and there are plenty of examples in economic literature to demonstrate that less information can be better; whilst Simon (1955, p104), in a critique of rational calculation, did not "rule out the possibility that the unconscious is a better decision-maker than the conscious".

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