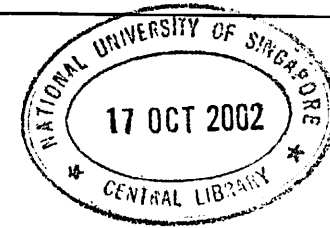


Valuing the Environment in Developing Countries

Case Studies



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7. Conflicts in conservation: the many values of the black rhinoceros

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1 INTRODUCTION

The plight of the black rhinoceros is an important case study in the analysis of existing conservation policies. This species has been subject to the maximum level of protection that may be accorded to a species under the existing regimes, and yet its populations have seen a spectacular rate of decline. The species has been listed as endangered under the Convention on International Trade in Endangered Species (CITES) since its inception 20 years ago, and it has been the subject of extraordinary control measures in many of its range states. Nevertheless, the populations of this species have declined dramatically and it is clear that the current policies have been unable to preserve the previously current populations of black rhinoceros in Africa.

This raises important questions concerning the validity of the assumptions underlying these policies. Why do not protected areas protect endangered species? Why do not anti-poaching policies prevent poaching? Why do not trade bans prevent commercial trade? This chapter is one of a series of studies initiated by the Centre for Social and Economic Research on the Global Environment to address these questions in the hope of learning from the experience with the black rhinoceros.

The particular issue addressed in this chapter concerns the problem of 'value aggregation': the capacity for a range of different policies to combine to produce the maximum amount of total value from the endangered species. We examine the extent to which the various values of the rhinoceros accumulate, or conflict. We attempt to discern whether specific individuals and groups interested in the conservation of the rhinoceros will withdraw their support when other groups and individuals are contributing to conservation in a very different fashion. For example, will a group interested in contributing to the conservation of the rhinoceros for animal

welfare motives withdraw their contribution in the face of conservation based on consumptive uses (such as hunting)? Or is it possible to aggregate across both constituencies in order to maximize the amount of value available for conservation? In other words, to what extent do conflicting perspectives on conservation imply conflicting (or accumulating) values?

Why is this an important issue? One reason is that species endangerment throughout the developing world is often a straightforward problem of resource allocation by the state concerned (Swanson, 1993). That is, many of the problems faced by endangered species (poaching, habitat conversions and so on) are driven fundamentally by the tight resource constraints faced by the people of developing countries and their governments. If range state governments do not perceive the benefits that might flow from the conservation of a particular species, they are unlikely to allocate large amounts of available funds to anti-poaching patrols and additional protected areas. Even if they do, these allocations will usually come to nothing if the local people do not perceive the benefits to be derived from sharing their lands and resources with the wildlife (Swanson and Barbier, 1992). The maximization of the value of the endangered species, from the perspective of the local people and governments, is very likely a fundamentally important first step towards the conservation of the species.

Does this imply that policies based on 'non-use' (anti-hunting, anti-trade) are fundamentally flawed? Perhaps, but not necessarily. The denial of consumptive uses is a policy based upon value destruction, and hence it is a problematic policy to pursue from the perspective of value maximization. However, it might be justified, given that the values of various non-consumptive uses (tourism, conservation contributions and so on) are that much greater than the consumptive uses (hunting, commercial trade and so on) *and given that the two forms of values are in conflict with one another*. That is, the aggregate contributions to conservation may be maximized by concentrating on a single category of values (such as non-use) if the two do not 'add up' on account of fundamental objections of the greater one towards the other.

This is the issue that we address here. How do the different forms of value of an endangered species (specifically, the black rhinoceros) add up? Would some parts of the conservation community withdraw their support for broad-based conservation programmes that rely upon a range of different approaches (use and non-use) for their conservation effectiveness? And, if so, how great would the rate of withdrawal be?

The answers that we give to these questions have a broader significance than the case study presented in regard to the black rhinoceros. It is important to learn from the plight of the most endangered species in order to avoid the recurrence of this state of affairs, and we hope that parallels may

be drawn from this instance to the more general problem of conservation policy reform. Specifically, this case study of the black rhino indicates the breadth and depth of the anti-trade constituency within the UK – a country renowned for its animal welfare sympathies. This study should give more general evidence of the extent of the support for the anti-use policies that are being advanced within CITES without the benefit of referendum on the policies being promoted. It is an attempt to make visible the nature of the support for and conflicts within the conservation movements in a typical northern country. In what follows we initially set forth the nature of the economic framework concerning the various values attaching to a species such as the black rhinoceros. Then we investigate in more detail the nature of the 'non-use values': those values attaching to a stock of rhinoceros and unrelated to a particular flow of tangible goods and services. In section 3, we set forth the framework we used to test the hypothesis concerning the accumulation of use and non-use values. In section 4, we report the results of our study. In the fifth section we state our conclusions regarding the meaning of these results.

In general, we find that the UK population is willing to support a broad-based conservation programme in support of the black rhinoceros, and that the average individual would be willing to contribute on a one-time basis an amount of about ten pounds sterling (UK) in support of such a programme. This support, and this amount, does not alter if the programme includes a wide range of consumptive uses, including the trade in rhino horns, the dehorning of rhinos and the sale of stockpiles to support this trade; however, the average individual in the UK would withdraw their support for a conservation programme which included sport hunting, and the average contribution would hence decline to five pounds. Therefore we find little support in the UK for general policies based on value destruction and trade bans, but solid support for specific policies that channel these values into conservation so long as these do not include values based on the enjoyment of animal hunting or destruction. We conclude that the optimal set of policies for the conservation of the black rhino (and probably many other species) would include policies for the maximum appropriation of all commercial use-related values of the species, with the exception of those involving sport hunting.

2 THE MANY VALUES OF THE BLACK RHINOCEROS

The total benefits of a wildlife species are sometimes measured by a simple concept known as *total economic value* (TEV). This is an aggregative

concept that combines values from both stocks of living rhinos (for example, the value obtained from retaining the option to view rhinos in the future) and the flows of goods and services deriving from currently existing rhinos (such as the value of rhino horn sales). One way to conceptualize the issue analysed here is to focus on the potential conflict in the conservation policies favoured by those constituencies primarily interested in the more stock-related values of rhinos (future viewing, animal welfare and so on) and those primarily interested in the current flows from the species (rhino horn use, sport hunting and so on). We are investigating the extent to which these constituencies support the same conservation policies, and the extent to which they conflict.

2.1 Aggregating over Many Values

TEV comprises *use* and *non-use values*. The first form of use value is direct use, and this incorporates both consumptive and non-consumptive utilization. Consumptive utilisation involves any use that is exclusive and exhaustive, that is, it consumes a unit of the resource. Use values regarding the rhinoceros include sustainable dehorning (consumption of the horn) and sport hunting. Non-consumptive use would include such activities as viewing and tourism, which leave the wildlife resource available for others' uses.

Consumptive uses are clear examples of flow related values, while non-consumptive uses are stock-related; that is, they derive from the maintenance of a stock of living rhinos alone without the necessity of any form of 'harvest'. Although flow-related values may be defined as necessitating some sort of harvesting for their occurrence, this does not necessarily imply reduced incentives for the conservation of stocks. There is now a not insubstantial literature analysing the relationship between the use of the flow from a resource and the incentives existing regarding its stocks (see Swanson, 1994; Skonhofs, 1997). Both constituencies, those focused on flows and those focused on stocks, can have an interest in stock conservation.

The stock-focused values require further consideration. There are often said to exist non-use values, which involve demands for the resources that do not involve any current individual use whatsoever. For example, option values are said to relate to the amount that individuals would be willing to pay to preserve supplies of the resource for future use. Option value is thus like an insurance premium to ensure the current level of supply of something the availability of which would otherwise be uncertain. 'Quasi-option value' is a term that is applied frequently to the demands for the retention of a resource, given the irreversibility involved in its loss and the possibil-

ity that new information might arrive over time to render a previous decision suboptimal. Quasi-option value is an amount that it is said that someone would pay in order to have the option to use the resource if a 'state of the world' materialized so as to render that use desirable. Finally, the term 'existence value' is a residual concept derived from the observed valuation of the environmental asset unrelated either to current or to future use. That is, a great many people have revealed a willingness to pay for the existence of various species *even in the absence of taking part in the direct uses of that species or having any expectation of doing so in the future*. This observation of such a phenomenon has resulted in the development of empirical approaches for the estimation of these more intangible and non-marketed values. Empirical measures of existence value, obtained through questionnaire approaches (such as the contingent valuation method used here), suggest that existence value can be a substantial component of total economic value. Some measures of existence value related to a range of different species are listed in Table 7.1.

Total economic value (TEV) is often expressed as the aggregate of all of these component parts: TEV = direct use value (consumptive and non-consumptive) + indirect use value + option value + existence value. The issue that we address here is whether these various values (when flowing to different constituencies) do in fact aggregate in the simple manner indicated above, or whether instead they conflict in part and hence cancel one another out.

It is clear that any species of wildlife, such as the rhinoceros, exhibits values under each of the categories described above. Sport hunters and tourists spend vast sums of money each year in order to engage in the direct use of the wildlife of African countries. For example, Kenya earned approximately US\$349 million in 1988 from primarily wildlife-based tourism activities, while the financial contribution of trophy hunting to Namibia in 1991 was approximately N\$25 million (Barnes, 1995). Equally clearly, the observed non-use values of the black rhinoceros are also quite substantial. Appeals for conservation funds for these species by organizations such as the World Wide Fund for Nature provide funding for vast conservation programmes across these same countries. These programmes are usually being funded by means of donations from people living on the other side of the globe from the wildlife, with little or no prospect of ever actually seeing one of the animals in its native country. In 1990, donations to wildlife conservation organizations in the United States alone amounted to at least US\$273 million, with \$42 million flowing to the WWF (World Conservation Monitoring Centre, 1992).

Therefore it is apparent that this form of accounting (under a wide range of values) makes sense for many wildlife species. People around the world

Table 7.1 WTP for endangered species

Species and habitats	WTP (US\$ p.a., p.p.)	Additional information
Namibian black rhinos	8-20.1	1, tax, median/mean
Bald eagle	19.28-28.25	Stevens <i>et al.</i> (1991), donation
Bald eagle	10.62 75.31	Boyle and Bishop (1987)
Striped shiner	1-5	Boyle and Bishop (1987)
Northern spotted owl	34.8	Rubin <i>et al.</i> (1991), p.h.
Whooping crane	31	Loomis and Helfand (1993), p.h.
Wild turkey	7.11 11.86	Stevens <i>et al.</i> (1991), donation
Coyote	3.40 5.35	Stevens <i>et al.</i> (1991), donation
Bottlenose dolphin	7.0	Pearce (1996), US\$90
Sea otter	25	Loomis and Helfand (1993), p.h.
Monk seal	62-103	Samples and Hollyer (1990), 1
Blue whale	40	Loomis and Helfand (1993), p.h.
Humpback whale	125-142	Samples and Hollyer (1990), 1
Sea turtles	13	Loomis and Helfand (1993), p.h.

Notes:

1. Values not adjusted for inflation.

2. p.h.: per household; 1: once-only payment; p.p.: per person; p.a.: per annum.

are willing to pay for the conservation of wildlife on account of a wide range of individual motivations. Some do so for the particular function that the wildlife species is able to perform for themselves, such as providing enjoyment in the course of recreation or providing products (leather, medicines) for their personal use in everyday life. Others do so for a wider and more complex range of reasons corresponding to the non-use values listed above. These values are more related to the conservation of the 'stocks' of the living animals than they are to the maintenance of any clearly observable flow of goods and services from the species. In order to understand how these very different forms of values might accumulate, it is necessary to enquire first into the underlying sources of these stock-related values.

2.2 Why do People Value Stocks of Rhinos?

The concept of stock-related value has been analysed in various parts of the economic literature. There is a range of possible reasons why an individual might register a willingness to pay for the maintenance of stocks of a given species. One part of the literature relates the concept to so-called 'stock effects': the impact of current stock levels on the costs of any future use of the species (see, for example, Neher, 1991). Another approach is to

analyse the so-called 'amenity value' of a given stock of a resource (see, for example, Krautkraemer 1989). This concept closely mirrors the non-consumptive use value of a wildlife species, that is, the flow of current value to be obtained without the necessity of harvesting. The option values of retaining stocks of a species have been analysed as valuing the deferral of harvesting or development (Arrow and Fisher, 1974). Another stock-related value that has been carefully analysed is *bequest value*, the value of retaining some of the resource at the end of a designated time horizon for passing on to the next decision maker.

Each of these forms of stock related values implies a very different sort of motivation for the retention of stocks of a given species, and yet a response to a question concerning the willingness to pay for the conservation of rhino stocks would not necessarily segregate between these various motivations. Hence an estimate of the stock-related value of a given species (provided by aggregating the responses to a question concerning an individual's willingness to pay) might very well be constituted of a set of responses deriving from a set of very diffuse motivations, all legitimately summoned in response to the same question. In this case it is highly unlikely that the correct approach would be the simple aggregation of the various responses. It is probably necessary to further categorize these stock-related values, and to investigate how these various values interact with one another and with the other values of the species.

Motivations for statements of positive stock-related values

What are the various motivations for stock-related valuations and how do they interact? The assumption on which we work is that stock-related values are in fact a residual category into which are placed many flow-related values of a complex nature. In particular, we will assume that people are unlikely to have pre-existing preferences regarding living things of which they have little or no personal knowledge or experience, but that they may have beliefs or expectations concerning the possibility of flows from these things reaching some individual or group about whom they care. We believe that caring about the expectancy of flows to these others makes more sense than caring about the non-existent flows to oneself. For example, the statements of WTP evinced in Table 7.1 for stocks of the striped shiner or monk seal are less likely to represent pre-existing preferences regarding these particular species, and they are more likely to represent those individuals' willingness to support groups who do receive utility by reason of the existence of positive stocks of these species.

Given this starting point, it is then necessary to elucidate the possible beliefs and expectations that might engender positive willingness to pay. We believe that the range of beliefs/motivations underlying the statement of a

positive stock-related value for a wildlife species would include the following:

1. *vicarious enjoyment motive* – the importance of providing stocks of the species, in the belief that other individuals than yourself are currently enjoying flows of utility from experiencing the species;
2. *bequest motive* – the importance of providing stocks of the species, in the belief that these will provide a flow of use or enjoyment to future generations of human societies (essentially vicarious enjoyment of future individuals' satisfaction);
3. *animal welfare motive* – the importance of providing stocks of the species, in the belief that some will experience an enjoyable style of life or existence (essentially vicarious enjoyment of the animals' satisfaction);
4. *option retention motive* – the importance of providing stocks of the species, in the belief that this will provide for your own unplanned but possible future use, given that circumstances change to make this desirable (essentially vicarious enjoyment of your own satisfaction in an unexpected but possible 'state of the world').

Framing the various motivations for conserving wildlife stocks as we have done above makes clear that a positive statement of a 'non-use value' can mean many different things, but that in each case this 'non-use' value can be expressed in terms of the channelling of a flow of services from the species in a desired direction. In essence, individuals are willing to pay for enhanced stocks of a species because they believe that enhanced stocks correlate with an enhanced flow of goods and services to some other beneficiary (other individuals or groups, future generations, the animals themselves). If the benefactor was able to separate and to provide for these flows to these groups directly, the stock-related value would not exist. Positive statements of stock-related values, in this framework, act as surrogates for flows that are unable to be thought out and arranged otherwise. Expressed preferences over enhanced stocks then act as very crude instruments for the channelling of flows of goods and services in the desired direction.

For the purposes of this chapter, the question of interest is: how many of the stock-related motives indicated above are in conflict with use-based values? If none of them is in conflict with flow-related values, the expressed values are additive; if conflicts exist, the concept of total economic value must be viewed as a concept imbued with inherent trade-offs, not an accounting identity.

We would postulate *a priori* that there is only one stock related value that

is potentially conflicting with use-based values: *animal welfare*. In that case the individual stating a willingness to pay to conserve stocks of the resource is indicating as much an interest in the means of conservation as in the ends. On the other hand, it is difficult to ascertain any basis upon which any of the other motivations could result in a conflict with conservation policies incorporating the consumptive use of the species. For example, a pure bequest motivation would not be in conflict with a use-based policy so long as it produced a better prospect for providing continuing supplies of live rhinos for future generations.

We now proceed to test our hypothesis that the sole conflict between use and non-use values lies in the welfare motivation, and also attempt to analyse the nature of the interaction between use and non-use values regarding the rhinoceros. In the next two sections, we describe the construction of, and the results from, a survey that was undertaken in order to separate the various values of the black rhinoceros.

3 THE NAMIBIAN BLACK RHINO CONSERVATION PROGRAMME: A RESEARCH EXERCISE

The answers to these questions concerning the accumulation of various forms of wildlife values were pursued within the context of a *contingent valuation survey*. The contingent valuation method (CVM) is a survey-based methodology frequently used to estimate the economic value of goods that are not traded in the market and therefore do not have a price, although it may be widely recognized that they have a positive value (Mitchell and Carson, 1989; Bjornstad and Kahn, 1996; Hoevenagel, 1994). Through the survey, a hypothetical market is constructed where the good in question can be traded; then people's willingness to pay (WTP) for a change in the environmental good can be elicited. Theoretically, CVM is based on welfare economics and assumes that stated WTP amounts are related to a respondent's underlying preferences. It is now well documented that the values obtained correspond to the correct monetary welfare measures, namely Hicksian compensating and equivalent variations (see, for example, Mitchell and Carson, 1989).

The contingent valuation method is unique in its application to the evaluation of both use and non-use values of non-market goods. Estimating the latter values is of fundamental importance in the case of species preservation where arguably non-use benefits may be a significant proportion of total value. In recent years it has gained widespread acceptance and become a routine tool for academics and policy makers.

The rhino survey was undertaken in the UK in 1996, in a collaborative exercise between the Namibian Ministry of Parks¹ and the Centre for Social and Economic Research on the Global Environment. The Namibian government provided the information concerning the costs of rhinoceros conservation and the value of various management options that was then supplied to the audience in the UK. This information consisted of detailed data on the various management options available for the conservation of the black rhinoceros, and the funding that each would generate. In summary, the UK audience was informed that a sum of at least one million pounds was required annually in order to safeguard the existing black rhino population in Namibia, and that various management options could provide a portion of this amount on a sustained basis. These options are listed in Figure 7.1. For example, the audience was informed that the sale of live rhinos could generate 10 per cent of the funds required for the maintenance of the black rhino while dehorning operations (with subsequent sale of the horns) could generate 14 per cent. Any funding shortfall (between the sum required and that generated via management options used) would have to come from the international community. The entire management/conservation package was entitled the Namibian Black Rhino Conservation Programme (BRCP), and the audience was asked both to vote for the package of management options they would prefer and to indicate the amount of money they would be willing to contribute to a UK based 'trust fund' in support of the BRCP, via a tax increase.²

3.1 Questionnaire Development

Given the complexity of the proposed task, the survey development stage lasted several months. During the last months of 1995, a first draft version of the CV questionnaire was circulated for comments among experts in valuation, biology and specific rhino policy issues. A focus group-type session was then set up with a group of ten selected postgraduate students in Cambridge to test an earlier version of the questionnaire. A first pre-test with an oral presentation giving background information on rhinos was later conducted in London, for a group of 21 postgraduate students.

Extensive changes were made to these preliminary questionnaire versions. During 1996, two more pilot studies were conducted, this time in the setting where the final survey was to take place, in Parent Teacher Association (PTA) meetings at primary schools. Respectively, 34 and 26 people attended these pre-test sessions. In both pilots, the final interactive format was tested successfully: oral and visual presentation of detailed information about rhinos, followed by individually answered questions, accompanied by more slides and oral explanations about the proposed

Option A – Increase in Entry Fees

- Photographic safaris, viewing of animals in the wild.
- Reduce Budget for BRCP by 6 per cent.

Option B – Sales of Live Rhinos

- A small number of animals (for example, six out of 670) can be sold each year on a long-term basis.
- Reduce Budget for BRCP by 10 per cent.

Option C – Sales of Stockpiled Horns*

- Existing stockpiled horns may be marketed in a controlled trade setting.
- Reduce Budget for BRCP by 17 per cent.

Option D – Dehorning Operations*

- Safe procedure: shooting adult rhinos with tranquillizer guns and then sawing off their horns. Rhino horn regrows: a horn is replaced in about ten years.
- Harvested horns could be sold in a controlled trade set-up (for example, 83 out of 670 rhinos).
- Reduce Budget for BRCP by 14 per cent.

Option E – Darting Safaris

- Tourist-hunters shoot rhinos with tranquillizer guns.
- Annual demand: around ten hunts.
- Reduce Budget for BRCP by 4 per cent.

Option F – Trophy Hunting

- Tourist-hunters shoot and kill adult black rhinos.
- In small numbers (for example, three out of 670 rhinos) and in a controlled way, this would not endanger the survival of rhino populations.
- Reduce Budget for BRCP by 9 per cent.

Note: *Only available if legal trade of rhino products allowed.

Figure 7.1 Management options for black rhinos: a summary

scenario, followed by a new set of questions. Some discussion was allowed and some respondents, randomly chosen, were extensively debriefed after the sessions finished.

3.2 Final Survey

The final studies were conducted in twelve PTA meetings at primary schools in Cambridgeshire during July 1996. In all, 382 people were interviewed. Meetings ranged from eighteen to 72 people and lasted between one and one and a half hours. The sample interviewed was random but not representative of the UK population. The survey instrument appeared to work successfully in the field, with only one person failing to complete the contingent valuation questions. The large majority found the questionnaire interesting (78 per cent) and only 5 per cent said it was difficult, which demonstrates the validity of the in-depth interviewing approach.

The final survey format was interactive. At the start, respondents were given a slides presentation containing information about black rhinos. To avoid the expected major problem of 'embedding' – stating a value for the existence of one species not significantly different from the value of many species (Kahneman and Knetsch 1992) – black rhinos were presented as only one threatened species among the 4452 known endangered species, among which 507 were mammals. It was explained in detail that there were another four types of rhino, some nearly extinct. Finally, it was pointed out that the survey would only be looking at the black rhino in Namibia, that constituted 25 per cent of the existing population of 2500 specimens.

The presentation included information about poaching, as the main reason for the decline in the black rhino population given the rhino horn high value in Asian markets. The uses for rhino horn were presented in a pragmatic way: as mainly an ancient ingredient in traditional medicine because of its fever-reducing properties (and not an aphrodisiac, as is widely believed in the North). This first part of the group presentation ended with a reference to the institutional framework, focusing on the existing ban on international trade on rhino products under CITES and on its inability to date to stop trade in the black market. Respondents then answered individually the first section of the questionnaire on attitudes towards environmental issues in general and rhino extinction in particular. The results provided some indication of the extent to which respondents were concerned about these problems.³

A second oral presentation (with overhead projections) then followed, explaining the rationale behind the preservation of the black rhino among all other rhino species and of the Namibian rhino population in particular, since conservation should focus on the most significant and biologically

important populations that are still viable. The current anti-poaching measures existing in Namibia were then discussed, highlighting the fact that they are insufficient through lack of financial support. A proposed conservation programme for rhinos was then introduced: the BRCP, aiming to protect the existing Namibian black rhino population of 670 animals and to promote its increase to a minimum viable population of 2000, within the next 25 years. This would be achieved through the creation of heavily guarded rhino sanctuaries.

Respondents were made aware of the total cost of the BRCP (estimated at one million pounds per annum by Namibian officials) and of the fact that a current shortfall exists that would prevent the adoption of the proposed set of protective measures. Two possible ways of raising funds are (a) establishing a UK Black Rhino Trust Fund that would be supported mainly by an environmental tax surcharge on UK taxpayers; and (b) establishing a set of management programmes developing various uses of the Namibian black rhinos in order to generate amounts of money to sustain in part their conservation efforts.

There was then a presentation on the available black rhino *management options*: entry fees, live animal sales, sales of horns, dehorning, darting safaris and trophy hunting (see Figure 7.1). Attention was called to the fact that some of these options would only be available if legal trade of rhino products was to be allowed. It was explained that, if all management options were adopted, 60 per cent of the necessary funds for the BRCP would be collected. The remaining 40 per cent would still have to come from international contributions to a government-organized fund (the Black Rhino Trust Fund).

Individuals were then asked to turn to section two of the questionnaire and vote on the adoption of the various management options outlined in the presentation. They were reminded that the more options approved the less rhino conservation would have to rely on foreign aid. This question was intended to reveal individual attitudes towards different levels of intervention regarding the species.

Immediately after this the group was presented with the valuation questions. Owing to difficulties in fully understanding this part of the questionnaire, apparent during the pre-testing phase, the moderator provided assistance in reading the WTP questions with the aid of overhead projections. Hence any remaining inconsistencies in people's answers probably reflected 'true' valuations rather than confusions caused by questionnaire design. The first WTP question asked for individual WTP for the full BRCP, when all the management options previously described were being used to help finance it. The format was open-ended and the payment vehicle was a one-time-only tax surcharge. In the second WTP question, hunting

was deleted as an option to finance the BRCP. Respondents were asked for their new WTP to support the BRCP without the hunting of the rhinos. This question was designed to elicit the differential WTP for a preferred lifestyle for the species. The third elicitation question asked for WTP when all of the options that implied legal trade were deleted (sales of stockpiled horns, dehorning operations, darting safaris and trophy hunting). This is basically the status quo, where the only possible way to generate funds domestically from rhino conservation is through increased entry fees or live sales. The question was designed to assess the differential WTP for the removal of additional forms of intervention into the animal's lifestyle (dehorning, darting). Clearly, it also allowed the respondent to indicate any WTP for the continued ban on the rhino horn trade.

The questionnaire included various questions directed to the task of checking on the results obtained previously: follow-ups to determine the reasons for zero WTP answers, the level of uncertainty in valuation responses, attitudes towards legal trade on rhino products, WTP with donations instead of taxes, WTP if it was known that black rhinos would become extinct five years after the completion of the BRCP and a set of questions intending to reveal attitudes towards the programme (credibility, fairness and so on). The last section of the questionnaire was a socioeconomic profile characterization (income, education and so on: see Tables 7.2 to 7.4).

4 RESULTS FROM THE STUDY

The survey provides a unique opportunity to study the breadth and depth of the motivations driving the existence of non-use values for exotic wildlife. None of the individuals surveyed was a resident of the country with which the study was concerned, and none had visited this particular place. The surveyed group were being asked to assess how much they would be willing to contribute for the conservation of *another country's* wildlife. The setting of the survey within the context of various management options then allows us to test various hypotheses concerning the nature of the motives generating the stated contributions and the conflicts between various motives for conserving black rhino stocks. In this section we state our results, and in the following section we state our conclusions.

4.1 The Non-use Value of the Namibian Black Rhinoceros

As explained above, respondents were asked to value a particular conservation programme for the remaining population of black rhinos in

Table 7.2 Socioeconomic profile of survey respondents

Socioeconomic profile		Per cent
Gender	Male	25
	Female	75
Marital status	Single	8
	Married/de facto	83
	Divorce/separated	4
	Widowed	5
Household size	1	5
	2	12
	3	14
	4	47
	5+	22
Age	16-29	9.5
	30-39	38
	40-49	32.9
	50+	18.5
Education	Primary	3
	'O' levels/GCSEs	32
	'A' levels	10
	Vocational training	16
	University degree	35
Job	Full-time	35
	Part-time	29
	Not working	34.5
Income (£ per month)	<1 000	23
	1 001-1 500	23
	1 501-2 000	20
	2 001-3 000	21
	>3 001-3 500	13

Namibia – the BRCP. The programme was described as including several management options, some implying a consumptive use of the species (trophy hunting, dehorning). These options would generate different amounts of money for rhino conservation (Figure 7.1). Figure 7.2 presents the attitudes of respondents towards the different management options.

The great majority of the sample is strongly opposed to trophy hunting (91 per cent) and darting safaris (83 per cent). Table 7.5 also reveals a strong correlation between the two policies: those who oppose hunting tend also

Table 7.3 Attitudes profile

Attitudes profile	Per cent	
Interest in the environment	0 (null)	0
	1	0.3
	2	6.8
	3	27.2
	4	37.9
Purchase of green products	5 (high)	27.7
	Regularly	49
	Sometimes	49
Membership of env. group	Never	0.7
	Yes	21
	No	79
Sources of rhino information	Safari (on the wild)	10
	Zoo	60
	TV/cinema	84
	Newspaper/book/mag.	64
	School/college	17
Three most worrying consequences of rhino extinction	Loss of genetic mat.	45
	Less species variety	88
	Children never see	35
	Like rhinos	29
	Env. chain impacts	65
	Guilty feeling	24
Rhino extinction in the next 5 years	Not worried	2
	Not surprised	60
	Surprised	23
	Doubt: faster extinc.	8
	Doubt: later extinc.	2
Attitude towards questionnaire	Interesting	78
	Boring	2
	Too long	4
	Difficult	5
	Partial	11

to vote against darting. This finding is not unexpected and, more than a general interest in animal welfare, confirms the UK public's distaste for blood sports and for enjoyment in harvesting wildlife.

On the contrary, non-intrusive policies like increasing entry fees in safari parks and selling stockpiled horns seem to generate widespread support. The endorsement of the latter option is indicative of some support for a controlled legal trade in rhino products: the survey also explicitly elicited

Table 7.4 Importance of environmental problems (per cent)

Environmental problem	Very important	Of some importance	Not important
Waste management	73	26	-
Urban air pollution	75	23	0.8
Species extinction	56	41	1
Deforestation	86	13	-
Global warming	64	32	2
Water pollution	83	16	-

respondents' views on this issue, with only 25 per cent voting against legal trade (Figure 7.3).

Perhaps the most interesting part of the analysis relates to respondents' attitudes towards the sale of live rhinos and dehorning operations. Of the six proposed management options, these two are arguably the best indicators of preferences for animal welfare. The other options – increasing entry fees and selling stockpiled horns – are non-intrusive regimes that do not reflect welfare concerns, while darting and trophy hunting may generate a disutility from a concern with animal welfare. On the other hand, selling rhinos will remove the animals from their natural original habitat and may have disruptive effects on the animal's life, while shooting rhinos with tranquillizer guns and sawing off their horns is an obviously distressing operation. Both options are capable of generating non-trivial amounts of money that can be used for the preservation of the species. Respondents are being asked to trade off the monetary benefits of these management options (where it is assumed that monetary benefits equate with increased stocks) against their costs to the animal (from the perspective of someone concerned with the well-being of each animal). Consequently, those who vote against these options primarily reveal a preference for animal welfare ('welfare effect'); those who support them are arguably more concerned about the flows that may accrue from the survival of the species ('conservation effect') than with the well-being of individual animals alone.

The survey shows that only 56 per cent of the sample supported the sale of live rhinos, while a much larger 77 per cent supported dehorning operations. Given that the latter is presumably more disturbing for the animals, this result is somewhat surprising – the fact that dehorning operations, apart from the benefits from the potential sale of rhino horns, make the animals less attractive to poachers may have influenced the results. In any case, conservation effects seem to be predominant on average over welfare

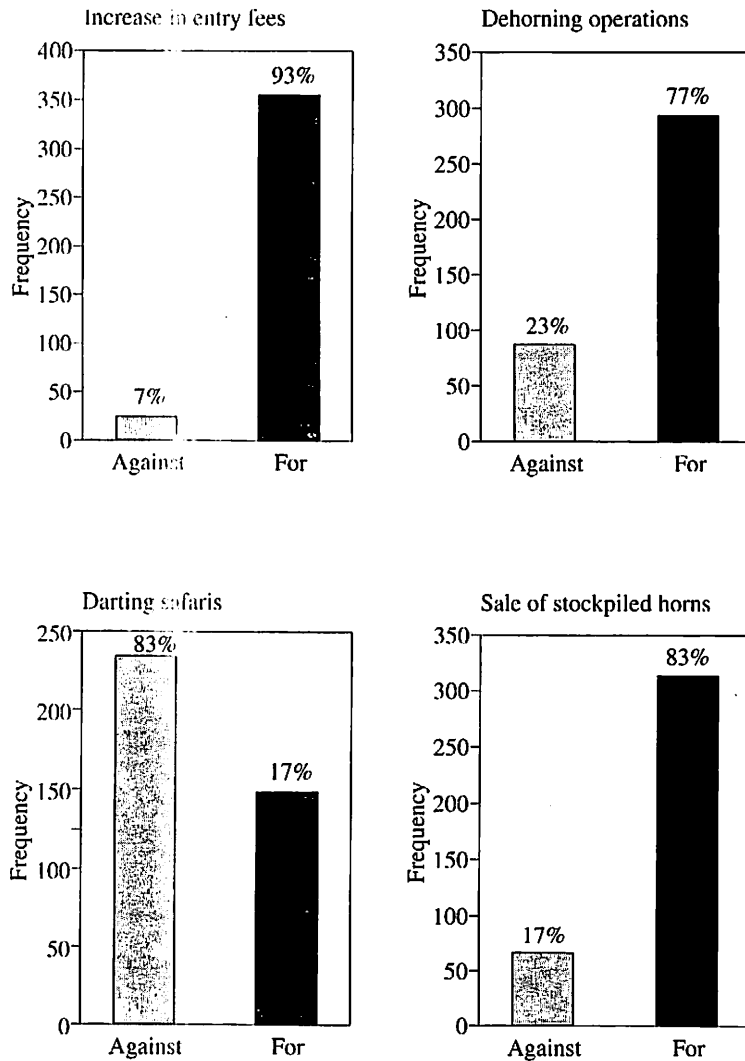


Figure 7.2 Attitudes towards management options

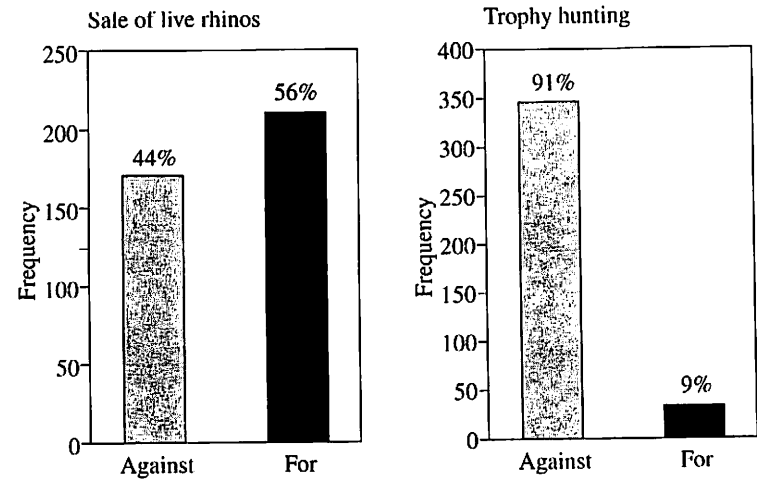


Figure 7.2 (cont.)

Table 7.5 Cross-tabulation of attitudes towards trophy hunting and darting

		Darting	
		For	Against
Hunting	For	29	6
	Against	119	227

Note: N = 381.

concerns. This finding is endorsed by the cross-tabulations shown in Tables 7.6 and 7.7, where no apparent correlation exists between hunting and dehorning and other legal trade options, suggesting that different factors may be behind respondents' attitudes towards these different options.

Analysis of the valuation questions indicates that a substantial economic value is associated with black rhino existence.⁴ Figure 7.4 illustrates the distribution of the estimated WTP values for the BRCP. An evident feature of this distribution is the clustering of respondents' bids around two values: respectively £5 and £30. This pattern is consistent with observations from

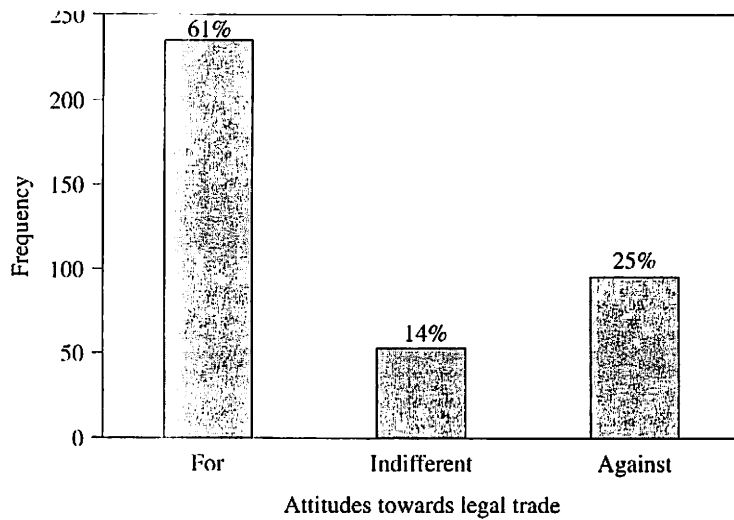


Figure 7.3 Vote on legal trade

Table 7.6 Cross-tabulation of attitudes towards trophy hunting and dehorning

		Dehorning	
		For	Against
Hunting	For	32	3
	Against	262	84

Note: N=381.

donations data and suggests the existence of two different groups of people interested in rhinos: a large group with a mild interest in the issue and a small group of highly interested and committed people willing to make significantly larger contributions.

On average, respondents are willing to pay between £5 and £12.67 (depending on whether the median or the mean is used to summarize the data), for the full management Black Rhino Conservation Programme, as a one-time-only contribution (see Table 7.8).⁵ As mentioned before, this programme includes management options such as trophy hunting, dehorn-

Table 7.7 Cross-tabulation of attitudes towards trophy hunting and all remaining legal trade options

		Legal trade options minus hunting	
		For	Against
Hunting	For	32	3
	Against	246	100

Note: N=381.

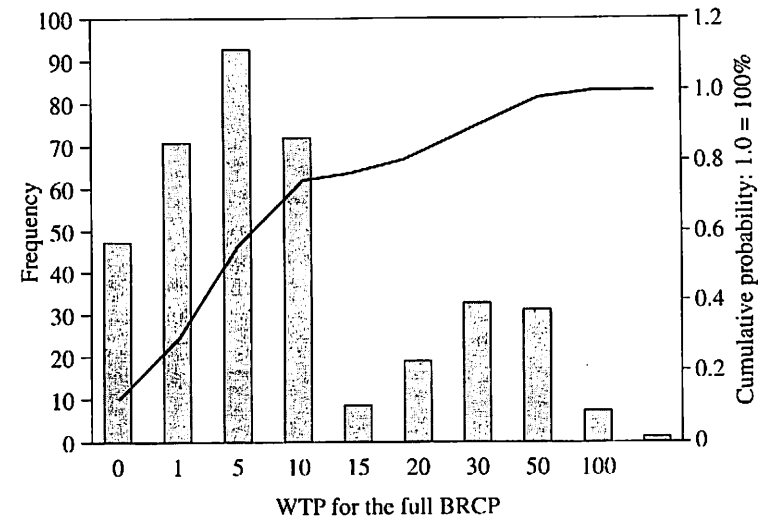


Figure 7.4 WTP for full BRCP

ing operations, darting safaris, sales of stockpiled horns, sales of live rhinos and increases in entry fees in wildlife parks.

In this CV survey, people in the UK were asked to put a monetary value on the preservation of only one out of almost 4500 species currently classified as threatened. Given that the rhino is a charismatic flagship species and, at least in the UK, one of the major fundraisers (5000 people 'adopted' a WWF rhino in 1996 alone), a major concern in the design of the questionnaire was to try to avoid an expected overvaluation of the species.

Table 7.8 Value of the BRCP

Total (n = 381)	WTP for the full BRCP	WTP for the BRCP with no hunting	WTP for the BRCP with no legal trade options
Mean	12.67	15.18	13.68
Std error	(0.96)	(1.08)	(1.12)
Median	5	10	5

Note: Units are pounds sterling.

Consequently, respondents were explicitly reminded that there are many other endangered species – and even other rhino species – which are on the brink of extinction. Table 7.1 shows that the estimated value for the preservation of black rhinos is in the same order of magnitude of values found for other animal species. This is a reassuring finding in terms of the meaningfulness of the survey results, given that many of these other species are less appealing and were valued in a local context as opposed to the global perspective adopted in this survey. It is also important to assess the extent to which the WTP estimates for black rhino preservation can be traced to more fundamental factors like an individual's preferences and socioeconomic characteristics. This allows for a deeper understanding and a consistency check of the results obtained. The following so-called 'valuation function' identifies the impact on WTP of several possible explanatory factors:

$$WTP_i = f(X_i)$$

where X_i is a vector of explanatory variables thought to influence the valuation process. The most common specification of the valuation function assumes a linear relationship between the regressors:

$$WTP_i = \beta' X_i + \varepsilon_i$$

$$\varepsilon_i \sim N(0, \sigma^2)$$

where β is a vector of unknown parameters reflecting the impact of changes in a given explanatory variable on WTP estimates and ε_i is a random error term reflecting unobserved taste components, assumed to be normally distributed with zero mean and constant variance. Valuation functions using WTP estimates resulting from open-ended CV studies may be modelled by a simple classical ordinary least squares regression (OLS).⁶

Table 7.9 summarizes the explanatory variables used in the regressions.

Table 7.9 Explanatory variables for regression analysis

Variable	Description
WTP	WTP amount (£) for the full BRCP
LOGWTP	Logarithm of WTP amount (£)
WTP _h	WTP amount (£) for the BRCP without the trophy hunting option
WTP _{it}	WTP amount (£) for the BRCP without any of the legal trade options
SEX	Dummy variable: 1 – male; 0 – female
EDUCATION	Age at which education was finished
FAMILY	Number of members of the household
EXISTENCE	Index variable reflecting general attitudes towards the environment and rhinos (interest in environment, concern about species extinction, buying green products, safari trip, zoo trip): from 1 – very interested to 0 – not at all interested
OPINDEX	Index variable reflecting attitudes towards the management options, + if favourable, – if against
FAIR	Dummy variable reflecting attitudes towards the payment vehicle: 1 – fair, 0 – unfair
DEHORNING	Dummy variable reflecting attitudes towards dehorning operations: 1 – for, 0 – against
RHINOSALE	Dummy variable reflecting attitudes towards the sale of live rhinos: 1 – for, 0 – against
DARTING	Dummy variable reflecting attitudes towards darting safaris: 1 – for, 0 – against
HUNTING	Dummy variable reflecting attitudes towards trophy hunting: 1 – for, 0 – against
HORNSALE	Dummy variable reflecting attitudes towards the sale of stockpiled horns: 1 – for, 0 – against
TRADE	Variable reflecting attitudes towards legal trade in rhino products: 1 – for, 0 – indifferent/don't know, (-1) – against
NEWTON	Dummy variable for school
FENDRAY	Dummy variable for school
WILBURTON	Dummy variable for school
LINTON	Dummy variable for school
FULBOURN	Dummy variable for school
CHEVELY	Dummy variable for school
BALSHAM	Dummy variable for school
GRTABINGTON	Dummy variable for school
THORNDON	Dummy variable for school
BARRINGTON	Dummy variable for school
DUXFORD	Dummy variable for school

Table 7.10 Valuation functions for the BRCP

Variable	OLS	
	Coefficient	t-ratio
Constant	-4.1159	-4.21
SEX	-0.60592	-2.062
EDUCATION	0.326	0.743
FAMILY	0.16104	1.742
EXISTENCE	1.4077	2.198
OPINDEX	0.50048	4.035
FAIR	0.93737	3.94
NEWTON	3.5735	6.383
FENDRAY	2.2778	3.849
WILBURTON	1.5573	2.285
LINTON	2.5716	4.671
FULBOURN	3.4006	5.045
CHEVELY	2.7112	4.333
BALSHAM	2.0031	3.16
GRTABINGTON	2.0524	3.249
THORNDON	2.1789	3.105
BARRINGTON	2.2794	3.226
DUXFORD	3.7268	6.176
R ²	24%	
N	381	

Notes:

1. OLS results corrected for heteroscedasticity.
2. Dependent variable = LOGWTP.

Socioeconomic variables included are gender, family size and education level.⁷ Other explanatory factors considered are an indicator of people's interest in environmental issues, in particular, those related to species extinction (EXISTENCE); an indicator of general attitudes towards the package of options embodied in the BRCP (OPINDEX); and a variable reflecting overall views about the fairness of the chosen tax payment vehicle (FAIR). A series of dummy variables were included for each school, reflecting prior expectations of clustering at the school level.⁸

The valuation function results are given in Table 7.10. All attitudinal index variables are statistically significant and have the expected signs: the higher the interest in environmental and rhino issues, the higher the degree of acceptability of the management options embodied in the BRCP, and

the higher the perceived fairness of the proposed payment scheme, the larger the WTP. As seems to be the case in many CV studies of environmental issues, women tend to contribute more than men. The positive effect of family size in the magnitude of the contribution could be indicative of the bequest motive mentioned previously. In both regressions the school dummies are highly significant, reflecting the clustering situation discussed above, that is, the influence of each particular school meeting on respondents' WTP. It may therefore be concluded that there is an unequivocally positive non-use value for the Namibian black rhinoceros within the UK, and that it is not random and can be explained by factors theoretically or logically expected to have some impact on preferences.

The conclusion of this section leads us to the analysis of the issues with which we commenced our discussion. We have identified a positive and non-trivial WTP for the conservation of the Namibian black rhinoceros; however, that value was derived by reference to a conservation programme that includes various types of management options, some of which are perceived as being detrimental to the animal's welfare (for example, trophy hunting with a 91 per cent disapproval rating). As Figure 7.2 shows, the public clearly does hold preferences over the sorts of intrusions it would like to apply in conservation. This suggests that the WTP attributed by UK citizens to the specified full management BRCP might not result in the greatest aggregate return (when combining BRCP and the WTP). That is, this aggregate amount might still be maximized if some of the 'less preferred' options were omitted from the BRCP. The next section will explore this possibility further.

4.2 The Conflicts between Use and Non-use Values

The second issue that was investigated concerned the impact of varying management regimes on the values offered in support of the Namibian BRCP. As mentioned above, respondents were offered the opportunity to pay for the set of management options that they preferred by means of registering different bids for different management packages. Specifically, they were given the opportunity to indicate their WTP for the full BRCP and also for the same package less trophy hunting. Then they were afforded the possibility of stating a WTP for the conservation of the rhino within a management programme that disallowed almost all uses (trophy hunting, dehorning, darting and the trading of the horn), allowing only park fees and live sales.

Our first hypothesis concerned the potential conflict between welfare and conservation interests. These conflicts could be identified in various ways. If welfare concerns predominated over a general interest in conservation, the full BRCP would be the set of management options that would receive the lowest WTP, because it entailed the most intrusive set of management

programmes (iii six) while generating the most conservation funding. Conversely, the status quo scenario, the less intrusive one that disallowed almost all commercial usage of rhino products, would yield the highest values. In addition, given the general public's dislike for sport hunting, it was anticipated that the elimination of rhino hunting would generate a significantly higher WTP than the full BRCP. Moreover, if welfare effects are strong, the elimination of further intrusive regimes (dehorning operations and darting safaris) and the denial of the commercial trade as well as sport hunting might increase the WTP over the WTP registered for the *full BRCP minus sport hunting*. Hence it is interesting to investigate how the subtraction of further intrusive programmes affects the non-use value over the amount registered for the 'non-hunting programme' (that is, full BRCP less trophy hunting). All of these comparisons are relevant to the determination whether 'welfare effects' or 'conservation effects' predominate in the case of the commercial use of the rhino horn.

The first finding to report is that, as expected, there is a substantial WTP for a management regime devoid of all forms of sport hunting. The mean WTP is £15.18 if the BRCP does not include trophy hunting as a possible option to raise funds for rhino preservation (Table 7.8) which indicates that, on average, respondents are willing to pay an extra £2.51 to avoid trophy hunting of black rhinos (Table 7.11). This difference is statistically significant both according to the Student's t-test of paired comparisons and the paired-rank Wilcoxon non-parametric test (Table 7.12). This is consistent with the results from the questions regarding respondents' attitudes towards rhino management options discussed above: as displayed in Figure 7.2, more than 90 per cent of the sample voted against trophy hunting, revealing that the average attitudinal pattern also comes across when monetary evaluations are sought and that the higher mean WTP is not just the upshot of a few very high bids but reflects the attitude of a large part of the sample. The preferred measure of average WTP also indicates this difference in stark fashion: the median WTP doubles, from £5 to £10, with the elimination of the use of the rhino for sport hunting.

These conclusions are most evident when the actual distribution of the WTP to avoid trophy hunting is viewed (Figure 7.5). Approximately 50 per cent of the survey group stated that their bids would increase significantly by virtue of the elimination of the sport hunting option. This indicates that, to a substantial group of UK residents, the conservation of stocks of black rhinos is valued significantly more if the rhinos are not subjected to a regime of sport hunting. It can therefore be asserted that trophy hunting as a management option is an instance in which there is a clear collision between use and non-use values, and it appears that welfare concerns predominate over purely conservation ones.

Table 7.11 Value of several components of the BRCP

Total (n=381)	Value of legal trade options minus hunting	Value of hunting	Value of all legal trade options
Mean	1.50	-2.51	-1.01
s.e.	(0.60)	(0.28)	(0.66)
Median	0	0	0

Table 7.12 Results of tests of hypothesis on the influence of several management options on the WTP for black rhino conservation

Estimated value	Null hypothesis	t-statistic Decision	Wilcoxon test Decision
Avoiding trophy hunting	WTP _h -WTP _{fp} =0	Reject	Reject
Avoiding all legal trade options	WTP _{lt} -WTP _{fp} =0	Cannot reject	Cannot reject
Legal trade options minus hunting	WTP _h -WTP _{lt} =0	Reject	Reject

Note: All tests are two-sided and all decisions on H0 are at the 95% level. WTP_{fp} = WTP for full programme; WTP_h = WTP for avoiding hunting; WTP_{lt} = WTP for avoiding all legal trade options.

Next, the potential conflict between non-use values and the use of the products that the black rhinoceros can generate was evaluated. Specifically, the survey groups were queried on the sensitivity of their WTP to the commercial usage of the horn of the black rhinoceros, that is the regimes that implied the existence of a legal trade for rhino horn: sales of stockpiled horns, dehorning operations, darting safaris and trophy hunting. Returning to Table 7.8, the mean WTP for the BRCP without these options – the status quo scenario – is £13.68, an increase of about one pound over the full BRCP. However, this slightly higher amount is not substantial enough to be statistically different from the WTP for the full programme with all management options included, as both the t-test of paired comparisons and the paired-rank Wilcoxon test shows (Table 7.12). That is, on the basis of this sample size, it is not possible to reject the hypothesis that the WTP within the UK is identical for both management programmes (those with and without trade in rhino horn). In terms of median WTP, the results are exactly the same as for the full BRCP: £5. Again, this leads to the conclusion that respondents are not against having this set of options included

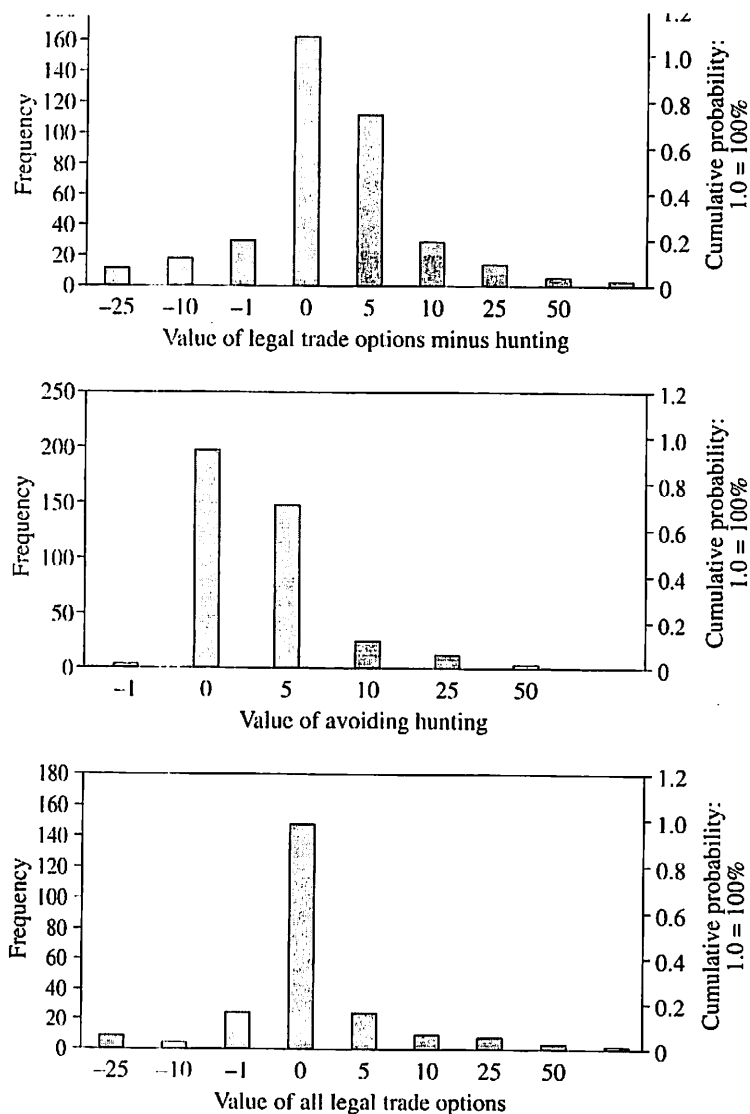


Figure 7.5 WTP to avoid hunting

in the programme, that is, there is no perceived conflict between the non-use value the respondents are expressing and the use values derived from rhino horn trade. These two forms of value appear to be aggregative.

Further insights into the nature of respondents' preferences are possible from a closer look at the results. The status quo scenario, in which the BRCP excludes all regimes that imply the legal trade in rhino horn, rules out trophy hunting which, as was already seen, respondents dislike and has a negative value of £2.51 (that is, respondents are willing to pay that sum to avoid it). Given that the value of the complete set of options that imply a commercial use of the horn is -£1.01 (respondents are willing to pay that sum to avoid it), it can be inferred that the value of the options that involve legal trade but not hunting is positive and equal to £1.50 (see Table 7.11 and Figure 7.5) with this amount being statistically different from zero, as displayed in Table 7.12. That is, respondents clearly are not giving a negative welfare-based valuation to some management options such as dehorning and darting, while they are to others that are similar in intrusiveness, such as trophy hunting.

Therefore it may be concluded that there is a clear conflict between use and non-use values in the case of trophy hunting but not in the case of the other uses (darting, dehorning, commercial uses, live sales). The puzzling aspect of this particular dichotomy lies in the identification of its particular motivation. This distinction between the various uses of the black rhino (in the minds of those with non-use values) was already strongly evident in Figure 7.2, as was discussed previously.

This is an interesting dichotomy, especially given that many of the preferred forms of use (dehorning, sale of horns, live sales) are currently illegal under CITES. As mentioned above, respondents indicated that they would support legal reforms to rectify this situation; about 60 per cent would vote for the legalization of a controlled trade in rhino products in order to provide the vehicle for appropriating these use values.

As before, the factors that contributed to the individual's stated WTP both for the withdrawal of sport hunting and for the regime with commercial usage of rhino products, but excluding trophy hunting, were analysed by means of an econometric regression. The variables that were thought to have some explanatory power are described in Table 7.13 and include the WTP for the full BRCP (that reflects the existence of non-use values for the existence of rhinos),⁹ dummy variables reflecting attitudes towards the relevant management options (HUNTING, DARTING, HORNSALE, RHINOSALE and DEHORNING) and a variable reflecting respondents' attitudes towards the existence of a legal trade in rhino products (TRADE). All other previously used variables were hypothesized to affect mainly the magnitude of the basic non-use value associated with rhino

existence and not necessarily the preferences towards different means of achieving the preservation aim.

Table 7.13 presents the regressions of the difference between the full BRCP and the no hunting programme (the dependent variable WTP_h reflects the value of avoiding hunting) and the difference between the no hunting and the no legal trade specifications of the BRCP (the dependent variable WTP_{lt} is then the value of having commercial usage of rhinos other than trophy hunting). The results seem to support the arguments presented above. The benefits derived from avoiding hunting are positively influenced by a dislike of both hunting and darting (the negative sign of the estimated coefficients indicates that those who support these options obviously tend to pay less to avoid them) but also by a support of dehorning operations. A possible interpretation is that these findings reveal (1) a general concern with conservation (positive sign of WTP and DEHORNING) coexisting with both (2) animal welfare concerns and (3) a strong dislike for management options where the animal is hurt as part of a sport activity (negative sign of HUNTING and DARTING). It is notable that it is the latter effect that dominates – when it is present.

The value of the rhino horn trade options minus hunting seems to be driven mainly by a general concern with conservation: the estimated coefficients attached to options like HORNSALE and DEHORNING and to the WTP variable are positive and significant. As expected, supporting legal trade also has a positive effect on WTP_{lt}, which again shows consistency between average attitudinal and monetary evaluations.

Figure 7.6 illustrates and summarizes the arguments presented in this chapter. The mean non-use value for the existence of black rhinos lies somewhere within the range of £12.67 to £15.18 per UK household (or between £5 and £10 if the median is used), depending upon the lifestyle afforded the animal in that jurisdiction. There is a mean positive WTP in support of the removal of sport hunting from the BRCP (about £2.51) and of the inclusion of the rhino horn trade (about £1.50).¹⁰

How is it possible to explain this? As discussed in section 2, it was our hypothesis that the group would be driven by two different motivations when considering the set of policy options that they would like to support: an animal welfare-based motivation and a conservation-based motivation. Their welfare motivation would drive their WTP upwards with the withdrawal of each additional intrusive option however, their conservation-based motive would drive them to withdraw WTP when it was felt that the best set of options was not being afforded the species (this would be the case if the respondent believed that the absence of an optimal use-based conservation policy in regard to the rhino might reduce the prospects of receiving non-use values deriving from motives other than animal welfare; for

Table 7.13 *Valuation functions for hunting and legal trade*

Variable	Value of avoiding hunting				Value of having legal trade options minus hunting			
	Regression 1		Regression 2		Regression 1		Regression 2	
	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio
Constant	1.321	1.544	1.116	1.071	-6.855	-3.806	-5.013	-2.334
Dehorning	1.157	1.95	1.247	1.91	2.453	1.628	1.644	1.068
Rhinosale	-0.032	-0.06	-0.003	-0.005	-0.113	-0.097	-0.375	-0.318
Darting	-1.356	-2.077	-1.313	-2.075	0.253	0.195	-0.127	-0.099
Hunting	-1.765	-3.596	-1.76	-3.595	-1.52	-0.924	-1.568	-0.962
Hornsale	-0.237	-0.393	0.009	0.012	5.713	3.392	3.504	1.689
Trade	-	-	-0.273	-0.599	-	-	2.456	2.444
WTP	0.095	2.759	0.095	2.782	0.146	1.776	0.147	1.822
R ²		0.13		0.13		0.11		0.14
N		381		381		381		381

Notes:

1. OLS results corrected for heteroscedasticity.
2. Dependent variable = WTP_h and WTP_{lt}.

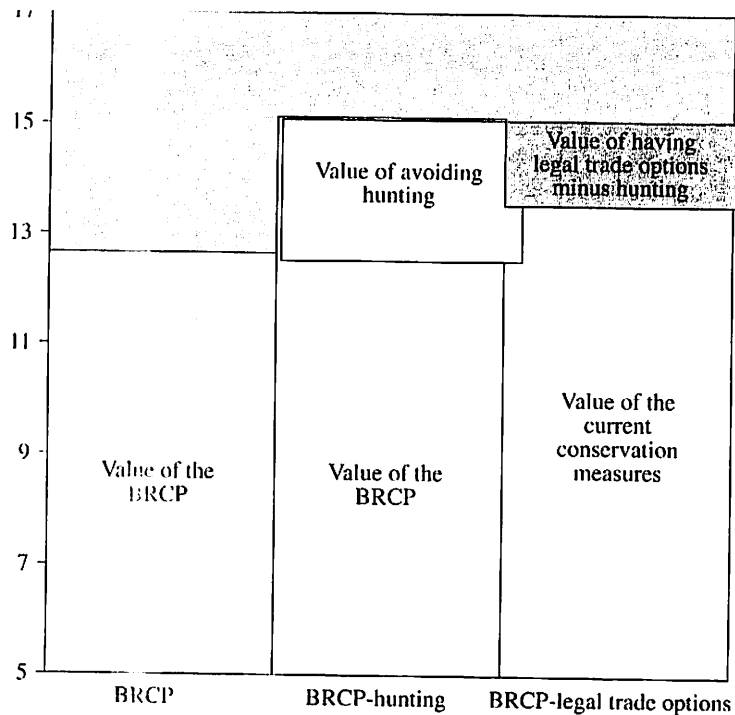


Figure 7.6 WTP amounts for BRCP disaggregated

example, the person might feel that the possibility of making a bequest to future generations would be jeopardized by virtue of an imperfect management programme). These two different motives would be running in opposite directions in regard to the consideration of the various use values.

We expected to find that there would be an additional (marginal) cost associated with the allowance of each additional intrusive option. Instead, the survey indicates that, in order to maximize the non-use values from rhinos, the most successful formula seems to be the banning of options that involve an element of enjoyment in the use of rhinos (hunting and darting) while allowing all other commercial uses of the animal such as the sale of stockpiled horns and darting and dehorning operations. Interestingly, it does not appear that there is any additional withdrawal of support associated with intrusive management options other than those associated with sporting activity.

In short, it appears that our initial hypothesis, namely that the only apparent conflict between use and non-use values concerned those constituencies with welfare motivations, was incorrect. This conflict exists to a very minor extent in the context of an endangered species such as the black rhinoceros, and it does not affect significantly the potential for all of the various use and non-use values to be aggregated in the pursuit of conservation. However, there is an unanticipated source of conflict which has very significant implications for the aggregability of use and non-use values. This is the conflict between those who enjoy specific forms of wildlife uses (sport hunters) and those who receive disutility from their enjoyment. This might be termed a sort of 'vicarious disutility', with one group valuing a loss of a flow of utility by another. This phenomenon was unanticipated, but appears to be the strongest source of conflict within the conservation community. Otherwise, it appears that there is stronger than anticipated support for most of the range of use-based policy options that might be applied in the conservation of the black rhinoceros.

5 CONCLUSIONS

Different people and constituencies see the object of wildlife conservation very differently: some would like to maintain large stocks of wildlife in order to trade it commercially or to hunt it, others would like to leave some wilderness to their grandchildren, and others still would like to know that there are some beasts on earth living a natural and undisturbed lifestyle. Is it possible for all of these different people to come together in the effort to conserve wildlife and their habitats, or are there fundamental conflicts between these different motivations that will always prevent them from cooperating? This is the issue that we have attempted to address here in the context of the conservation of the Namibian black rhinoceros. It was in this context that the capacity for the aggregation of use values in Namibia (derived from various managed uses there) together with non-use values of the citizens of the UK (derived from the maintenance of a specified lifestyle for a stock of live rhinos) was examined.

There are lessons to be learned from this case study that are much broader than this single context. For many years now the various wildlife constituencies have been in conflict over the future direction of international wildlife policies: should preservation, animal welfare or simplest conservation be the overall objective of wildlife policies? Different groups have been at loggerheads over the direction that policy from an assembly such as CITES or the Biodiversity Convention should take. Is sustainable

utilization of wildlife preservation the overriding objective? The case study examined here allows for an assessment of the capacity for these various groups to work together, and also for the identification of some of the fundamental conflicts between them.

This experiment found that non-use values are substantial. If the conservative estimate of WTP at five pounds is at all accurate, this would indicate a non-use value within the UK of about one hundred million pounds (5×22 million UK households). Even if this estimate is too great by an order of magnitude, this would still indicate that very substantial non-use values inhere in northern countries that should be channelled to conservation purposes. It may be compared with the full anticipated revenue from all of the various uses that may be accorded to the rhino in Namibia, which are anticipated to generate no more than 600 thousand dollars per annum. The indicated non-use value in the UK alone is capable of supplying the full amount of funding required for the conservation of the black rhinoceros in Namibia, and it should clearly be able to supplement fully the funding derived from the various uses occurring within Namibia.

However, if non-use value is intended to supplement rather than displace domestic management programmes, to what extent is this possible? How well do non-use and use values add up? This study demonstrates that non-use value is motivated significantly by a very unusual form of preferences, which we have termed *vicarious disutility*. Essentially, there is a significant group of individuals who do not wish to allow others to enjoy themselves in the use of animals for sport hunting. They would withdraw their support for the enhancement of live stocks of wildlife before they would allow those stocks to be used for sport hunting of any form (consumptive or non-consumptive). The study demonstrated that the WTP regarding rhino conservation was doubled (from five to ten pounds on average) when sport hunting was withdrawn as a management option. Clearly, non-use values are in substantial conflict with this form of use.

It is also clear that there are other motivations for non-use values. Some of these motivations include the desire to maintain live stocks of rhinos for future generations and future uses, and they are clearly not incompatible with any uses that aid the conservation of rhino stocks. For this reason, our study revealed, the majority of those surveyed would support all forms of commercial utilization other than sport hunting in aid of rhino conservation, and in fact they expressed disapproval of the withdrawal of these options. This study indicates that there is not a very broad or very deep range of support for general policies that shut down commercial markets in wildlife that might be used in aid of conservation. People do not want

people to enjoy the harvesting of the wildlife, but they do appreciate the need for the use of wildlife in order to sustain it.

Therefore there are conflicts between the various values of wildlife, but not perhaps as substantial as the paralysis in international policy making might suggest. From our research we believe that most people in the UK do support the commercial use of wildlife and wildlife products in support of conservation, but they reject the concept of encouraging the taking of pleasure in doing so. An optimal conservation policy would make use of those uses of wildlife which are compatible with non-use value, and would especially make substantially greater efforts at harnessing the non-use values that exist in the northern countries.

NOTES

1. We would like to acknowledge the cooperation of the Namibian Ministry of Parks in providing the data that supported this research exercise. Nigel Patchings was the member of the ministry who supplied the necessary effort. Malan Lindeque was the director of research who developed the collaborative link.
2. For a detailed analysis of the survey development, implementation and results, see Mourato *et al.* (1997).
3. The opening questions revealed a high level of general concern for the environment, with more than 90 per cent of respondents claiming to have some degree of interest in environmental issues and to purchase green products at least sometimes. About a fifth of respondents claimed they were members of an environmental organization.
4. To ascertain in more detail the reasons why respondents may care about rhino preservation, they were also asked for the three consequences of rhino extinction that worried them the most. The loss of biodiversity and the adverse impacts on the environmental chain are the most frequently cited consequences. These findings are interesting in that they indicate that, for a significant proportion of the sample, the only likely motives for placing an economic value on rhino preservation would be related to 'non-use' existence considerations, as was the prior expectation.
5. Given the presence of some outliers in the data, that is, very large bids, the median WTP is significantly lower than the mean. The median WTP provides a conservative estimate of the true value that could arguably be used for policy purposes.
6. OLS, however, may not be the most suitable model when a large percentage of zero bidders is observed or in the presence of a self-selected sample. Respectively, Tobit and Heckman's selectivity models should be used in those cases (Greene, 1993).
7. Although income was not included in the regression, its influence was controlled for, given that the chosen sample came from a particular mid-income class of people.
8. The omission of these school dummies was found not to influence the sign or significance of the impact of other explanatory variables but only the overall explanatory power of the regression.
9. The OLS estimates could be biased owing to endogeneity associated with this variable. However, a two-stage least squares procedure did not alter the estimated coefficients in a significant manner.
10. It should be noted that this result was not unanimous. About 20 per cent of the respondents increased their WTP when the incremental commercial policies were excluded; 42 per cent of respondents decreased their WTP in the face of their elimination. On balance, the change in policies produced a significant downward shift in WTP.

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