Evaluating non-user willingness to pay for a large-scale conservation programme in Amazonia: a UK/Italian contingent valuation study

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SUMMARY

Contingent valuation (CV) is a popular method in economics for eliciting individuals' preferences for non-market environmental resources, but very few attempts have been made to apply it to distant environmental goods of global importance. This paper reports the results of a CV study in the UK and Italy, which evaluated non-users' willingness to pay for the implementation of a proposed programme of protected areas in Brazilian Amazonia. The main focus of the survey was the wealth of biodiversity in the region proposed for protection and the ecosystem services provided by such areas. Taking both countries together, respondents were willing to pay, on average, £30 (US$ 45.60) per household per annum to fund the implementation of a protection programme covering 5% of Brazilian Amazonia and £39 (US$ 59.28) per household per annum to fund a 20% programme. Aggregated across households, an annual fund to conserve 5% of Brazilian Amazonia as strictly protected areas could yield around £600 million (US$ 912 million) in the UK and a similar amount in Italy. It should be noted that respondents appeared to show a high degree of uncertainty in the bid decision process for such an unfamiliar and distant good, leading to questions as to the validity and reliability of results. Nevertheless, responses were non-random and systematically related to a range of socio-economic characteristics and attitudinal variables. Thus initiatives such as international financial transfers from wealthy developed countries to support the protection of threatened areas of global significance could attract widespread support in those countries.

Keywords: biodiversity conservation, contingent valuation, Amazonia, conservation project

INTRODUCTION

Despite the species richness of the vast Amazon basin (Mittermeier 1988; CDEA [Commission on Development

and Environment for Amazonia] 1994), deforestation rates averaged 1.9×10^6 ha yr^{-1} between 1995 and 1999 (INPE [Instituto Nacional de Pesquisas Espaciais] 2000), the cumulative area cleared so far conservatively estimated at 550 000 km^2 or 14% of the region's total forest cover. The principal causes of this have been, and continue to be, land clearing for agriculture and ranching, fires, commercial logging, mining, fragmentation, invasion by exotic species and climate change (Fearnside 1999). These threats may become even more serious in the near future, given the Brazilian government's plans under the *Avança Brazil* (Forward Brazil) development programme (Peres 2001). This programme is worth around £26 billion (US$ 40 billion) in infrastructural commitments over a 10-year period and includes plans for paved roads, railways, pipelines, power lines, ports and hydroelectric power plants (MPOG [Ministerio de Planejamento, Orçamento e Gestão] 2000), providing heavily subsidized access to many previously remote parts of the region for the timber, mining and agricultural sectors. It has been predicted that, should Avança Brazil go ahead, between 28% and 42% of the forest in Brazilian Amazonia would be destroyed by 2020 (Laurance *et al.* 2001), greatly impoverishing biodiversity and reducing the hydrological and carbon-retention value of the ecosystem (Nepstad *et al.* 1999).

The management, conservation and sustainable development of forests are considered crucial in terms of economic and social development and for the planet's life support systems (UNCED [United Nations Conference on Environment and Development] 1993). However, since many of the functions associated with tropical forests, such as watershed protection and nutrient cycling, are public goods (in the sense that users cannot easily be charged for them), their benefits are not reflected in any market and have implicitly been assigned low, or even zero, value. When combined with the lack of clearly defined property rights in the region, this suggests that conservation cannot take place without some level of intervention (James *et al.* 2000). Furthermore, the external costs associated with destructive timber extraction, such as nutrient loss and soil erosion, have not generally been borne by those who exploit the resources (Sharma 1992), and policies such as government subsidies to forest conversion for livestock have exacerbated the situation. Such distortions have prevented the true scarcity of many non-timber functions becoming apparent, leading to levels of

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deforestation and overexploitation that many believe are not socially optimal. It is also the case that many of the effects of deforestation, such as climate change and the loss of provision of pharmaceutical products, are not confined to forests themselves (Swanson 1997). The loss of many of these functions is essentially irreversible, and biodiversity loss in particular is largely non-substitutable.

One possible solution is a network of publicly owned protected areas (Kramer *et al.* 1996). There are already a large number of conservation units within the Amazon biome, with varying degrees of protection, including extractive, ecological and biological reserves, national parks and forests and environmental protection areas. However, whilst the existence of even 'paper parks' can be effective in reducing local deforestation rates (Bruner *et al.* 2001), 85% of Brazilian protected areas are not effectively implemented, largely due to a lack of funds (Lemos de Sá *et al.* 2000), resulting in widespread illegal activities which continue to erode biodiversity in nominally protected areas. The one-off costs of successfully implementing the protection of these areas have been calculated at £344.74 million (US$ 524 million) (Espirito Santo & Faleiros 1992), the majority of which is for land purchase. Operating costs are estimated at around £20 million (US$ 30 million) per year (Peres & Terborgh 1995). However, since most of those who would derive the benefits from the creation of such areas are far removed from them physically, financial mechanisms would be needed to transfer funds from the beneficiaries to the areas concerned. Such international financial transfers were one of the recommendations of the Brundtland report (WCED [World Commission for Environment and Development] 1987), and calls for such transfers are becoming increasingly common (Pimm 2001). For these to occur, the values attached to these areas need to be greater than the costs of protecting them.

One method of attempting to capture the benefits of a good accruing to individuals but not reflected in a market is the contingent valuation (CV) method (Mitchell & Carson 1989), which elicits individuals' preferences for non-market goods by asking them to state their willingness to pay (WTP) or willingness to accept (WTA) compensation for a specified change in the level of provision of the good in question. Despite being the subject of continued controversy and debate over its theoretical basis and moral justification, CV is now the most widely used approach to valuing public goods and is frequently the only method applicable to environmental public goods (Johansson *et al.* 1995). This is because it can potentially measure a larger proportion of economic value than other methods, including non-use values (the satisfaction gained from simply knowing a resource exists without wishing to use or visit it personally), which generally exceed use values when goods have no direct substitutes (Pearce & Moran 1994; Pearce 1998).

Despite the large and growing CV literature, there have been relatively few attempts to use the method to evaluate preferences for tropical forest protection (Carson 1998). One such study found that the mean one-time WTP of USA citizens for protection of 5% of the world's tropical forests was US$ 31 ($\approx$£20) per household (Kramer *et al.* 1996). Aggregated across all USA households, this amounted to US$ 2.8 billion (£1.84 billion), which, if matched by other industrialized countries, would create a substantial global fund.

The aim of this paper is to report the findings of a study conducted in the UK and Italy to estimate non-use WTP values for a programme aimed at the conservation of parts of Brazilian Amazonia and the biodiversity contained within it.

METHODS

The survey instrument used in the study was a questionnaire, the first section eliciting information regarding perceptions of and attitudes towards environmental issues in general and tropical forests and biodiversity in particular. This was designed to motivate respondents into thinking about these issues, to consider their preferences, and for us to gauge the extent of people's existing knowledge about these concepts.

In the second section, information was then presented to respondents that specified:

- the geographical location and extent of the areas involved (maps provided);
- those parts of Brazilian Amazonia included in the programme (see below) and the proportion of the world's remaining tropical rainforest it covered;
- the area's biological diversity, including landscapes, flora and fauna (photos provided);
- the present extent and condition of the protected area programme;
- the degree of protection to be given and who would be responsible for the implementation and maintenance of existing and future protected areas;
- likely future impacts on the area if the programme were not implemented; and
- who would be required to pay for the proposals if implemented.

Respondents were then asked whether they were prepared to pay at least some amount in extra taxation to ensure the conservation programme was implemented. This 'payment principle' question was intended to validate true zero bids by enabling respondents to register a protest bid without feeling uneasy about doing so. It also took into account the potential for lexicographic preferences, whereby respondents believed the area should be protected irrespective of cost (Shyamsundar & Kramer 1996). Both positive and negative replies were followed up by attempts to discover the motivation behind responses.

Two potential programmes were then presented using a split sample technique. The first outlined a scheme to protect 5% of Brazilian Amazonia, roughly the extent of the existing network of protected areas already in place, around

190 000 km². The second outlined a hypothetical conservation target of fully implemented protected areas representing all major river basins and one fifth of the entire region (around 760 000 km²). Half the sample was asked their WTP for the implementation of the 5% scheme first (part-whole subsample), followed by their WTP for the 20% scheme, and vice versa for the other half (whole-part subsample). The purpose of this was to minimize the possibility of embedding effects, where respondents were insensitive to the scope of the good and stated similar WTP amounts regardless of the amount under consideration (Kahneman & Knetsch 1992). The final section of the questionnaire gathered information on respondents' socio–economic and demographic characteristics. The full questionnaire can be found in Horton *et al.* (2002).

The relationship between WTP and scale of programme was established by analysing responses to the two scenarios. WTP bids were also regressed against a number of socio-economic and attitudinal variables using ordinary least squares (OLS) and Tobit estimation techniques (Greene 1999), the latter being undertaken since it explicitly incorporates the fact that we could not get negative WTP bids. To facilitate bid curve analysis, modelling its natural logarithm controlled for the positive skew of the WTP distribution. The bid function was arrived at using stepwise regression techniques (Greene 1999), starting with all potential explanatory variables, eliminating that of least significance, re-estimating the model, and so on until all remaining variables were significant at the 95% level. Truncation of bids was also undertaken to investigate how mean WTP was affected by bids at the highest end of the scale (Bateman *et al.* 1995).

Elicitation method

The current trend in CV surveys is towards referendum style formats when eliciting WTP responses. The dichotomous choice method, for example, requires a simple yes/no response to a sum presented to the interviewee and is also the method recommended by the influential NOAA [USA National Oceanic and Atmospheric Administration] panel on CV design issues (Arrow *et al.* 1993) since truth telling is the optimal strategy. It also more accurately reflects a market decision on whether or not to pay an exogenous specified amount (Kriström 1993) and has been found to generate a higher response rate (Johansson *et al.* 1995). However, when considering goods for which preference valuation is unfamiliar, such formats can lead to strong anchoring effects and starting point bias, with respondents basing their WTP on the amounts offered during the interview, resulting in an overestimate of true value (Balistreri *et al.* 2001). Neither would an open-ended type question, where respondents are asked to state their maximum WTP without cues from the interviewer, have been appropriate in this case since the unfamiliarity with payment for the good would have led to excessive variability of bids.

After extensive pre-testing and piloting, we opted for a payment ladder approach (Rowe *et al.* 1996). Respondents were presented with a range of monetary amounts and asked to tick those they would be willing to pay to ensure the implementation of the relevant programme, leave blank those they were uncertain about, and cross the first amount they definitely would not pay. This method has the advantage of taking into account the uncertainty in bid levels, which we expected to be fairly prominent in this study, more effectively than other methods.

Payment vehicle

A most important criterion for the payment method is that it is believable. Whilst the Kramer *et al.* (1996) study used contributions to a UN [United Nations] managed fund, a more credible vehicle for this study, less susceptible to strategic behaviour and recommended by the NOAA panel, was taxation (Arrow *et al.* 1993). Although the effects can be non-neutral, an EU-wide tax was considered most appropriate given the more serious problems of other approaches and the need to maintain a consistent approach in both countries. The increased realism associated with taxation also tends to reduce the zero bid rate and bid variability (Bateman *et al.* 1993).

To reduce any temporal effects, it was made explicit in the survey that annual payments would be required to ensure the long-term maintenance of the protected areas. Respondents were reminded of this commitment just prior to the WTP questions.

Sampling

A simple random sampling strategy was adopted, with interviews carried out face-to-face at various outdoor locations such as beaches and parks where respondents had time to reflect and make thoughtful decisions. The two European countries were selected for comparison with the Kramer *et al.* (1996) study and to examine whether WTP for what is a well-known area of international concern varied for cultural or other reasons. They were also considered broadly representative of Northern and Mediterranean Europe, which would make the study more suitable for benefit transfer analysis later. In the UK, interviews were conducted in the city of Norwich in East Anglia. In Italy, various locations in Lazio, Lombardy and Tuscany were used. A total of 442 individuals were approached and 407 interviews were completed during July and August 2000, a response rate over 91%, which is high for such a study (Mitchell & Carson 1989).

RESULTS

Environmental attitudes

Overall, 98% of respondents claimed to have some knowledge of tropical forests (Table 1). When asked about the reason for their importance, most people seemed to have

Table 1 Responses to the main attitudinal questions in the survey.

Question	% respondents		
	UK	Italy	Combined
Who had read about, heard about or seen TV programmes about tropical forests	100	96	98
Who considered that tropical forests important	98	97	98
Who considered the reason for their importance to be:			
regulation of global climate	83	92	87
biodiversity and habitats	52	30	42
cultural diversity/indigenous peoples	13	5	9
economic resource	8	2	5
pharmaceutical research	5	4	4
Who considered tropical forests to be under threat as a result of:			
commercial logging	50	89	69
multinational corporations clearing land	33	37	35
internal policies in tropical forest countries	20	30	20
international trade and globalization	20	81	49
pollution	11	70	39
fires	1	73	35
overpopulation	19	82	49
Who considered developed countries should help pay for the costs of preserving tropical forests	92	95	93
Number of respondents	194	213	407

some understanding, with many giving more than one response. The figures from the UK and Italy showed no statistically significant differences in this respect. However, when asked about the causes of deforestation, respondents in the Italian sample tended to give more than one reason (in some cases several), and were more likely to state nearly every possible threat than those in the UK (Table 1).

A very high proportion of the sample (93%) said that developed countries should help to pay the costs of preserving tropical forests (Table 1). When asked what percentage of these costs should be borne by developed countries, the mean response was 51.7%.

Payment principle

Only 45 respondents (11% of the sample) said they were not prepared to pay any amount in extra taxes towards the costs of the programmes. Of these, 19 people either said they could not afford to pay or taxes were too high already, 11 said this was a problem for the Brazilian government, six said the area under consideration was too small to be important and a further six people said the issue was not important to them. There was little evidence of people withholding their true values due to free riding behaviour (benefiting from the use of a good or service without paying for its provision), or due to a lack of trust in either the tax raising or the programme implementing authorities. Only one person objected to the fundamental principle of valuing the preservation of Amazonia.

Statistical analysis of responses to the payment principle question showed that those who said protection of the areas in question was particularly important were significantly more likely to answer positively than those who did not ($\chi^2 = 8.37$, $p < 0.05$). Female respondents were more likely to accept the payment principle ($\chi^2 = 5.12$, $p < 0.05$) and the number of cars in a household was also positively related to response ($F = 7.11$, $p < 0.05$). Neither nationality nor whether people were asked about the 5% or the 20% scheme first was a factor.

Those who responded positively to the payment principle were asked why they were willing to pay for the proposed programme. Direct and option use values were almost completely absent, whilst indirect, existence and bequest values were all found to be important (Table 2). In particular, much of the value that people derived from this good seemed to stem from the non-market services provided by tropical rainforests (or at least perceived to be provided), such as carbon sequestration and global warming reduction. There was a degree of overlap in responses and many people may therefore have been holding a variety of values. Again, no differences between the two nationalities were detected in this respect.

WTP per annum

Using an exchange rate of £1 = Lit 3000 throughout (£1 ≈ €1.57 and US$1.52, August 2000), and including as zeros those who refused the payment principle, the WTP question elicited a whole sample mean (calculated from the midpoints of the intervals given by respondents on the payment ladder) of £29.83 (US$43.97) per annum for the 5% scheme and

Table 2 Reasons respondents gave for accepting the payment principle.

Type of (economic) value	Reason	(%)Respondents who gave reason
Indirect use	I think the future of Amazonia is a globally important issue	59.0
Indirect use	I am very concerned about climate change	48.0
Existence (non-use)	I am very concerned about biodiversity loss	17.0
Option use	I may want to visit a tropical forest at some time in the future	0.6
Bequest (non-use)	We should protect this area for future generations	33.0
Existence (non-use)	In order to preserve the genetic diversity	2.5
Direct use	I would receive some personal benefit from paying	0.6

£39.16 (US$ 59.52) for the 20% scheme. These were split into those asked about the 5% scheme first and those about the 20% scheme first (Table 3). Three bids were treated as outliers and excluded from the analysis as they were considered excessively high given the income of the individuals concerned.

Mean WTP was higher for the more inclusive programme in each subsample (Table 3), and the second responses were therefore internally consistent in each case. However, in each subsample confidence intervals overlapped due to the high variability of bids. In addition, the Italian sample results were not externally consistent since the first WTP question for the 5% scheme elicited a higher mean response than the first question for the 20% scheme. Furthermore, the means from the Italian survey were significantly larger than UK means and mean WTP was higher than the median in each subsample (Table 3).

Successive truncations of bids led to a marked decrease in both mean and standard deviation in both countries, similar to that found in other studies (Bateman *et al.* 1995). Omission

of the four highest bids (1% of the sample) caused mean WTP to fall by 8.6%, of the highest 5% of bids led to a reduction in mean WTP of 25.3%, and of the highest 10% to a fall of 38.6%.

Bid function analysis

Because very few zero bids were received, OLS and Tobit models gave very similar results. For each of the subsamples (whole–part and part–whole), two OLS models are presented, the first including all potential explanatory variables, the second only those of statistical significance (Table 4). WTP bids for the first programme were excluded as predictors of bids for the second programme in each case to eliminate any anchoring effect. Higher WTP bids were associated with respondents who felt that environmental issues were important compared to other social and economic problems and with those who felt that rich countries should bear a higher percentage of costs of the protection programme (Table 4). Males tended to state higher WTP, and bids were positively associated with level of education and income. Italian respondents gave higher bids than those in the UK. Other variables were not generally significant and none had a theoretically unexpected sign.

DISCUSSION

The main reason for the higher bids in Italy, mentioned by many respondents in that country, was the high profile of these issues at the time due to recent extensive media coverage. Just prior to the survey, Italian State television had shown a series of short documentaries about tropical deforestation and biodiversity loss in the Amazon, media coverage that had not taken place in the UK. This therefore seems to have been an issue of considerable current national interest and at the forefront of many people's minds in Italy. It may also explain why the Italian results in particular demonstrated a high familiarity with a site that is geographically remote and which only one person in the whole sample had visited.

The positive correlation between WTP and income and education is a result common to many stated preference studies, and the fact that males were more likely to state higher bids may demonstrate a further income effect. Whilst the significance of the constant (Table 4) could indicate omitted variables, it is more likely that respondents

Table 3 Mean WTP per annum per household for each sub-sample. CI = confidence interval.

	UK				Italy				Combined			
	Part-whole		Whole-part		Part-whole		Whole-part		Part-whole		Whole-part	
	5%	20%	20%	5%	5%	20%	20%	5%	5%	20%	20%	5%
Mean	£12.94	£20.65	£24.23	£18.16	£49.54	£61.36	£40.41	£29.63	£31.67	£41.49	£31.18	£23.10
95% CI	£9.57–£16.31	£14.77–£26.53	£16.36–£31.99	£11.92–£24.41	£40.54–£58.54	£49.93–£72.79	£30.96–£49.85	£21.88–£37.39	£26.22–£37.13	£34.45–£48.52	£25.13–£37.24	£18.20–£28.00
n	103	103	110	110	108	108	83	83	211	211	193	193

Table 4 Full and best OLS models of explanatory variables in determining WTP. Envrank = rank given to environment compared to other social/economic problems (1=lowest…5=highest); Biorank = 1 if biodiversity loss is very important to respondent, 0 otherwise; Envgroup = 1 if respondent belongs to an environmental group, 0 otherwise; Protect = importance to respondent of protecting areas in question (1 = not at all…5 = very); Richpay = percentage of costs respondent says should be borne by rich countries; Education = level of education of respondent (1 = primary…. 6 = higher degree); Age = age group of respondent (1 = under 20…. 7 = 70 or over); Gender = 1 if female, 0 if male; Car = number of cars in the respondent's household; Income = household income group (1 = £5000 per annum or less… 9 = over £70 000 per annum); and Nationality = 1 if UK, 0 if Italian. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Explanatory variables	All variables included				Best-fitting model			
	Part-whole subsample		Whole-part subsample		Part-whole subsample		Whole-part subsample	
	5%	20%	20%	5%	5%	20%	20%	5%
Constant	1.30**	2.60***	0.95**	1.43**	1.21***	2.02***	1.22***	0.87**
Envrank	0.13	0.20***	0.10	0.14	0.16*	0.28***	_	0.16*
Biorank	0.05	0.14	−0.08	0.30*	–	–	–	0.43**
Envgroup	0.33*	0.31**	0.30	0.34	0.32*	–	–	–
Protect	0.07	0.09	0.06	0.14	–	–	–	–
Richpay	0.98×10^{-2}**	−0.88	0.01***	−0.64	0.01***	–	0.01***	–
Education	0.21***	0.17***	0.24***	0.19**	0.23***	0.19***	0.25***	0.20**
Age	−0.09	0.05	−0.06	−0.01	–	–	–	–
Gender	−0.35	−0.38***	−0.53***	−0.35**	−0.35***	−0.39***	−0.46***	–
Car	0.04	0.00	0.12	−0.09	–	–	–	–
Income	0.08**	0.04	0.09	0.11**	0.08***	0.04	0.12***	0.12**
Nationality	−1.30***	−1.28***	−0.51**	−0.94***	−1.30***	−0.36***	−0.54***	−0.72***
R^2 (adj)	0.43	0.47	0.31	0.20	0.43	0.42	0.31	0.19
n	187	187	175	173	187	187	175	173

experienced considerable uncertainty in answering and resorted to a roughly common conception of a socially acceptable level of payment. Further evidence of this was provided by analysis of reasons why respondents stated a particular WTP amount, which showed that strategic behaviour, where respondents did not believe they would actually be asked to pay the amount stated and gave higher bids than they would actually have been prepared to pay, may have been a factor. In addition, 28% said their bid would be enough if everyone else contributed similar amounts and 22% felt it was an 'important issue,' suggesting that these respondents were keen to support a 'good cause' whatever it might be, a 'warm glow' effect (Andreoni 1990). Nevertheless, the largest group (61%) said that their WTP bid was appropriate given their income, indicating that the majority of respondents adopted some kind of mental accounting process before giving their bids.

Aggregated across households, the results suggest that an annual fund to conserve the combined protected area of the smaller scenario in question of around £600 million (US$ 912 million) in the UK and a similar amount in Italy could be created. This exceeds the total estimated costs of protection outlined in the introduction by an enormous amount, even taking into account inflationary increases in costs. A potential benefit-cost ratio of such magnitude suggests that comprehensive multilateral programmes aimed at conserving natural resource capital with global benefits would be financially viable and would increase overall social welfare significantly. Furthermore, WTP values are likely to increase substantially in the future (Cartwright 1985) as deforestation continues and climate change takes hold.

Extrapolating contributions across all households in the developed world (UN Population Division 1999) could yield a total annual global fund of around £17.6 billion (US$ 26.75 billion). This is more than half the amount estimated to be needed to create a global protected area covering ~15% of each continent (Pimm 2001).

Of course, we have not considered the institutional capacity and mechanisms at national, regional and local scales that could make such large financial transfers possible with minimum levels of inefficiencies, including individual or central government appropriation of conservation funds (Peres 2002). In addition, a full cost-benefit analysis to determine whether unique resources such as Amazonia are protected would need to include the opportunity costs of foregone development on business and local populations as well as social and other costs. Further, considerations of economic efficiency are only one criterion informing the decision-making process and other factors such as distributional issues and political acceptability should also be taken into account.

CONCLUSIONS

The values which people hold for both the tangible and intangible goods and services provided by areas such as Amazonia and which we have attempted to elicit in this paper clearly discredit any notion that protecting biodiversity at meaningful spatial scales is unaffordable at present. Furthermore, other potential values (such as hydrological and carbon storage) were not stressed in this study, and it is also the case that many people affected by deforestation

cannot afford to pay anything to ensure the protection of Brazilian Amazonia. We would therefore expect our results to represent a lower bound of the true value of such areas. Whilst actual payments of the magnitude suggested in this paper are unlikely to occur in practice, they do highlight the fact that many of the benefits of conservation do not currently have identifiable values and this is one reason for the under-provision (in economic efficiency terms) of such conservation measures.

Whilst this study demonstrates that a majority of house-holds in the UK and Italy were willing to pay to support large-scale tropical forest preservation efforts, the results display evidence of considerable uncertainty in responses to WTP questions. Plausible explanations include respondents' adherence to notions of social fairness, an obligation to pay a fair share of the costs and strategic behaviour. We can there-fore provide, at best, only a crude guide to individual preferences and estimates of value. At worst, bids may be spurious guesses motivated primarily by a desire to support a good cause irrespective of the good under evaluation. Indeed, since respondents in the two subsamples (whole-part and part-whole) expressed analogous first bids, it is likely that they were not valuing the specific programme in question, but were expressing the general importance of Amazonia to them.

However, given the intangible nature of the good and the unfamiliarity with the process experienced by respondents, such uncertainty is hardly surprising. The values elicited were significant and there was certainly evidence of a relationship between stated WTP and socio-economic and attitudinal variables, suggesting that responses to the valu-ation questions were non-random.

We would not argue that the CV method is a panacea to the problems of incorporating environmental values into decision-making processes and can be applied to any environmental good or service. Indeed, the findings of this study suggest that respondents who are unfamiliar and far removed physically from the good demonstrate excessive uncertainty in the valuation process for the results to be considered entirely meaningful. However, this attempt to estimate the non-use values that residents in the West hold for preservation of large regions of tropical forest and their biodiversity suggests that such values should be considered by decision-makers, since they are not, at the current time, generally incorporated into decision processes at all. This paper provides some indication of the scale of monetary flows that could be provided to meet the costs of implementing conservation measures and to ensure a sustainable future for the areas concerned.

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