

Wildlife-based tourism and increased support for nature conservation financially and otherwise: evidence from sea turtle ecotourism at Mon Repos

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The arguments of most conservationists supporting ecotourism have been based on the view that it is environmentally friendly as a resource-use and that receipts from it can counter demands to use the natural resources involved for more extractive economic purposes. But wildlife-based ecotourism can also have positive impacts in itself on the willingness of tourists to pay for wildlife conservation, strengthen the pro-conservation attitudes of tourists, and foster personal actions by them that contribute to wildlife conservation. These aspects are explored in this article on the basis of a survey of tourists visiting Mon Repos Beach near Bundaberg, Queensland, for the purpose of watching marine turtles. The results enable several of the conservation impacts of this experience on tourists to be quantified, and highlight important relationships between specific socio-economic variables and the willingness of tourists to pay for the protection of sea turtles. Furthermore, it is shown that the on-site experiences of ecotourists have positive impacts on the willingness of tourists to pay for the conservation of wildlife, and that willingness to pay is sensitive to whether or not wildlife is seen. It is suggested that *in situ* ecotourism is likely to be a more powerful force for fostering pro-conservation attitudes and actions among visitors than *ex situ* wildlife-based tourism in aquaria and zoos.

Keywords: Australia; conservation; contingent valuation; ecotourism; turtles; wildlife-based tourism

The potential of wildlife-based ecotourism to provide support for nature conservation or conflict with it has been much discussed in the literature.¹ However, most attention in such discussions has been focused on (a) the on-site interconnection between ecotourism development and the conservation of nature, or (b) the ability of financial receipts and positive economic impacts from such tourism to provide continuing political support for the conservation of the protected areas involved and counter moves to use their land area for more extractive economic purposes. The conservation argument is often further

bolstered by consideration of the total economic value of the protected area involved – that is both use and non-use values² or on-site and off-site values.³ However, the impact of ecotouristic experiences on visitors in terms of their increased willingness to pay for nature conservation and strengthening of their behaviour to conserve nature has been given little consideration.

The purpose of this article is to rectify this position by drawing on results from a survey of tourists visiting Mon Repos Conservation Park in Queensland to watch marine turtles on the beach. The article is intended to demonstrate that ecotourism experiences can strengthen the willingness of visitors to pay for conservation of the wildlife viewed, and can result in visitors adopting a more positive set of conservation attitudes and actions after their visit. These are important benefits of ecotourism from a conservation point of view. The article also identifies some factors that influence changes of this type.

In this article, we provide background on sea turtle based ecotourism at Mon Repos, then describe the survey and visitors' profile before briefly commenting on the role of marine turtles in generating tourism in the Bundaberg region, and the regional economic impact of turtle watching at Mon Repos Beach. Subsequently the focus is on whether visitors to Mon Repos Beach intent on seeing marine turtles show an increase in their willingness to contribute financially to the conservation of marine turtles after their visit and on identifying the factors likely to influence their willingness to pay for such conservation, including their on-site experiences in viewing turtles. Finally, we consider whether or not their visit increases the likelihood of visitors taking actions (additional to increased financial action) to conserve marine turtles.

Non-consumptive wildlife-oriented recreational (NCWOR) tourism is a significant and popular segment of the tourism industry.⁴ It has been shown that such tourism activities generate significant economic benefits.⁵ Economic benefits constitute a useful tool in building political support for the conservation of wildlife species,⁶ especially if public money has to be spent on their conservation and land and has to be set aside for their preservation. Economic benefits are also useful in justifying conservation measures adopted that may impinge on human activities – for example, reducing human access to sea turtle nesting beaches and restricting boat speeds where turtles forage. However, apart from the economic benefits NCWOR tourism generates, it also imparts conservation and educational benefits to visitors by providing a first-hand experience of viewing wildlife in its natural surroundings. The conservation benefits include financial contributions made for the conservation of the species that is being viewed. These contributions further strengthen the support for the conservation of wildlife resources. Educational experiences derived from coming into direct contact with wildlife also contribute to conservation efforts.

Sea turtle based ecotourism at Mon Repos: background

Sea turtle based ecotourism is becoming increasingly popular in Australia and other parts of the world where sea turtles nest in significant numbers. Mon Repos is the most visited and accessible sea turtle rookery in Australia for tourists. It is located on the coast near Bundaberg in central Queensland, north of the coastal township of Bargara (Figure 1). Mon Repos beach, about 1 km

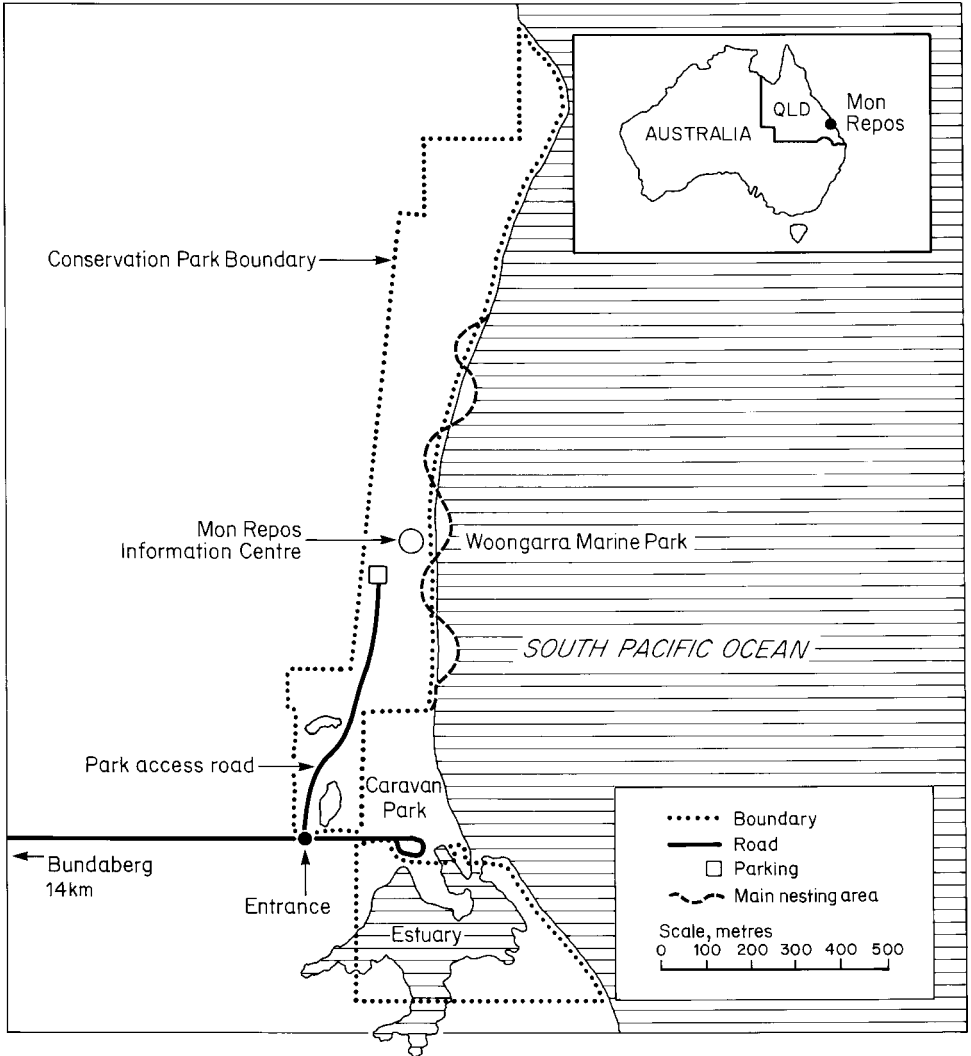


Figure 1. Location and site map of Mon Repos Conservation Park and its environs.

in length, supports the 'largest concentration of nesting marine sea turtles on the eastern Australian mainland and is one of the two largest loggerhead turtle rookeries in the South Pacific Ocean region'.⁷ The breeding that takes place here is vital for the survival of loggerheads *Caretta caretta* in the region. Flatbacks *Natator depressus*, and greens *Chelonia mydas*, too, visit Mon Repos, but in low numbers. In addition to these three species, the giant leatherbacks *Demochelys coriacea* occasionally nest at Mon Repos and on beaches north of Mon Repos.

Data maintained by Queensland Parks and Wildlife Service (QPWS) show that on average 183 loggerheads, 6 flatbacks and 2 green sea turtles were recorded during the last four years at Mon Repos. Table 1 gives a breakdown of species and numbers seen during these years.

Each year, female sea turtles travel thousands of kilometres from their feeding

Table 1. Nesting sea turtles at Mon Repos for four seasons, 1996–2000.

Turtle season	Species		
	Loggerhead	Green	Flatback
1996/97	198	2	4
1997/98	119	1	8
1998/99	262	2	7
1999/2000	152	3	4

Source: Queensland Parks and Wildlife Service, 2000 (unpublished data).

grounds to nest at Mon Repos. QPWS research shows that they travel from locations as far away as Indonesia, New Caledonia, Vanuatu, and the Solomon Islands, or as close as Hervey Bay (Australia). It is widely believed that sea turtles that nest in Mon Repos are those that hatched on the same beaches many decades ago.

Sea turtle viewing at Mon Repos dates back to the early part of the 1900s, but then it was only a local event.⁸ However, since the establishment of the Queensland Turtle Research Programme in 1968, visitor numbers have increased. A formal sea turtle viewing programme was started in 1985 by research staff to manage growing crowds, and the 1994–95 season marked the commencement of commercialized ecotourism at Mon Repos. During the last seven seasons, a total of 135,984 visitors have come to Mon Repos to view sea turtles. The number of visitors for the 1999/2000 season was 23,485.

Mon Repos Conservation Park is managed by QPWS. Use of the beach by the public is restricted during the nesting season. Visitors are taken to the beach to view sea turtles at night under the guidance of QPWS rangers and volunteers. Each group consists of no more than 70 people. The use of torches is restricted and visitors are guided so as to have minimal adverse impact. An interpretative programme is conducted by QPWS staff on the beach to explain the egg-laying process of sea turtles and hatchling behaviour. The display centre and audio-visual presentations provide further information on sea turtle nesting behaviour, life history, migration, biology, evolution, and sea turtle research and conservation.

Turtle watching at Mon Repos is seasonal. The season begins in mid-November and continues until the end of March of the following year. It must be noted here that during the first half of the sea turtle season, only adult sea turtles are seen. In the second half of the season, both sea turtles and hatchlings are seen and in the latter part mainly hatchlings are seen. All of these phases have their attractions for tourists.

Survey and visitors' profile

A survey of visitors to Mon Repos was undertaken during the 1999/2000 season. A detailed questionnaire was developed to gather the necessary information. The questionnaire was subdivided into two main sections. Part I obtained background information on the visitor's current visit to watch sea turtles at Mon Repos and the costs involved in the trip to Bundaberg and Mon

Repos. Socio-economic data were also obtained. Part II included collecting data on educational aspects, conservation appreciation of sea turtle viewing and economic valuation questions. Section I of Part II also obtained information to determine whether visitors had seen sea turtles and/or hatchlings during their current visit.

Random sampling techniques were used to obtain the data from visitors. The survey was conducted from December 1999 to the end of March 2000 by volunteers and rangers of the QPWS attached to Mon Repos. Approximately 15 questionnaires per day were randomly distributed to visitors at the entrance and/or while awaiting their turn to watch sea turtles. Completed survey forms could either be left with rangers or volunteers at Mon Repos, or returned to us in a postage pre-paid envelope. During the four-month survey, 1,200 questionnaires were distributed, of which 519 usable responses were received. The response rate was 43%. These responses correspond approximately to about 10% of visiting groups during the 1999/2000 season. While the response rate may seem relatively low, such rates are not unusual for a survey of this nature.⁹ Loomis¹⁰ found the average to be around 40%. So the response rate for our marine turtle survey is near the average for this type of study. By comparison, Sappideen¹¹ achieved 31%, Kerr and Sharp¹² report a response rate of 37%, Walsh *et al.*¹³ achieved 41%, Kirkland¹⁴ and Pate and Loomis¹⁵ attained 51%, while Kristrom¹⁶ had a 67% response rate.

In our sea turtle study, however, there is still a non-response rate of 57%. Whether this results in bias into the sample is not known. For example, it could do so if only those who were more conservation-minded answered the questionnaire: this could result in some upward bias in expressed conservation concerns. We have no way to check on this. The relatively low response rate could be due to respondents being surveyed while they were on holiday. Furthermore, since sea turtle watching is done at night on the beach, it is likely that many visitors would have misplaced the questionnaire that was handed out to them. In addition, the Contingent Valuation Method (CVM) question was only part of an eight-page questionnaire. The CVM question was also made optional for foreigners, the reasons for which are given elsewhere in this paper.

Prior to the survey, a pilot study was conducted in November 1999. A total of 25 responses was obtained. This enabled us to check the viability of the questions prepared to collect the necessary data. As a result, the questionnaire was modified, removing questions that proved difficult to administer. The number of questions, too, was reduced.

In the sample group there were visitors from 18 countries and the majority, as expected, were from Australia. A considerable number of European tourists visited Mon Repos. For example, there were significant numbers of visitors among the surveyed respondents from the UK (21%), Germany (6%), The Netherlands (3%) and Switzerland (2%). North Americans, too, visited Mon Repos in quite significant numbers. The number of Asian visitors was almost negligible, but it is possible that fewer Asians completed the questionnaire because of language limitations. There were some visitors in the surveyed group from Israel and South Africa, where sea turtle viewing is established. Some of these respondents had in fact previously visited viewing sites in their respective countries.

State-wise, most surveyed visitors to Mon Repos were from Queensland

(79%). This is probably due to their relative proximity to Mon Repos and the availability of information about sea turtle viewing, especially through the local media.

The majority of surveyed visitors came to Mon Repos to watch sea turtles (78%), while some came especially to study the turtles (11%) and others to entertain visitors (9%). The largest number of respondents said that they would not have visited Mon Repos if it had not been for the presence of sea turtles.

Tourism generation and economic impact of presence of sea turtles

The data obtained from the survey show that the presence of sea turtles is an important factor in attracting tourists to the Bundaberg region during the sea turtle season. Forty per cent of the respondents said that they would not have visited Bundaberg if it had not been for the presence of the turtles. The proportion of tourists who would and who would not have visited Bundaberg in the absence of sea turtles is shown in Table 2.

Of the surveyed visitors to Mon Repos, 19% (excluding locals)¹⁷ would have reduced their stay within a 60 km radius of Bundaberg if there had been no sea turtles in the area. However, 38% of respondents said that they would have visited Bundaberg and would not have reduced their stay even in the absence of sea turtles. The percentage of non-responses was 43%. The number of reduced days in the Bundaberg area (within a 60 km radius) was 110, at an average of 1.34 days for this group. There were 13 non-responses.

Sea turtle based ecotourism at Mon Repos provides significant economic benefits to the Bundaberg region. If it were not for the presence of sea turtles at Mon Repos, the loss of income to the region (within a 60 km radius) would be close to 0.8 million Australian dollars a year.¹⁸ The income generated is significant considering the short sea turtle season, the scarcity of the wildlife that is being viewed, and the relatively low human population in the region. In addition, the surveyed respondents indicated that they were willing to pay higher entrance fees than those currently charged. However, it should be borne in mind that this is an ex post answer while the actual entrance fee is paid ex ante. This indicates that the Mon Repos experience of watching sea turtles seems to have a positive influence on what visitors are willing to pay to view sea turtles and also on their conservation behaviour. Apart from direct economic impacts, educational and conservation benefits are obtained from sea turtle ecotourism.¹⁹ Conservation benefits include the willingness of visitors to make

Table 2. Surveyed visitors to Mon Repos who came to the Bundaberg region due to the presence of sea turtles.

	Number of respondents	Percentage
Yes	280	54
No	208	40
Locals	25	5
No response	6	1
Total	519	100

increased financial contributions for the conservation of sea turtles visiting Australia to nest. Our survey provides evidence about such conservation impacts.

Increased willingness of tourists to contribute financially to sea turtle conservation

It is hypothesized that the experience of viewing sea turtles and/or hatchlings affects visitors' attitudes to sea turtles and their conservation. Of those interviewed, a large number had observed sea turtles laying eggs and hatchlings emerging from their nests. Some respondents had seen adult sea turtles as well as hatchlings. Fewer than 50 respondents had seen no sea turtles or hatchlings during the current visit. Figure 2 shows the number of surveyed visitors seeing adult sea turtles/hatchlings at Mon Repos.

The study showed that the sea turtle viewing experience had a positive

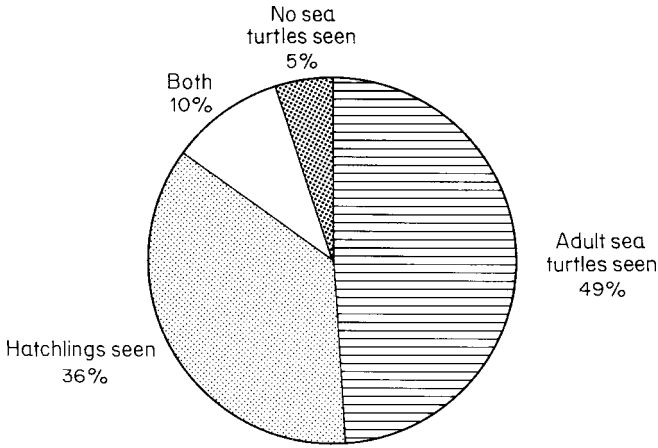


Figure 2. Number of visitors seeing adult sea turtles/hatchlings at Mon Repos.

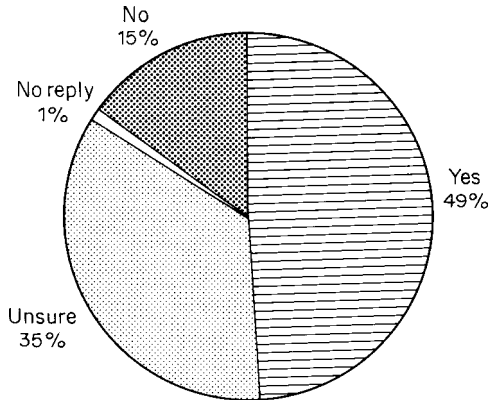


Figure 3. Influence of the Mon Repos experience to contribute money for sea turtle conservation.

influence on visitors' willingness to contribute money to sea turtle conservation. A considerable percentage of responding visitors (40%) said that their visit to Mon Repos would influence them to contribute more money for sea turtle conservation than before. Twenty-seven per cent said that they would contribute the same amount as before their visit to Mon Repos, whereas only 1% said they would contribute less. However, 32% did not answer this question. Figure 3 shows the number of respondents who were influenced by the Mon Repos experience to contribute money for sea turtle conservation. They were of the opinion that the experience at Mon Repos had influenced them to make a contribution to sea turtle conservation in the future.

Contingent valuation by visitors – their willingness to pay for conservation of sea turtles

In order to determine how much money visitors were willing to pay for sea turtle conservation in Australia, the study adopted the Contingent Valuation approach. Since the CVM was proposed by Davis,²⁰ it has been widely used during the last thirty five years to estimate economic values for a range of commodities for which there is no market. Furthermore, in the last decade, there has been a dramatic increase in the number of academic papers and presentations relying on Contingent Valuation. These studies have dealt with the methodological issues concerning the CVM and debated the advantages and disadvantages of each approach.

The CVM is the most frequently used of the constructed market techniques employed in the USA to settle environmental disputes in courts, especially in estimating lost passive-use values (a good example, is the *Ohio State v Department of the Interior* case of damage assessments).²¹ Government agencies in several countries, including Australia, Canada and Norway, frequently employ this method. In Australia, the CVM has been increasingly used: studies relying on this approach include the Kakadu Conservation Zone inquiry²² and the Institute of Applied Environmental Research²³ study to assist with the inquiry into the conservation, management and use of Fraser Island and the Great Sandy region.

The NOAA panel²⁴ on Contingent Valuation states that providing relevant information to respondents before the CVM questions are asked is essential. They report 'placing the choice problem in a broader context helps the respondent to arrive at a realistic or even conservative valuation'. For this Mon Repos turtle study, visitors obtained all relevant information (about, for example, threats facing sea turtles, action that needed to be taken, and the status of sea turtle species) through Mon Repos Conservation Park visitor centre displays, amphitheatre lectures and the interpretative programmes conducted by the QPWS staff on the beach.

The questions were based on the dichotomous choice model and Yes/No responses were elicited to several questions relating to visitors' willingness to pay to protect sea turtles that came to nest in Australia. The final Contingent Valuation question was an open-ended one in which respondents were asked what was the maximum amount per week they were willing to pay to protect sea turtles that came to nest in Australia for the next 10 years (see Appendix

1 for further information on the Contingent Valuation questions that were asked for this study). The respondents were told that, in order to protect sea turtles, money would have to be raised by the government. They were told that the questions were being asked to determine how much individuals were willing to pay for sea turtle conservation and not to raise money for Mon Repos and that this was only one of many environmental issues for which the costs might have to come from family budgets.

Of the 519 usable survey forms used in the analysis, 374 respondents answered this question: 285 Australians answered it, while 29 did not. The question was optional to foreigners, but 89 of them answered it (116 did not). Although making the willingness to pay question optional to foreigners reduced the response rate, this was felt to be appropriate because it related to the conservation of sea turtles in Australia. This also makes the payment vehicle as realistic as possible, because Australian government action can target Australians more effectively than foreigners. Of the respondents who answered the valuation question, there were 71 zero bids (63 Australians and 8 foreigners) and 33 protest bids (25 Australian and 8 foreigners). The number of protest bids is not excessive. Jakobsson and Dragun²⁵ argue that a figure of 30% or more would be excessive and the percentage of protest bids here is well below this figure. Of the 71 zero bids, 25 Australians and 6 foreigners gave reasons for taking this stance: the reasons are given in Table 3. The percentage of zero bids for the study is also consistent with other studies.²⁶

It is clear that the reasons behind the zero bids of the 31 (8%) respondents were: because they had other commitments, such as making contributions to other charities; because they were unemployed; because they were pensioners or students; or because their present income was insufficient to make a contribution to sea turtle conservation.

A distinction can be made between those who gave zero bids and protest bids. Protest bids are given in order to protest against payment. Among the reasons why some respondents gave protest bids was the feeling that, because they were already paying taxes, the government should be expected to pay for conservation.

Those who gave non-zero bids (268) were willing to pay an average of Aus\$2.49 per week to protect sea turtles in Australia. When the 71 zero bids are included, the average amount the visitors were willing to pay was Aus\$1.97 dollars per week. On average, foreigners were willing to pay a slightly higher figure for sea turtle conservation than Australians. This may be due to the

Table 3. Reasons for zero bids.

Reason	Number
Contribute to other charities	9
Unemployed	3
Pensioner	5
Cannot afford	13
Student	1
<i>Total (25 Australians and 6 foreigners)</i>	<i>31</i>

favourable exchange rate enjoyed by many foreign visitors to Australia at the time of the survey, especially those from the UK and North America. For example, Australians (when zero bids were included) were willing to pay Aus \$2.15 a week, while foreigners (when zero bids were included) were willing to pay Aus\$2.53 a week. Australians (without zero bids) were willing to pay Aus \$2.43, while foreigners (without zero bids) were willing to pay Aus\$2.67 a week. It can be inferred that the visitors to Mon Repos for the 1999/2000 season involved in sea turtle viewing would be prepared to pay at least Aus \$250,000 per year to protect sea turtles in Australia. When this is combined with the willingness to pay by turtle watchers from previous years, plus the willingness of some non-visitors to pay for protection of turtles, considerable collective economic value is clearly placed on the conservation of Australian marine turtles. This can also be expected to translate into political support for government programmes for the conservation of marine turtles.

Factors influencing the amount visitors are willing to pay

It is useful to determine the probable factors that influence visitors' willingness to pay for sea turtle conservation, especially with regard to raising money for conservation purposes. Once the relevant factors are identified it is then possible to target them to obtain the best possible results. These factors could also highlight the conservation reactions of visitors to *in situ* conservation sites.

In order to do this, a Tobit regression analysis was carried out using the field survey data. For the regression analysis 330 observations are used. The protest bids were excluded from the sample as recommended, and so were the other variables that had missing data.²⁷ A Tobit analysis is used in preference to Ordinary Least Squares (OLS) because it is the more theoretically appropriate method for willingness to pay data sets.²⁸ This is because the dependent variables are limited in their range:²⁹

$$y_i^* = x_i' \beta + u_i, \quad y_i = y_i^*, \quad \text{if RHS} > 0 \\ y_i = 0, \quad \text{otherwise} \quad (1)$$

where y_i^* is a non-observable random variable.

The data were transformed into square roots and the diagnostic tests showed no problems with heteroscedasticity (see Appendix 2 for diagnostic tests). The dependent variable comprises the Contingent Valuation willingness to pay bids to protect sea turtles visiting Australia to nest. The model used to analyse the data is as follows:

$$Y_i = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \mu_i \quad (2)$$

where:

Y_i = willingness to pay bids for the conservation of sea turtles that come to nest in Australia (includes zero bids);

X_2 = respondents' educational qualifications;

X_3 = respondents' income;

X_4 = seeing adult sea turtles/hatchlings;

X_5 = donations made at Mon Repos for sea turtle conservation; and

X_6 = influence of the Mon Repos experience.

Table 4. Regression results of the Contingent Valuation willingness to pay bids to protect sea turtles that come to nest in Australia.

Independent variable	Coefficient	Standard error	T-ratio
Respondents' educational qualifications	0.334	0.135	2.484****
Respondents' income	0.233	0.962	2.418****
Seeing sea turtles/hatchlings	0.299	0.226	1.331*
Donations made at Mon Repos for sea turtle conservation	0.267	0.111	2.422****
Influence of the Mon Repos experience	0.173	0.129	1.327*
Constant	0.615	0.408	1.509(-)*

****and * indicate 1 and 10% levels of significance, respectively, for a one tailed test.

71 observations at zero; 259 non-zero observations; n = 330

The results shown in Table 4 suggest that the respondents' level of education, income, seeing sea turtles or hatchlings, donations made at Mon Repos for sea turtle conservation and the Mon Repos experience are factors that positively influence the willingness to pay to protect sea turtles that come to nest in Australia. The regression results are consistent with the hypothesis that better education, higher income, seeing adult turtles or hatchlings, donations made at Mon Repos for sea turtle conservation and the Mon Repos experience are factors that influence the willingness to pay bids to protect sea turtles that come to nest in Australia.

From Table 4, it can be seen that the level of educational qualifications is the most important influence (coefficient 0.344) on willingness to pay to protect the turtles, followed by income (coefficient 0.233). The T-ratio for both variables is highly significant. Both variables are liable to be correlated, but not perfectly so. Note also that whether or not visitors saw marine turtles was of importance for willingness to pay (coefficient almost 0.3), although the level of significance was 10%. There was much less apparent impact from whether or not visitors expressed satisfaction or dissatisfaction with their Mon Repos experience. This provides some indication that increased support for wildlife conservation following a tourist visit, amongst other factors, also depends upon whether or not the wildlife is seen. Furthermore, additional regression analyses strongly indicate that seeing adult sea turtles/hatchlings is an important factor likely to influence the reporting of sick turtles.³⁰

Change in attitudes and actions of visitors to turtle conservation

Apart from possible positive impacts of ecotourism on the willingness of tourists to contribute financially to the conservation of species (in this case marine turtles), ecotourism can result in tourists developing more positive attitudes towards species conservation and their willingness to take actions (additional to greater financial contributions) to promote such conservation. This is clear from the Mon Repos study.

As a result of the first-hand encounters of visitors with sea turtles and/or hatchlings, the task of demonstrating the plight of sea turtles and the threats

facing them may become more effective. Data collected from the survey revealed that the majority of respondents (98%) were convinced that more action should be taken to minimize threats to sea turtles. It was revealed that the desire to protect sea turtles increased after visiting Mon Repos. The reasons cited included: sea turtles are unique (90%); they are ancient (66%); their recreational value (32%); and they can generate income (23%). It was also found that, after the visitors' experience at Mon Repos, they were likely to report the sighting of sick turtles (66%), injured sea turtles (66%), and poaching or mistreatment of sea turtles (88%).

Furthermore, it was revealed that sea turtle viewing was a very satisfying experience and the majority of respondents (85%) wanted to return to Mon Repos. The large recreational surplus confirms the satisfaction that was gained from viewing sea turtles at Mon Repos.³¹ Furthermore, a high proportion of respondents (98%) said that they would talk to their friends and relatives about their turtle-watching experience at Mon Repos, and presumably recommend a visit to them.

Apart from the above-mentioned benefits, there are potential benefits to be derived from sea turtle viewing at Mon Repos. Many visitors indicated their desire to subscribe to a newsletter with updates on the conservation work carried out at Mon Repos and elsewhere with regard to sea turtles. Some respondents indicated the need to form a 'friends of sea turtles' group that could be involved in conservation work. Support from such a group can be effective in promoting the message of conservation: a good example is the Royal Society for the Protection of Birds (RSPB) in the UK, which started as a small group and today has grown to over a million members. The RSPB is now one of the main influential conservation pressure groups in Britain and it also influences conservation decision making in Europe. Respondents also indicated their desire to have more access to material on sea turtles, current threats to sea turtles in Australia and elsewhere, and the conservation measures undertaken.

Sea turtle viewing also raises the possibility of introducing a scheme whereby sea turtles can be adopted by the public in return for a donation. Updates can be provided to sponsors whenever information is available. With sea turtle tagging and monitoring taking place, the provision of information to those adopting sea turtles becomes possible.

While economic benefits are useful to generate political support, the education imparted can in turn aid conservation. For example, the survey revealed that many visitors learned about the threats to sea turtles and their biology for the first time because of the experience at Mon Repos. The sea turtle viewing programme and associated museum display and presentations increased visitors' knowledge about threats such as sea turtles being harvested for consumption (56%), collecting of eggs for consumption (52%), threats from prawn trawlers (64%), entanglement in crab pots (55%), boat strikes (60%), fox/wild pig predation (59%), natural predators, like goannas (45%), natural diseases (37%), and pollution of waterways (53%).

Knowledge gained at Mon Repos from presentations by rangers about the biology and conservation of marine turtles, as well as associated museum displays, was most likely reinforced by visitors viewing sea turtles in their natural setting, and in some cases by their touching the carapace of a sea turtle when signalled to do so by the QPWS ranger-in-charge. This direct or hands-

on experience helps to create empathy with the turtles. Thus most ecotourists involved in turtle watching at Mon Repos increased their support for conservation of marine turtles as a result of their total experience.

Concluding comments

As just indicated, educational and interpretative facilities plus the experience of seeing turtles in a natural setting at Mon Repos have been shown to be very effective in increasing the willingness of tourists to pay for the conservation of sea turtles, in strengthening pro-conservation attitudes towards the protection of sea turtles, and in encouraging tourists to take positive actions to help conserve them. Wildlife-based ecotourism managed in a similar manner can be expected to have similar consequences. It is interesting to observe that willingness to pay to conserve sea turtles also depends positively on whether adult sea turtles/hatchlings are seen. This indicates that a decline in marine turtle populations, and hence in the chances of ecotourists seeing them, is likely to reduce the willingness of tourists to pay to conserve the species. Thus, as mentioned by Tisdell and Wilson,³² support for conservation of species is related to the populations of those species. If the population declines below a critical threshold, social support for conservation may decline.³³ At least, this appears to be so for support generated via the ecotouristic factor. However, society may still value sea turtles for their existence values.³⁴ As Krutilla,³⁵ who first introduced this existence concept, argued, there are two sources for this non-use value – one is bequest value, which is a desire to leave the resource for future generations, and the other is the existence value, which is related simply to knowing that the resource exists. Existence value is independent of any current or expected future value, but people still value a resource even if they do not use it.³⁶ As Jakobsson and Dragun³⁷ state, ‘the knowledge that species such as blue whales and giant pandas may exist may provide value, even if the possibility of seeing one is very small or non-existent’.

An anonymous reviewer brought to our attention Fisher’s recent discussion of the Contingent Valuation method³⁸ and that of Fredman,³⁹ and claimed that the use value of a species would decline as its population dropped, but that its existence value would remain constant. While the former hypothesis has substance, the latter is much more contentious. Fredman⁴⁰ specifically illustrates these relationships in Figure 1 of his article. While a comprehensive critique of his theory cannot be given here, his basic assumption seems to be that existence value has an objective basis and not a subjective basis, and is independent of individuals’ knowledge and experiences with a species. Furthermore, his results are not based on empirical evidence. We do not accept the above assumption, although we believe Fredman’s analysis to be important.

Economists have little knowledge in practice of the dynamics of variations in existence valuations (or more generally non-use valuations) made by individuals, but, in our view, these valuations for the conservation of species (or natural environments) are influenced by the prior experiences of individuals. There is, for example, convincing evidence that prior knowledge influences such valuations,⁴¹ and knowledge is partly a product of experience. But

experience yields much more than knowledge. For example, it results in various types of psychological conditioning liable to compliment Contingent Valuations. Therefore, in our view, both use and non-use values, including the existence values of a species, can decline in *some* cases when the population level of a species drops below critical levels, because knowledge of and experience with the species decreases as a result of reduced human contact with it. It is necessary to undertake further empirical research to determine the inter-relationships among experience, knowledge and such valuations.

In conclusion, this study indicates that the whole package involved in the ecotouristic experience plays a positive role in building support for wildlife conservation. This package cannot easily be duplicated in aquaria, zoos and museums because all involve some artificiality. They are to some extent synthetic, though they have valuable educational and interpretive features, and can play a positive role in promoting conservation ideals. One suspects, however, that their pro-conservation impact on tourists/visitors is likely to be less than in the case of ecotourism based on non-captured species. But this hypothesis has yet to be tested.

Endnotes

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33. This provides an example of the concept of a *social* safe minimum standard as espoused in S. V. Ciriacy-Wantrup, *Resource Conservation: Economics and Policies*, 3rd edition, Division of Agricultural Science, University of California, Berkely, CA, 1968, and a discussion in I. Seidl and C. Tisdell 'Neglected features of the safe minimum standard: socio-economics and institutional dimensions', *Review of Social Economy*, 2001, forthcoming. They emphasize, as did Ciriacy-Wantrup, that the social safe minimum standard for a species often differs from the biological safe minimum standard.
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Appendix 1

Contingent Valuation questions from the survey

Conserving sea turtles costs money. In order to meet the costs of conservation, money will have to be raised by the government (please bear in mind that this is only one of many environmental issues which may cost you money and that this may have to come from your/family budget). These questions are being asked to determine how much individuals are *willing to pay for sea turtle conservation* and *not* to raise money for Mon Repos.

8.4 Would you be willing to have your take-home income reduced by \$2 dollars a week, that is \$100 per year, for the next ten years to protect sea turtles that come to nest in Australia?

Yes No If No, go to Q.8.3

8.2 What if the cost of protecting sea turtles turned out to be higher, would you be willing to have your take-home income reduced by \$5 dollars a week, that is \$250 per year, for the next ten years to protect sea turtles that come to nest in Australia?

Yes No

8.3 If the cost of protecting sea turtles turned out to be lower than indicated above, would you be willing to have your income reduced by \$1 dollar a week, that is \$50 per year, for the next ten years?

Yes No

If No, what are the reasons 1 2 3

8.4 In order to protect sea turtles that come to nest in Australia what is the *maximum* amount you would be willing to pay per week for the next ten years? (Please bear in mind that this is only one of many environmental issues which may cost you money and that this may have to come from your/family budget).

\$ dollars a week

Appendix 2

Diagnostic tests for the regression data

Test statistics	LM version	F version
A: Serial correlation	CHSQ(1)= 1.1802[0.277]	F(1,324)= 1.1594[0.282]
B: Functional form	CHSQ(1)= 1.6392[0.200]	F(1,324)= 1.6125[0.205]
C: Normality	CHSQ(2)= 2.1742[0.337]	Not applicable
D: Heteroscedasticity	CHSQ(1)= 0.018899[0.891]	F(1,329)= 0.018786[0.891]

A: Lagrange multiplier test of residual serial correlation.

B: Ramsey's RESET test using the square of the fitted values.

C: Based on a test of skewness and kurtosis of residuals.

D: Based on the regression of squared residuals on squared fitted values.