

## The incidental ecotourist: measuring visitor impacts on endangered howler monkeys at a Belizean archaeological site

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### SUMMARY

Conservationists are missing opportunities to protect species at mass tourism sites where wildlife itself is not the main tourist attraction. At such locations are 'incidental ecotourists', i.e. tourists with multiple interests who encounter wildlife or fragile ecosystems inadvertently. A case study from Lamanai Archaeological Reserve, Belize, reveals the motivations of incidental ecotourists and their impact on an endangered primate species, the black howler monkey, *Alouatta pigra*. Four hundred and seventy-one visitors were surveyed to assess their travel goals, conservation commitments, and reactions to viewing howler monkeys. Data were also collected on the behaviour of tourists and monkeys during encounters. More intense tourist interactions with howler monkeys were correlated with the number of tourists and the duration of the encounter; guided parties interacted more intensely than unguided parties. Tourists were largely unaware that these interactions may harm the howler monkeys. Qualitative observations of howler response to tourists suggest short- and long-term negative impacts. These impacts could be mitigated through more effective guide training, limiting tourist group size, and increasing entrance fees at the Reserve. Improving environmental education may reduce impacts and motivate some tourists to become advocates for conservation of endangered species.

*Keywords:* ecotourism, visitor impacts, howler monkeys, Mayan ruins, environmental education, attitudes

### INTRODUCTION

Ecotourism promises to generate economic and political support for wildlife conservation without degrading the natural environment. The past two decades have seen a proliferation of ecotourism operations, often in impoverished rural areas in the tropics where wildlife must 'earn its way' to survive (Shackley 1996; Wilkie & Carpenter 1999; Archabald & Naughton-Treves 2001). The explosive growth of ecotourism in developing countries ought to bode well for

wildlife conservation, but all too often tourism profits have not been reinvested in wildlife protection (Lindberg *et al.* 1996; Brandon 1996; Tershy *et al.* 1999). Worse still, tourism activities at some sites threaten wildlife survival leading some observers to dismiss ecotourism as a legitimate conservation strategy (Kinnaird & O'Brien 1996; Isaacs 2000).

Assessing the general value of ecotourism for wildlife conservation is difficult given the diverse experiences around the world. Moreover, as the industry grows, the definition of ecotourism has expanded to include multiple, often conflicting objectives (Brandon & Margoluis 1996; Ross & Wall 1999). Some experts argue that the term 'ecotourism' should refer only to tourism activities where long-term conservation is the aim, and they juxtapose this with nature-based tourism, in which wildlife or other natural features draw tourists who may or may not contribute to conservation programmes on site (Brandon & Margoluis 1996, p. 28; Ceballos-Lascurain 1996). Such rigorous definitions of ecotourism expose destructive activities masquerading as environmentally-sensitive programmes. But while conservationists search for 'pure' ecotourism, too often they fail to recognize that the majority of tourists visiting developing countries have multiple interests and may visit natural areas only as an add-on to a general tour (Boo 1990; Brandon 1996). Many tourists come across wildlife or natural forests inadvertently as they visit archaeological ruins, temples and beaches (Zhao 1991; O'Leary 1993; Struhsaker & Siex 1996); the impacts of such incidental contact on wildlife have been largely neglected in the research literature (Higham 1998). Here we call these visitors 'incidental ecotourists', and argue that their role as threats or supporters of wildlife conservation deserves more attention, particularly given that mass tourism overshadows ecotourism in numbers and geographic range. We argue that conservationists must work to maximize wildlife survival and minimize threats even in sites where wildlife itself may not be the primary attraction.

Environmental education, when offered to ecotourists, can ameliorate the impacts of tourism activities on wildlife and can help build a conservation constituency among tourists (Forestell 1993; O'Leary 1993; Norris *et al.* 1998; Orams & Hill 1998). In theory, by learning more about a species or ecosystem, more tourists will come to support measures to conserve it (Ceballos-Lascurain 1996; Shackley 1996). Successful environmental education programmes go beyond simply identifying species; they emphasize ecological

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interactions and they challenge and empower tourists to change their behaviour (Forestell 1993). However, many ecotourism sites lack signs and explicit instructions regarding minimal impact behaviour (Farrell & Marion 2001). Moreover, educational efforts may not reach the growing numbers of incidental ecotourists who encounter wildlife inadvertently.

Tourism that focuses on wild primates deserves special attention given primates' strong attraction of tourists and their sensitivity to human disturbance (Lee *et al.* 1986; Lippold 1990; Grieser 1996; Kinnaird & O'Brien 1996; de la Torre *et al.* 2000). The presence of tourists can stress primates and cause long-term behaviour modifications (Kinnaird & O'Brien 1996; de la Torre *et al.* 2000). Tourists may also hinder primates' access to important food resources (Dunstone & O'Sullivan 1996). High noise levels associated with heavy tourism were associated with lowered reproductive success in pygmy marmosets (de la Torre *et al.* 2000). Howler monkeys move away from areas frequented by tourists and their reproduction declines with increasing levels of tourism (Lippold 1990). Moreover, contact between tourists and primates carries the risk of disease transmission (Foster 1993; McNeilage 1996; Wallauer 1996).

Tourists do not encounter wild primates only in remote tropical rainforests; incidental ecotourists at archaeological and cultural sites and beaches also frequently interact with wild monkeys. In China, Tibetan macaques (*Macaca thibetana*) residing at Buddhist temples are regularly fed by monks and visiting tourists, and are becoming increasingly aggressive toward tourists (Zhao 1991). Visitors to Gibraltar feed sweets to Barbary macaques, resulting in obesity and reduced lifespan (O'Leary 1993). Tourists in Zanzibar stop to view endangered red colobus monkeys (*Procolobus kirkii*) on the road to the beach, putting the monkeys and themselves at risk of disease transmission (Struhsaker & Siex 1996). Similarly, tourists driving cars around southern Kenyan beach resorts strike and kill endangered Angolan colobus monkeys (*Colobus angolensis palliatus*; P. Kahumbu, Director for Science, Kenya Wildlife Services, personal communication 2001).

In this paper, we examine 'incidental ecotourism' at Lamanai Archaeological Reserve, Belize. This study has five objectives. First, we identify the characteristics of an incidental ecotourist by comparing Lamanai visitors to accepted characteristics of ecotourists. Most definitions of ecotourism agree on at least two points: ecotourists are motivated by the desire to view and learn about natural areas and/or wildlife (Boo 1990; Epler Wood *et al.* 1991; Ceballos-Lascurain 1996; Kinnaird & O'Brien 1996), and ecotourists frequently engage in conservation-oriented behaviour (Brandon 1996; Wallace & Pierce 1996; Hvenegaard & Dearden 1998). We compare the attitudes and behaviour of three visitor groups at Lamanai to assess whether they fit these standards of ecotourism.

Second, we investigate the impacts of incidental ecotourists on local wildlife by quantifying tourist parties'

interactions with groups of endangered black howler monkeys (*Alouatta pigra*). We use self-reported measures as well as systematic observations of human-monkey interactions. Our third objective is to gain an understanding of incidental ecotourists' attitudes toward wildlife conservation by examining their opinions of whether these interactions may harm the howler monkeys. Fourth, we analyse the level of environmental education offered to these incidental ecotourists through systematic observation of guided tourist parties. Finally, we offer a qualitative assessment of tourism's impacts on howler monkeys, and make recommendations for reducing this impact. To address these aspects of incidental ecotourism at Lamanai, we use multiple research methods including a visitor survey, participant observation of tourist parties, and howler monkey behavioural observations.

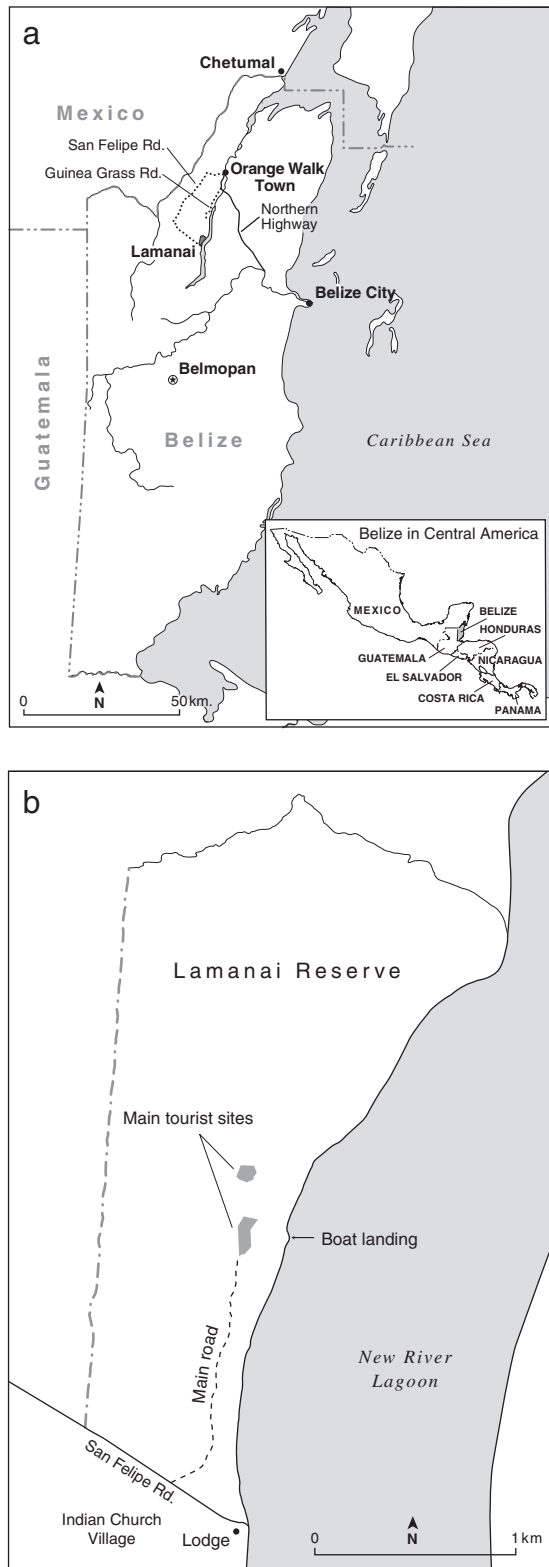
## STUDY SITE AND METHODS

### Study site

Tourism is of exceptional economic importance to Belize (25% of gross domestic product), and the government is committed to promoting environmentally-sustainable tourism. Belize's diverse forests, proximity to North America, and relatively late economic development, which caused the country to be bypassed by Caribbean resort development in the 1960s-1980s, contribute to the country's attraction as a nature tourism destination (Gould 1999). In addition, nearly 35% of the nation's lands are designated as protected areas. The Belizean government promotes eco-cultural tourism, defined as tourism with an environmental consciousness, which respects local cultures and traditions, and provides economic benefits for both rural and urban communities (Norris *et al.* 1998, p. 332).

In addition to Belize's extraordinary natural features, the country is a centre of ancient Mayan civilization. Belize's Mayan ruin sites are managed by the Department of Archaeology, under the auspices of the Ministry of Tourism and Youth. In the study year, 2000, 95 790 out of a total 186 883 tourists (51%) visited Belize's Mayan ruins, while 95 701 people (51%) visited the country's eight most popular national parks and reserves. Cultural/archaeological tourism has been growing, from 48 779 visitors to the Mayan ruins in 1995 to 99 755 visitors in 2001 (Belize Tourism Board 2002).

Our study site, Lamanai Archaeological Reserve, is the third most visited Mayan site in Belize. Lamanai is located on the west bank of the New River Lagoon in Orange Walk District (Fig. 1). Mayan people occupied the site from 1500 BC until the 19th century, through the Preclassic and Classic periods and the eras of Spanish and British occupation in the 16th-19th centuries (Belize Explorer 2002). The Department of Archaeology employs two full-time staff members who work as caretakers, museum curators and educators. In the study year, 2000, the entrance fees at the Reserve were BZ\$ 5.00 (US\$ 2.50) for international visitors, and entrance was free for Belizeans.



**Figure 1** Maps of (a) Belize and (b) the Lamanai Archaeological Reserve.

The ruins are located within the 400-ha Lamanai Archaeological Reserve. The vegetation within the Reserve is semi-evergreen seasonally dry forest dominated by broadleaf

species (such as *Guazuma ulmifolia*, *Spondias mombin*, *Stemmadenia donnell-smithii* and *Enterolobium cyclocarpum*) with pockets of palm (especially *Orbigyna cohune*; Matola 1998). The forest provides habitat for diverse wildlife; for example 370 bird species have been recorded in and near the Reserve (Lamanai Outpost Lodge 2002a).

#### *Tourists at Lamanai*

The Mayan ruins at Lamanai attract visitors year-round with a peak from January to March. Annual visitation at Lamanai has increased from 10 336 in 1995 to 21 499 in 2000 (Belize Tourism Board 2002). As a result of the sevenfold increase in cruise ship passengers visiting Belize (Fig. 2), Lamanai frequently had >200 visitors per day in the 2000 season (Belize Department of Archaeology, unpublished data 2001). Most tourists arrive at the site from major resort destinations, travelling with guiding companies by powerboat along the New River.

Tour guides in Belize must obtain a licence by completing a 30-day National Tour Guide Training Programme, which includes natural and cultural history, guiding 'etiquette' and an internship. Independent guides and tourism companies found without a licence are fined (up to BZ\$ 500 or BZ\$ 5000, respectively), or are charged with six months in prison (S. Rivero, Product Development Officer, Belize Tourism Board, personal communication 2002). In 1999, the Lamanai Outpost Lodge (located 0.5 km from the archaeological site) hosted an additional guide-training workshop attended by 15 guides who operate at Lamanai (M. Howells, owner of Lamanai Outpost Lodge, personal communication 2001).

We identified three broad types of tourism operations at Lamanai. The first type 'Mass' was composed of international visitors who arrived by boat at the main ruins and rarely stayed longer than three hours. Mass tours had up to three non-local guides and did not stray from the main ruins site. The second type of tourism operation we term 'Ecolodge' tourism. This group included guests at the Lamanai Outpost Lodge, who used woodland trails or small boats to access the site, as well as visitors from a second lodge in the region (Programme for Belize). Both lodges billed themselves as ecotourism operations (Lamanai Outpost Lodge 2002b; Global Travel Club 2002). These ecolodge parties were often smaller than the mass tourism groups, and were guided by foreign or local naturalists, biologists or archaeologists. These tours tended to be longer in duration, and often ranged further into the Reserve. The third type of tour 'Unguided' was more variable in party size and was often composed of Belizean nationals. These tourists often arrived by road, and were likely to range further into the Reserve. If guides were present, they did not make themselves apparent by leading, narrating or answering questions. Often large unguided groups broke into small fractions that travelled independently within the site.

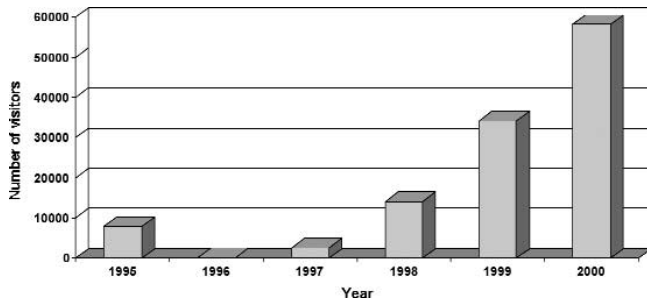


Figure 2 Annual number of cruise-boat visitors to Belize, 1995–2000.

#### *Black howler monkeys at Lamanai*

Lamanai Reserve is home to approximately 17 stable groups of howlers at a density of 28.8 individuals  $\text{km}^{-2}$  (Treves 2001). Groups typically contained two adult females, one adult male and their young, yielding a median size of six individuals (range 2–10). This is characteristic of the species across its geographic range (Horwich & Johnson 1986). However, at Lamanai, it is not uncommon for groups to contain two adult males (mode = 1, range 1–3). The howler groups faced varied intensities of tourism depending on their location in the Reserve. The majority of visitors remained near the ruins, where they traversed the ranges of no more than four howler monkey groups. Other tourists ventured further and came into contact with black howlers in outlying areas.

The genus *Alouatta* is widespread in the Neotropics but black howler monkeys are restricted to Belize and the Peten region of Guatemala and the Yucatan peninsula. Thus they are locally abundant but considered threatened because of their narrow geographic range (CITES Appendix II). They appear to depend on forest within a few hundred metres of water in low altitude areas (less than 400 m) (Horwich & Johnson 1986; Ostro *et al.* 1999). Black howlers eat mainly fruit and leaves, foraging in stable groups composed of several breeding females and their young, accompanied by one or more unrelated, breeding males (Horwich 1983; Horwich & Johnson 1986; Silver *et al.* 1998; Treves 2001). The genus gets its name from its roaring vocalization, emitted in its most elaborate and loudest form by the adult males. Roars are produced under a variety of circumstances and serve various socioecological functions including territorial advertisement, mate attraction and intimidation of rivals or enemies. The roar can be heard over several kilometres and is repeated in series of up to several hundred individual roars (Horwich & Gebhard 1983; Treves & Brandon 2003).

#### Methods

To examine incidental ecotourism at Lamanai Reserve, we used multiple research methods. We examined tourist

characteristics and attitudes through a visitor survey. We evaluated the level of environmental education provided by Lamanai tour guides through participant observation of tourist parties. We quantitatively recorded guides' and tourists' interactions with howler monkeys, and we studied howler monkeys' responses to tourists through qualitative observations of howler behaviour.

#### *Tourist survey*

We administered surveys during both the high-use season (13 January–1 March 2000) and low-use season (6 June–26 July 2000). On each scheduled survey day, researchers stayed at the picnic area, which was the major congregating site for tourists in the Reserve, from approximately 09:00 hours, when the first tourist group arrived, until the last tourists left late in the afternoon. One in five tourists (over age 15) was randomly selected to fill out the questionnaire, which was printed in both English and Spanish. Respondents were selected within each party; for instance if the group had 20 tourists, we administered surveys to four randomly selected people. Since the proportion of males and females was relatively even among tourist parties, this method did not result in gender bias. The refusal rate was 12% in the high season and 10% in the low season and was usually attributed to lack of time or disinterest by the tourists.

The total number of visitors to Lamanai during the first sample period (winter) was 2464 (Belize Department of Archaeology, unpublished data 2001); we surveyed 229 (9%). During the second sample period (summer), 1293 tourists visited Lamanai, and we surveyed 242 (19%). The differences in sample rate between the two periods is likely to be due to the difficulty in surveying cruise-boat parties, who frequently returned to their boats immediately after the tour. No cruise-boat parties were observed during the summer sample period, whereas 19% ( $n = 44$ ) of the respondents in the winter sample were cruise-boat passengers. Because of the difficulty in surveying them, the cruise-boat passengers were likely to be under-represented in this study.

To define incidental ecotourists in the Lamanai context, the survey included questions about motivations for visiting Lamanai, self-reported tourist type, expectations for viewing wildlife, reported level of environmental concern, and past conservation-supporting behaviour. We compared these characteristics among the three types of tourists, namely mass, ecolodge, and unguided.

Motivations for visiting Lamanai were measured by an open-ended question: What were your main reasons for visiting Lamanai Reserve? Respondents were asked to categorize themselves as one of the following tourist types: general tourist, nature tourist/ecotourist, archaeological tourist, backpacker/hiker, birdwatcher, or other tourist type. Tourists were asked if they expected to view howler monkeys at Lamanai, did not expect to view howler monkeys, or did not know what to expect. Level of environmental concern was measured on a four-point scale from 'very little concern' to 'strong concern,' as compared to other social and political

issues. Past conservation-supporting behaviour was measured by three questions: (1) Are you a member of any conservation or wildlife organizations? (2) Have you donated to a conservation cause in the past year? and (3) Have you ever donated to a conservation cause in Belize?

The survey also examined conservation attitudes within the context of the Lamanai tour. Visitors were asked to report if they saw anyone (guide or tourist, in their party or another party) conduct any of the following behaviours towards the howler monkeys, and to indicate whether they believed the behaviours they witnessed could harm the animals: (1) shake tree branches to get a response from the monkeys, (2) try to make the monkeys roar, (3) offer food to the monkeys or (4) make physical contact with the monkeys.

Tourists were also asked to report any other damage they perceived to the wildlife or environment at Lamanai. Finally, the questionnaire solicited demographic information and other details about the tourist experience including how they first learned of Lamanai, length of stay, other sites visited, mode of arrival at the site and satisfaction with the tour.

#### *Participant observation of tourist parties*

To evaluate the level of environmental education provided by Lamanai tours we completed 24 tourist party observations: 15 in the high season between 6 January and 24 February 2000, and nine in the low season between 7 June and 7 July 2000. To avoid biasing our results and to establish a positive rapport with the guides, we aimed to follow parties with as many different tour guides as possible. Two guides refused to allow an observer to accompany their tours. We did not follow any unguided parties (which were often Belizean), biasing our participant observations toward international tourists.

Along the tour, the observer recorded all comments by the guide regarding the ecology, flora and fauna of the rainforest. We did not systematically check the accuracy of the guides' ecological and conservation knowledge. The educational comments were grouped into five qualitative categories:

ID = identification of a plant or animal, possibly mentioning traditional and/or current uses. Example: 'This is the *copal* tree. The Mayans burned its sap for incense.'

Behaviour = comment on plant or wildlife behaviour or physiology. Example: 'The howler monkeys roar to defend their territory.'

Ecology = comment on ecological relationships between two or more organisms, or comment about the ecological community as a whole. Examples: 'The strangler fig is a parasite on the host tree, eventually killing the host.' 'We are now entering a broad leaf secondary growth forest.'

Conservation = mention of current or historic conservation issues, or humans' role in altering the environment. Examples: 'Mayan civilization destroyed much of its

environment.' 'The howler monkeys are endangered due to habitat loss and hunting.'

Code of conduct = direct or indirect reference to a 'code of conduct' for tourist behaviour at Lamanai, either for safety or environmental reasons. Examples: 'The howler monkeys came to the ground and a curious tourist got bitten.' 'Tourists are causing erosion by climbing the temples.'

In addition to assessing the level of environmental education provided by tour guides, we systematically recorded tourists' and guides' interactions with black howler monkeys. During the howler group follows (described below), at least one observer devoted full attention to the tourist party and recorded the number of tourists and guides, single sex or mixed-sex composition of the party, the duration of their time visible to the observer and the quality of the interaction with the monkeys. Tourist-monkey interactions were coded into the following exclusive categories:

- 0 = none = no member of human party notices monkeys
- 1 = observe = observation of monkeys only
- 2 = elicit (mild) = low-amplitude, brief vocalization by humans directed at monkeys
- 3 = elicit (moderate) = loud or lengthy vocalization by humans directed at monkeys
- 4 = elicit (intense) = long and loud vocalization by humans directed at monkeys, accompanied by missiles or shaking branches

Observations were recorded separately for guides and tourists. The interactions were ranked from 0 = none to 4 = intense elicit in order to test relationships between guide and tourist interactions and other variables, including party size and the duration of the encounter.

#### *Black howler monkey behavioural observations*

We have studied the behavioural ecology of the black howler monkeys of Lamanai Reserve systematically since 1997. All the study animals were fully habituated to our presence before collection of the data presented here, in part due to heavy tourist visitation and to research undertaken since 1993 (Gavazzi 1995). Furthermore, hunting of howler monkeys has been unheard of for at least 25 years in this area (B. Esquivel, 25-year resident of Indian Church Village, personal communication 2001). However, when three or more researchers were present, monkeys tended to move away from observers and higher up in the canopy (Treves & Brandon 2003).

Howler monkey groups were followed from dusk to dawn on a rotating schedule, with each group being followed for three to four days in succession. As a result, observers were often present when the monkeys were exposed to a tourist party. When tourist parties were audible or visible to the observers following howler groups, we recorded aspects of the monkeys' behaviour including movement, vigilance, and

roaring. In this paper we present qualitative observations of monkey response.

#### Statistical analysis

Quantitative data presented in this paper include the tourist survey and the coded interactions with howler monkeys. Missing values were left out of the tourist survey analysis, and  $n$ -values and degrees of freedom differ among variables and tests because some respondents skipped questions. For survey analysis, we used independent sample  $t$ -tests when independent variables were bivariate and dependent variables were continuous, and  $\chi^2$  tests when independent and/or dependent variables were categorical. For the analysis of human-monkey interactions, Mann Whitney and Kruskal-Wallis tests were used when the assumption of constant variance was not met. We used multivariate linear models for both analyses when the assumption of constant variance was met. For all analyses, statistical significance was set at  $p < 0.05$ .

## RESULTS

### Visitor characteristics

The modal visitor to Lamanai Reserve was a USA citizen (75%), with a Bachelor's degree (34%) or advanced degree

(30%) and a household income of US\$ 50 000 or more (75%; median income US\$ 75 000–US\$ 100 000). Belizeans and Europeans each constituted 9% of the sample, and other Latin Americans, Canadians, Asians and Australians made up very small proportions of the visitor population. Men and women visited Lamanai in roughly equal numbers (52% female, 48% male). Tourist age followed a nearly normal distribution, with relatively even proportions in their twenties (17%), thirties (24%), forties (20%), fifties (19%) and sixties or older (13%).

Our survey sample was composed of 325 mass tourists (74%), 85 ecolodge tourists (19%), and 30 unguided tourists (7%) (31 tourists were not categorized, and therefore were left out of the analysis). The mass tourists originated from San Pedro Town on Ambergris Caye (25%), cruise boats (14%), inland resorts (7%) and other or unspecified locations (54%). Of the 85 ecolodge tourists, 45 (53%) were Programme for Belize participants and 40 (47%) were staying at the Lamanai Outpost Lodge. Of the unguided tourists, 67% were Belizean and 70% arrived at Lamanai by road. Forty-two per cent of Belizean tourists had no tour guide, compared to only 5% of international tourists ( $t = 8.04$ ,  $df = 426$ ,  $p < 0.001$ ).

Visitors reported high satisfaction with Lamanai Reserve; 95% stated that they would either recommend or strongly recommend Lamanai to others. Visitors who took a guided

**Table 1** Incidental ecotourist characteristics of Lamanai Reserve visitors. \* Multiple responses were sometimes given as reasons for visiting; therefore the total adds up to greater than 100%.

Characteristic	% Mass tourists ( $n = 325$ )	% Ecolodge tourists ( $n = 85$ )	% Unguided tourists ( $n = 30$ )	$\chi^2$
<i>Main reason for visiting Lamanai Reserve*</i>				
Mayan ruins/history	66	49	57	7.56 ( $p = 0.023$ )
Jungle/rainforest	14	5	17	5.07 ( $p = 0.079$ )
Wildlife	10	9	13	0.35 ( $p = 0.839$ )
Part of tour	9	15	0	5.63 ( $p = 0.060$ )
Education/study	4	15	13	16.30 ( $p < 0.001$ )
Birdwatching	2	8	0	7.86 ( $p = 0.020$ )
Howler monkeys	2	0	4	2.43 ( $p = 0.297$ )
<i>Tourist self-categorization</i>				43.51 ( $p < 0.001$ )
General tourist	51	21	40	
Nature tourist/ecotourist	21	33	8	
Archaeological tourist	13	20	16	
Backpacker/hiker	10	7	24	
Birdwatcher	1	6	4	
Other tourist type	5	12	8	
<i>Expectation for viewing howler monkeys at Lamanai</i>				12.17 ( $p = 0.016$ )
Expected to see howler monkeys	50	69	68	
Didn't know what to expect	29	20	18	
Didn't expect to see howler monkeys	21	11	14	
<i>Level of environmental concern</i>				18.47 ( $p = 0.005$ )
Strong concern	44	54	36	
Moderate concern	43	41	28	
Slight concern	13	5	36	
<i>Member of conservation organizations</i>	27	60	10	34.58 ( $p < 0.001$ )
<i>Donated to conservation cause in past year</i>	54	66	36	8.09 ( $p = 0.017$ )
<i>Ever donated to conservation cause in Belize</i>	8	18	29	15.15 ( $p < 0.001$ )

tour reported high levels of satisfaction with their tour guides: 90% rated their guide very good or excellent on knowledge of archaeology, 87% rated very good or excellent on environmental knowledge, and 91% rated very good or excellent on enthusiasm. Ecotourists rated their tour guides higher than mass tourists did on knowledge of archaeology ( $t = 2.617$ ,  $df = 358$ ,  $p = 0.009$ ) and on enthusiasm ( $t = 3.784$ ,  $df = 355$ ,  $p < 0.001$ ).

### Incidental ecotourists

Our first objective was to compare Lamanai visitors to generally accepted characteristics of ecotourists. We found that they tended not to fit the ecotourism standard. When Lamanai visitors were asked to state in their own words the main reason they chose to visit Lamanai, a majority mentioned the Mayan ruins (Table 1). By contrast, only 13% mentioned the jungle/rainforest, 11% mentioned wildlife, 3% mentioned birdwatching, and 2% mentioned viewing howler monkeys. These total 29%, but since many responses overlapped (i.e. some respondents mentioned both jungle and wildlife), only 20% of visitors actually reported being motivated by the natural environment. Ecotourists were less likely than mass tourists and unguided tourists to indicate the Mayan ruins as a reason for visiting ( $\chi^2 = 7.56$ ,  $df = 2$ ,  $p = 0.023$ ), and were significantly more likely than the others to be interested in birdwatching ( $\chi^2 = 7.86$ ,  $df = 2$ ,  $p = 0.020$ ). Ecotourists and unguided tourists were also more likely to be motivated by educational goals ( $\chi^2 = 16.30$ ,  $df = 2$ ,  $p < 0.001$ ).

Overall, more visitors to Lamanai Reserve considered themselves to be general tourists (45%) than eco/nature tourists (22%), birdwatchers (2%) and backpackers/hikers (10%) combined. Fifty-one per cent of the mass tourists categorized themselves as general tourists, whereas only 21% of ecotourists and 40% of the unguided tourists did so ( $\chi^2 = 43.51$ ,  $df = 10$ ,  $p < 0.001$ ). Ecotourists were more likely than the other two groups to consider themselves to be eco/nature tourists (33%) as well as archaeological tourists (20%) and birdwatchers (6%) (Table 1).

Many visitors were not aware that they would encounter the endangered black howler monkey on their tour of Lamanai. This was especially true among mass tourists, of whom 50% either did not expect to see howlers or did not know what to expect. Smaller numbers of ecotourists (31%) and unguided tourists (32%) were unaware of the presence of howler monkeys ( $\chi^2 = 12.17$ ,  $df = 4$ ,  $p = 0.016$ ; Table 1).

Lamanai visitors displayed a moderate level of conservation interest and involvement. Ecotourists reported higher levels of environmental concern than mass tourists and unguided tourists ( $\chi^2 = 18.47$ ,  $df = 6$ ,  $p = 0.005$ ). Overall, one-third of visitors surveyed claimed membership in conservation or wildlife organizations (Table 1). Membership was strikingly higher among ecotourists (60%) than among mass tourists (27%) and unguided

tourists (10%;  $\chi^2 = 34.58$ ,  $df = 2$ ,  $p < 0.001$ ). The most common membership organizations listed were: World Wide Fund for Nature (27), Sierra Club (21), The Nature Conservancy (18) and the Audubon Society (16). Overall, 55% of visitors reported donating to conservation or wildlife causes in the past year (Table 1). Ecotourists and mass tourists were more likely than unguided tourists to have donated to conservation causes in the past year ( $\chi^2 = 8.09$ ,  $df = 2$ ,  $p = 0.017$ ). However, unguided tourists were significantly more likely than the other two groups to have donated to conservation causes in Belize ( $\chi^2 = 15.15$ ,  $df = 2$ ;  $p = 0.001$ ) (Table 1). This is due to the fact that unguided tourists were most often Belizean nationals; these local visitors (41%;  $n = 14$ ) were significantly more likely than international visitors (8%;  $n = 29$ ) to have donated to Belizean conservation ( $t = 6.101$ ,  $df = 385$ ,  $p < 0.001$ ).

### Tourist encounters with black howler monkeys

The majority of visitors (82%) saw howler monkeys during their tour of Lamanai. Most tourists (43%) reported seeing two or more howlers in one group, while 22% reported seeing two groups of howlers. The most common encounter with howler monkeys consisted of observing them at a distance that was out of reach but observable with the naked eye (65%) (Table 2). The three tourist types did not differ significantly in the number of howlers they saw or the closest encounter they reported having with the animals.

Researchers recorded 207 observations of guides' and 354 observations of tourists' interactions with howlers (Table 3). The intensities of tourists' interactions and guides' interactions were highly correlated (Spearman  $r^2 = 0.79$ ,  $Z = 9.86$ ,  $p < 0.0001$ ). Tourist interaction was also correlated with the number of tourists ( $r^2 = 0.31$ ,  $Z = 4.06$ ,  $p < 0.0001$ ), but guide interaction was not ( $r^2 = 0.20$ ,  $Z = 0.19$ ,  $p = 0.85$ ). Both were correlated with the duration of the encounter

**Table 2** Tourist encounters with black howler monkeys at Lamanai Reserve. \* Self-reported on visitor survey.

Encounter*	<i>n</i>	%
<i>Number of howler monkeys seen</i>		
Zero	84	18
One	44	10
Two or more in one group	201	43
Two groups	103	22
Other number	31	7
<i>Closest encounter with howler monkeys</i>		
Neither observed nor heard any howler monkeys	25	6
Only heard howler monkeys	51	12
Observed at a distance (needed binoculars)	60	14
Out of reach but observable with the naked eye	284	65
Observed within arm's reach	16	4
Made physical contact with howlers	3	1

**Table 3** Guides' and tourists' interactions with howler monkeys. \* Recorded during howler group follows. \*\* None recorded during systematic observations but observed at least twice during study 1999–2000. \*\*\* None recorded during systematic observations but observed at least once during study 1999–2000.

Interactions with howler monkeys*	Guides		Tourists	
	<i>n</i>	%	<i>n</i>	%
None	42	20	86	24
Observation only	147	71	208	59
Mild elicit	5	2	26	7
Moderate elicit	11	5	24	7
Intense elicit	2	1	7	2
Physical contact**	0	0	0	0
Feeding + contact***	0	0	0	0

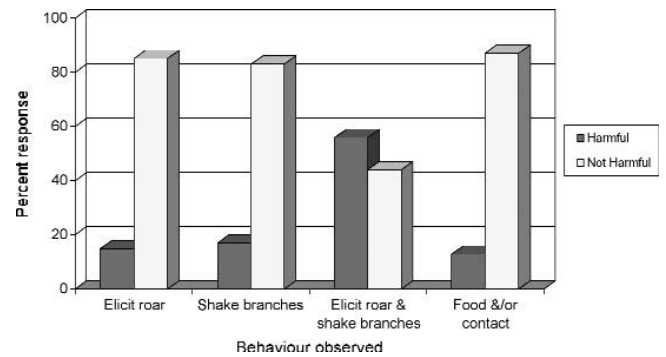
(tourist interaction:  $r^2 = 0.45$ ,  $Z = 7.09$ ,  $p < 0.0001$ ; guide interaction:  $r^2 = 0.40$ ,  $Z = 3.89$ ,  $p = 0.0001$ ).

The mass, ecolodge and unguided tourist parties differed in the intensity of their interactions. Unguided tours had the lowest average intensity of interaction with the monkeys because many of them did not detect the monkeys (40%) compared to the two types of guided tours (17%). In other words, guides were doing their jobs by pointing out monkeys; hence they increased the intensity of interactions over unguided tours. Mass tourist parties displayed the most intense interactions with howler monkeys. Mass tours (84%) detected the monkeys with the same frequency as ecolodge tours (83%), but mass tour groups were more likely to attempt to elicit responses from the monkeys than were ecolodge groups. This difference was significant for tourist interactions (Kruskal-Wallis  $H = 17.77$ ,  $p = 0.0005$ ) as well as guide interactions ( $H = 7.01$ ,  $p = 0.030$ ).

Individual guides differed in the intensity of interactions between their group and the monkeys. Twenty-three guides were identified, but we only analysed data for the nine guides for which  $>5$  interactions were observed. On the scale from 0 = none to 4 = intense elicit, the guides' averages ranged from 0.63–1.33. There was significant variation between guides (Kruskal-Wallis  $H = 22.8$ ,  $p = 0.019$ ). Even within a specific tourism institution, guides differed in the intensity of their interactions. The guide with the lowest intensity score (0.63) and the guide with the second highest score (1.14) were both employed by Lamanai Outpost Lodge (Mann-Whitney  $U = 78.00$ ,  $p = 0.045$ ).

### Tourists' perceptions of harm to howler monkeys

Among all tourists surveyed at Lamanai, 108 (25%) reported seeing tourists or guides interacting with howler monkeys (shaking branches, trying to make monkeys roar, offering food, and/or making physical contact with the monkeys). Unguided tourists (41%) were more likely than mass tourists (24%) or ecolodge tourists (22%) to witness human-monkey interactions ( $\chi^2 = 16.88$ ,  $df = 8$ ,  $p = 0.031$ ). The most common behaviour reported by all tourist types was



**Figure 3** Tourists' opinions of whether four different observed behaviours were harmful to howler monkeys ( $n = 108$  tourists who observed any of the four behaviours).

attempting to make the monkeys roar (71 out of 108; 66%). Twelve tourists reported witnessing someone shake branches to get a response from the monkeys, 10 tourists reported seeing someone both elicit a roar and shake branches, and 15 tourists reported observing someone offer food and/or make contact with the howler monkeys.

Of the 108 tourists reporting interactions, only 18% ( $n = 19$ ) thought that what they saw might be harmful to the monkeys (Fig. 3). The percentages evaluating harm were similar among tourists who saw someone attempt to make monkeys roar (15%), those who saw someone shake the branches (17%), and those who saw someone offer food and/or make physical contact with the animals (13%). However, tourists who observed someone both roar and shake the branches were significantly more likely to consider these actions harmful (56%;  $\chi^2 = 9.37$ ,  $p = 0.025$ ).

Because of the small numbers of tourists reporting each interaction, we combined them into one group for the following analysis. Within this group of 108 tourists, we compared those who judged the actions as harmful to the howler monkeys ( $n = 19$ ; 18%) with those who did not ( $n = 86$ ; 82%) (3 missing responses).

Tourist type (mass, ecolodge or unguided) did not significantly predict tourists' belief that interactions they observed were harmful ( $\chi^2 = 2.74$ ,  $p = 0.254$ ). Tourists with a college or advanced degree were significantly more likely than others to evaluate human-monkey interactions as harmful to the howler monkeys ( $t = -2.012$ ,  $df = 95$ ,  $p = 0.047$ ). So were tourists who had donated money to conservation in Belize ( $t = -3.673$ ,  $df = 86$ ,  $p < 0.001$ ), tourists who came to Lamanai as part of an organized tour ( $t = -2.124$ ,  $df = 95$ ,  $p = 0.036$ ), and tourists who reported other harm to the Lamanai environment ( $t = -3.234$ ,  $df = 102$ ,  $p = 0.002$ ).

When controlling for six independent variables in a multiple regression (ecolodge tourist, education level, past donation to Belizean conservation, organized tour as reason for visiting, environment as reason for visiting and observation of other harm to the Lamanai environment), only



**Table 4** Variables influencing tourists' perception of harm to howler monkeys (results of multiple regression).

\* No intercorrelation among independent variables:  $r < 0.50$  for all pairwise comparisons. \*\* Ecotourist was used because mass tourist and unguided tourist were intercorrelated with donations to Belizean conservation (mass tourist negatively correlated, unguided tourist positively correlated).

<i>Independent variable*</i>	<i>Standardized beta</i>	<i>t</i>	<i>Adjusted r<sup>2</sup></i>	<i>F</i>
Ever donated to conservation cause in Belize	0.32	2.74 ( $p = 0.008$ )		
Observed other harm to the environment / wildlife at Lamanai	0.19	1.72 ( $p = 0.091$ )		
Ecotourist**	0.20	1.67 ( $p = 0.101$ )	0.17	3.35 ( $p = 0.006$ )
Environment (jungle, wildlife) was reason for visiting Lamanai	-0.12	-1.09 ( $p = 0.280$ )		
Organized tour was reason for visiting Lamanai	0.05	0.43 ( $p = 0.666$ )		
Education level	0.04	0.33 ( $p = 0.743$ )		

donations to Belizean conservation retained its effect on the perception that observed interactions harmed howler monkeys (Table 4). Ecotourists were not significantly more likely than others to believe that tourist-monkey interactions were harmful. The effects of education level, organized tour as reason for visiting, environment as reason for visiting, and observation of other environmental harm, dropped out in the multiple regression.

#### Environmental education offered to incidental ecotourists

To further understand incidental ecotourism at Lamanai, we analysed the environmental education content of the tours. The majority of environmental comments by tour guides were simple identifications of plants or animals. Each observed tour guide identified between six and 35 forest organisms, with an average of 13. The most frequent plant species identified included the strangler fig (*Ficus* sp., 26 times), *guanacaste* (*Enterolobium cyclocarpum*, 23 times) and *cohune* palm (*Orbignyia cohune*, 17 times). Plant identifications often included mention of their traditional or current human uses. The most frequently mentioned animals were the black howler monkey (20 times), termites (*Zootermopsis* sp., 12 times), and keel-billed toucan (*Ramphastos sulfuratus*, 11 times) (Matola 1996a, b).

Guides seldom commented on the behaviour or physiology of a species, ecological relationships, conservation issues, or codes of conduct. Compared to a mean of 12.9 species identifications per tour, tour guides only provided a mean of 1.3 comments about behaviour or physiology, 1.5 comments about ecological relationships, 0.6 comments about conservation, and 0.2 comments regarding codes of conduct.

The most frequently recorded comments about behaviour or physiology included the territoriality of black howler monkeys (8 times), *cohune* palm growth and physiology (4), per cent of time howlers spend resting (3), and howler monkey population and average group size in Lamanai (3) ( $n = 31$  total comments). The most frequently mentioned ecological relationships were the parasitism of the strangler fig (8 times), termites acting as recyclers for the rainforest (3),

*cohune* palm growth indicating fertile ground (3), foods eaten by howler monkeys and birds (3), and allspice tree shedding its bark to prevent parasites (3) ( $n = 36$  total comments).

Tour guides mentioned the following conservation issues most frequently: the endangerment of the black howler monkey (3 times), the endangerment of the jaguar (2), and research on medicinal plant use by howlers (2) ( $n = 14$  total comments). Finally, 'codes of conduct' mentioned by tour guides included: tourists and archaeologists erode the temples (2 times), staying on the trails to avoid snake bites (1), avoiding contact with howlers so as not to be bitten (1), and the general statement 'we're visitors in the animals' home' (1) ( $n = 5$  total comments). Most of these 'codes of conduct' were not direct instructions to tourists, but rather offhand remarks about appropriate behaviour to avoid injury or environmental damage.

#### Howler monkeys' response to tourists

Monkeys usually detected tourist parties before the humans detected the monkeys. Most monkeys monitored nearby humans visually and presumably acoustically, but individuals differed in the intensity of their vigilance. Most encounters between humans and howler monkeys were limited to short-term disruptions. However, the few tourists who tried to elicit roaring triggered a greater disruption of the monkeys' activity budgets. The response to these stimuli varied among howler groups as well as among the members within a group (A. Treves, R. Grossberg, B. Lenz & K. Jones, unpublished data 2000). Females, juveniles and infants usually avoided intense provocation by moving higher in the canopy, while subadult and adult males often responded to provocation by roaring or approaching the humans. On several occasions monkeys moved to the ground to bite people, or grab apparel or bags. In one case, a dog that accompanied humans bit a monkey that climbed near the ground. Occasionally, intense provocation by tourist parties triggered roaring, which sometimes led another monkey group to roar or approach.

## DISCUSSION

### Incidental ecotourists

Based on our analysis of tourism at Lamanai Archaeological Reserve in Belize, we define 'incidental ecotourist' as a tourist who encounters wildlife and/or fragile ecosystems without the primary intention of doing so and without being adequately educated about the ecology of the wildlife and site, nor instructed about appropriate behaviour. The incidental ecotourist generally does not stay long at the site, and tends to have multiple, general tourism goals and interests rather than a primary interest in learning about ecology and conservation.

Many tourists at Lamanai Reserve fitted this definition; they were not primarily motivated by the desire to view wildlife or the forest, and many did not even know they would encounter the endangered black howler monkey or other sensitive and ecologically-important species. Most only visited the site for a few hours, and categorized themselves as general tourists rather than ecotourists or birdwatchers. Thus tourism at Lamanai did not appear to fit the restricted definitions of ecotourism (see Buckley 1994; Brandon & Margoluis 1996; Ceballos-Lascurain 1996).

The ecolodge tourists staying at Lamanai Outpost Lodge and participating in the Programme for Belize tended to resemble 'ecotourists' more than mass tourists did. They were more likely to be interested in birdwatching and education, and to be members of conservation organizations. However, these visitors only constituted about 9% of the visitor pool at Lamanai. Furthermore, our analysis of tourist-monkey interactions demonstrates that ecolodges did not always carefully control their guides' behaviour. For example, the Lamanai Outpost Lodge, though promoting itself as an ecotourism operation, had one guide who rarely disturbed the monkeys and another who frequently disturbed them by trying to elicit roars.

Duffus and Dearden (1990) describe how many wildlife tourism destinations first attract only 'expert' tourists, but eventually draw larger numbers of 'novice generalist' tourists as awareness of the site grows. At Lamanai, the increasing numbers of cruise-boat passengers indicates that the site was moving away from small-scale, specialized tourism toward mass tourism. Belize was expecting 300 000 cruise passengers to visit in 2002, up from 24 000 during the first nine months of 2001. This was partly because of cruise lines moving to the Caribbean from the Mediterranean after the 11 September terrorist attacks (Economist 2001). Such an enormous increase in the numbers of incidental ecotourists would undoubtedly exacerbate the impacts that tourism was having on wildlife at Lamanai and other Caribbean sites. Specifically, we expect there to be more interactions between tourists and monkeys, more efforts to elicit due to larger parties, and higher densities of tourists that see no harm in shaking branches, offering food, contacting monkeys, and other interactions with wildlife and the environment.

### Impact of tourism on black howler monkeys

Protected area managers are frequently unaware of visitor impacts on wildlife (Farrell & Marion 2001). These impacts need to be better understood, particularly at mass tourism sites with large numbers of incidental ecotourists. Our qualitative observations suggest that the presence of tourists can inflict both short-term and long-term costs on howler monkeys, which responded to tourists by increased vigilance, coming to the ground, and roaring. Visual monitoring of humans (vigilance) conflicts with the search for food or other activities requiring visual attention (Treves 2000), and may reduce monkeys' ability to detect predators (snakes, raptors) or other threats. Human presence and provocation may also encourage monkeys to come to the ground, putting them at risk of predation by dogs or other animals (see Peres 1990; Cuarón 1997), and increasing the risk of disease transmission between humans and monkeys (Foster 1993; McNeillage 1996; Wallauer 1996).

The impacts on monkeys may be exacerbated if tourists or guides attempt to elicit a vocal response from the monkeys. Roaring bouts appear energetically expensive because they are loud (>95 dB), may last many minutes, and are often followed by the roaring male flopping down on his branch to rest in apparent exhaustion (Whitehead 1995; Treves & Brandon 2003). Moreover, one group's roaring often leads to intergroup encounters that can last hours and involve multiple successive bouts of roaring. Intergroup encounters or encounters between solitary males and groups generate the highest risk of aggression and injury.

A quantitative study of the impacts of tourism on howler monkeys at Lamanai found further evidence that tourist presence is having detrimental effects on the primates. Monkeys scattered when tourist parties were present, and this response increased as the size of the human party increased (Treves & Brandon 2003). Scattering and moving higher in the trees is characteristic of prey attempting to avoid predators, and disrupts normal activities such as foraging and resting (Lima 1998). Furthermore, monkey groups exposed to high levels of tourism had higher rates of infant mortality and disappearances of non-infants than did groups exposed to less tourism (A. Treves, R. Grossberg & L. Bar-Sagi, unpublished data 2000). In short, chronic tourism presence has the potential to disrupt howler monkeys' daily maintenance activities as well as to affect long-term changes in reproductive success and intergroup relations.

### Management recommendations

Managers can reduce negative impacts of tourism on wildlife at Lamanai. Our results call attention to the importance of educating and regulating the behaviour of both tourists and tour guides. The large majority of tourist parties were guided (92%), so improved guide training would likely reduce harmful tourist behaviour. The large number of tourists (85%) who saw no harm in eliciting roars from howler

monkeys reflects tourists' trust of their guides, who were often the initiators of such actions. If the guides abstain from eliciting roars, tourists will learn that quiet observation is the most appropriate conduct and the most fruitful in terms of glimpsing natural social interactions or rare behaviours.

The environmental education component of most Lamanai tours was largely superficial, focusing on simply identifying species rather than discussing ecological relationships or conservation issues. The guides might explain why black howler monkeys are endangered and why the forest around Lamanai is ecologically important. They might also enforce codes of conduct for appropriate tourist behaviour. Guides must understand the ultimate and proximate causes of species endangerment, and be taught not to harass wildlife. In-depth local training programmes such as that offered by Lamanai Outpost Lodge should be encouraged at other sites throughout Belize and wildlife tourism destinations around the world.

Better training for guides is not the only required intervention. Tourists do not always model their behaviour on that of guides, and many at Lamanai were observed initiating interactions with wildlife. Lamanai's lack of signage indicating the presence of an endangered species or instructing tourists on appropriate behaviour around wildlife is typical of many ecotourism sites (Farrell & Marion 2001). Our results also demonstrated that larger tourist parties had the most intense interactions with howler monkeys. Restrictions on group size would therefore lessen the impacts on howler groups and other wildlife, and would also expose tourists more closely to the environmental education messages offered by their tour guides.

Budget and staff limitations have been identified as the biggest barrier to managing visitor impacts in Central American protected areas (Farrell & Marion 2001). Increasing entrance fees, which are currently only US\$ 2.50 at Lamanai, could augment environmental education programmes and offer guides a financial incentive to provide a higher standard of service.

These recommendations can be applied to many 'incidental ecotourism' sites beyond Lamanai. Environmental education has enormous potential at these sites, for the masses of tourists represent an untapped constituency for building conservation support. Conservationists cannot afford to focus their efforts only at high-profile, 'pure' ecotourist sites, for in so doing, they miss the majority of opportunities to protect endangered species residing at tourist spectacles like ruins, beaches and temples.

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