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An ethnoprimatological approach to assessing levels of tolerance between human and commensal non-human primates in Sri Lanka

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Summary - *Human and non-human primates increasingly are forced to live commensally, and understanding the human-nonhuman interconnections are paramount in understanding tolerance and conflict. In our study area, the heavily deforested parts of southern Sri Lanka humans and primates live side by side and prevalent religious tenets encourage a peaceful co-existence. We quantify the attitudes of rural communities towards three resident primate species (red slender loris, purple-faced langur, toque macaque) and wildlife conservation through semi-structured interviews with 301 people. Presence of the three primates on people's land or farms was not related to the distance to the nearest forest but for langurs the incidence of crop-raiding was negatively related to distance to the forest. Despite Buddhist's beliefs about 10% of interviewees indicated having killed primates (in the past) but levels of killing was not related to awareness of protective status of the primates. Overall however positive attitudes towards primates prevailed, without noticeable influence of sex, education or employment type. There was overwhelming support for forest protection measures – not because of the primates but mainly for water preservation and for ensuring a steady timber supply. We found that despite high levels of deforestation, and an increase of encroachment of humans into primate habitats, attitudes has led only to a limited increased level of tension between humans and primates.*

Keywords - *Primate conservation, Crop-raiding, Human-wildlife conflict, Langur, Macaque.*

Introduction

First coined by Sponsel (1997) the emerging field of ethnoprimatology is fundamentally concerned with human-nonhuman primate interconnections and is hitherto mostly studied at the local level. It challenges the existence of natural environments from which humans are separate (Fuentes & Wolfe, 2002; Riley, 2006; Fuentes, 2012). In many parts of the world people and non-human primates have lived side by side for thousands of years. Over the past 50 years or so there has been a growing concern that the changing needs of humans have endangered their ability to live in close association with non-human primates (Cowlishaw & Dunbar, 2000). In areas where humans and non-human primates live in close sympatry or where they live commensally, primate often have expanded their niche as to include the human domain whereas modern technology and increasing access allows humans to penetrate deeper into the primate domain. This mutual niche expansion may lead, and indeed has led, to conflicts between humans and nonhuman primates. Mitigation of these conflicts, and properly quantifying their proximate and ultimate causes, has become an increasingly important part of conservation policies. In formulating these policies adopting an ethnoprimatological perspective is imperative (Riley, 2006; Loudon *et al.,* 2006a; Jones-Engel *et al.,* 2011a,b; Lee, 2010). Proponents reason that an ethnographic perspective allows conservation policy to be defined with regard to

Tab. 1 - The primates of Sri Lanka with a synopsis of traditional beliefs and potential conflicts with humans. Note that not all species occur all over the island and beliefs and sentiments differ between regions.

SPECIES	BELIEFS	POTENTIAL CONFLICT WITH OR FROM HUMANS
Red slender loris ***Loris tardigradus*** Grey slender loris ***Loris lydekkerianus***	Very innocent; mysterious; evil omen; can bring great riches	Used in traditional medicine and sacred rites; kept as pets
Purple-faced langur ***Trachypithecus vetulus*** Grey langur ***Semnopithecus priam***	Sacred; forest people	Crop raiding; kept as pets; eaten for food
Toque macaque ***Macaca sinica***	Incarnation of the god Hanuman; forest people	Crop raiding; kept as pets; eaten for food

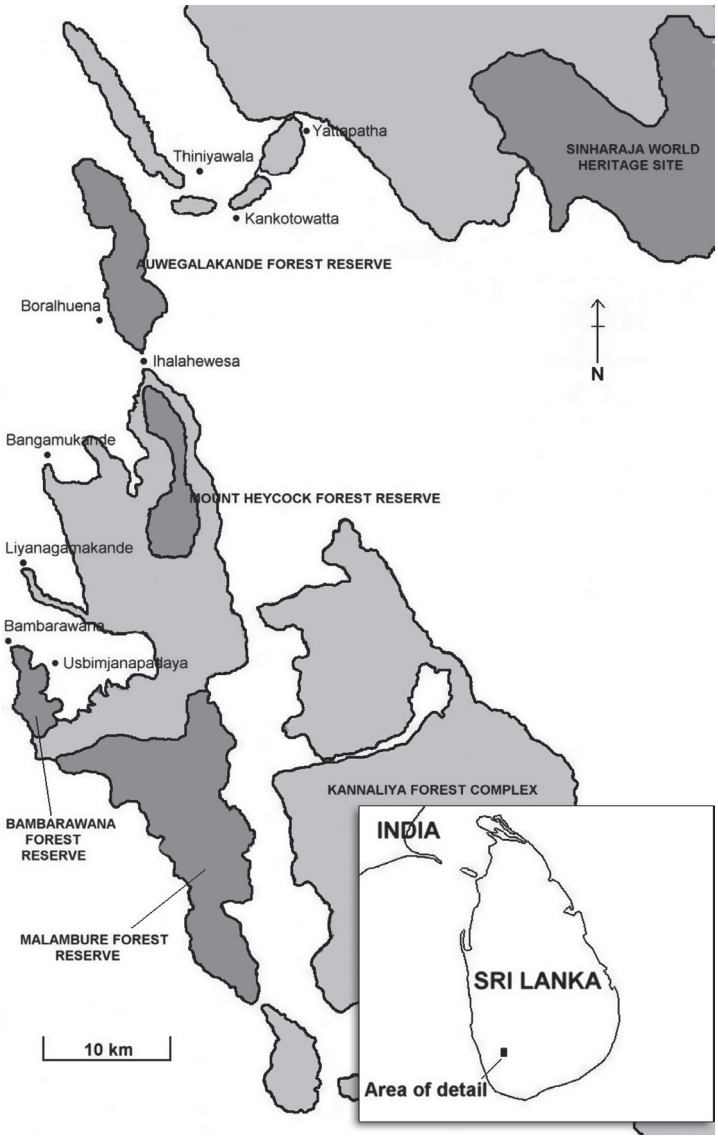
a local cultural context in which traditions and religious parameters often exist for the preservation or to the detriment of wildlife (Wheatley, 1999; Kuriyan, 2002; Priston, 2005; Lee, 2010). The feelings and perceptions that resident people have towards a conservation area or project within their immediate locale are fundamental to its success (Alexander, 2000; Nyhus *et al.,* 2005).

As noted by Riley *et al.* (2011) and Cowlishaw & Dunbar (2000), at a global level, attitudes towards the protection of primates, and the levels of persecution they face, differs largely. It has been suggested that levels of hunting are somewhat lower in Asia than in other parts of the world, partially because some of the major Asian religions (Hinduism, Buddism, Islam) tend to be tolerant towards primates. Although the three predominant religions in Asia proscribe the eating of flesh many societies still hunt and eat primates (Lee & Priston, 2005; Nijman, 2005; Meijaard *et al.,* 2011). In spite of religious sentiment, repeated crop-raiding events cause people to become increasingly intolerant to primates (Lee & Priston, 2005; Srivastava & Begum, 2005; Loudon, 2006a; Nijman & Nekaris, 2010a; Strum, 2010; Lee, 2010). Livelihoods take precedence and societal expectations are ignored and primates may face elevated levels of persecution (Chakravarthy & Thyagaraj, 2005; Nyhus *et al.,* 2005).

In terms of ethnoprimatology Sri Lanka is an interesting study area because of the close relationships between primates and humans. The island is home to 5 species of primate, including red and grey slender loris, purple-faced and grey langurs, and toque macaques (Tab. 1) and humans have lived on the island for at least the last 37,000 years (Kennedy, 2000). The widespread existence of homegardens, mimicking the forest structure by adopting different layers, allows primates to come into close contact with humans. This and the fact that the majority of people consider themselves Buddhist (70%) or Hindu (15%) potentially would facilitate a peaceful co-existence between humans and non-human primates. However, deforestation, encroachment into primate habitats, and changing attitudes has led, at least locally, to increased levels of tension (Dela, 2007; Parker *et al.,* 2008: Nijman & Nekaris, 2010a; Nijman, 2012).

In our studies on the primates of Sri Lanka we often by default had to employ an ethnoprimatological approach. Sri Lanka has suffered a massive loss of forest and in many areas only small patches of forest remain (Eschmann *et al.,* 2008; Nekaris & de Silva Wijeyratne, 2008; Parker *et al.,* 2008; Nijman & Nekaris, 2010b). In some of the regions we have worked, such as the western lowlands, forest has all but disappeared forcing entire groups of primates to live within villages (Nijman & Nekaris, 2010a; Moore *et al.,* 2010). Here we examine the attitudes of rural communities towards three resident primate species in southwestern Sri Lanka,

Fig. 1 - Study area in southeastern Sri Lanka showing the location of the nine villages; protected forests in dark grey and disturbed forests in light grey.



a region where forest remains as highly scattered patches in a largely cultivated matrix (Nekaris *et al.,* 2012). Semi-structured interviews were used to elicit information on attitudes towards wildlife conservation in general, and towards the primates living in close proximity.

Methods

Study site

The study area is situated in Sri Lanka's Southern Province and comprises a mixture of forests, plantations, cultivated land and villages,

covering a large altitudinal range from c. 100-1000 m a.s.l. We have been working in the area intermittedly from 2002-2008 in nine villages all within 5 km from the forest (Fig. 1). The forest area forms a corridor between the Kanneliya forest complex [06°48'N, 80°14'E] in the Galle District of the Southern Province, and the Sinharaja World Heritage Site [06°20'N, 08°14'E] located c. 28 km to the northeast in the Kaluthara District of the Western Province.

The economy in the area is based on smallholder farming of rain-fed cultivation. The main cash crops are tea *Thea sinensis* and rubber *Hevea brasiliensis* with other crops, including rice *Oryza sativa* and banana *Musa spp*. also used for mixed purposes of subsistence and income generation (Nijman & Nekaris, 2010b). Relatively few households rely on salaried employment as their primary source of income but most engage in supplementary income-generating activities such as wage labour and taxi driving (Bernede, 2009).

Sampling and data collection

Data collection was carried out by AB and a local translator in 2006. Random sampling was employed to minimise bias and permit robust statistical analysis (Kapila & Lyon, 1994). A count of households was made in each settlement with the intent to sample at least 25% of families (e.g. Alexander, 2000). This was achieved by visiting every fourth household while walking through each village (Mehta & Kellert, 1998; Bauer, 2003). If adult (≥ 18 years) household members were absent or declined interview, neighbouring households were selected to produce the required sample size (Mehta & Kellert, 1998).

Semi-structured interviews were conducted face-to-face in the home or farming lands of the interviewee. The precise format of each interview was agreed beforehand and rehearsed to clarify exactly how each question should be asked (cf. Kapila & Lyon, 1994). The interviews were conducted in the local language by the translator to avoid confusion and the omission of vital information. The interviews were informal and open-ended but guided by a checklist of questions. Family members, friends and workers were permitted to remain present for the duration of the interview, but to insure independence of data only answers given by the designated respondent were recorded (cf. Lammertink *et al.,* 2003). Interviews took approximately 30 minutes to complete.

The interview comprised the following four sections: (1) questions that covered the respondent's background and demographics (e.g. age, religion, occupation, level of education); (2) questions regarding cultivation and crop damage in the region [largely restricted to those interviewees that indeed did grow crops]; (3) questions eliciting information on feelings towards commensal primate species; and (4) questions examining the respondent's attitude towards conservation of forest and primates (the dataset is available as an online supplement)

Although guided, the interview permitted free speech and provided opportunities to follow new lines of questioning when novel perspectives were buoyed by the respondent (e.g. Kapila & Lyon, 1994; Curran *et al.*, 2000). If the interviewee appeared reluctant or confused, the semi-structured interview was also flexible enough to allow the question to be rephrased or left unanswered (Curran *et al.*, 2000). Questions were short, clearly worded and devoid of jargon to avoid ambiguity (e.g. Kapila & Lyon, 1994). Potentially sensitive issues were approached by asking additional questions around the subject (e.g. Kapila & Lyon, 1994; Jones-Engel *et al.*, 2011) but it was stressed that the respondent did not have to answer any question if they did not wish to do so. At the end of each interview, the recording was stopped and participants would chat informally with the respondent to demonstrate an interest beyond the project. Finally, the respondent was thanked for their time spent answering questions and the interviewees departed. Respondents did not receive gifts for their participation. The interview protocols followed the ethical guidelines proposed by the Association of Social Anthropologists of the UK and Commonwealth and was approved by the Research Ethics Committee of Oxford Brookes University.

Tab. 2 - Occurrence of, and incidence of crop-raiding by, three species of primates in southwestern Sri Lanka.

VILLAGE	MEDIAN DISTANCE TO FOREST (KM)	SAMPLE SIZE*	RED SLENDER LORIS ON LAND (% CROP-RAIDING)	PURPLE-FACED LANGUR ON LAND (% CROP-RAIDING)	TOQUE MACAQUE ON LAND (% CROP-RAIDING)	KNOWLEDGE THAT PRIMATES ARE PROTECTED (%)	KILL(ED) PRIMATES (%)
LIYANAGAMAKANDE	0.5	21	3 (0)	17 (19)	12 (20)	57	14
BAMBARAWANA	1.0	48	5 (0)	39 (17)	35 (8)	83	4
IHALAHEWESA	3.0	51	8 (0)	34 (8)	28 (6)	67	10
KANKOTOWATTA	1.0	19	3 (0)	11 (11)	10 (5)	11	11
USBIMJANAPADAYA	1.5	21	7 (0)	20 (24)	20 (24)	43	5
BANGAMUKANDE	2.0	20	3 (0)	8 (0)	8 (0)	75	10
THINIYAWALA	1.0	50	7 (0)	40 (24)	33 (16)	52	10
BORALHUENA	4.5	20	0 (0)	2 (0)	3 (0)	15	5
YATTAPATHA	1.5	51	4 (0)	24 (8)	15 (6)	31	20

*interviewees

Statistical analysis

We analyse data at the individual level with each individual contributing equally, and following the methodology described in Parker *et al.* (2008) at the village level, where data are expressed as a percentage of the interviewees in a village that gave a certain response. Attitudinal data are presented as response frequencies for the entire sample using response categories constructed from the replies (e.g. Gillingham & Lee, 1999; Bauer, 2003). Where multiple responses were given to a question, data are presented as the percentage of respondents giving each response, and so may sum to over 100 percent (e.g. Gillingham & Lee, 1999).

Data were analysed using non-parametric tests applied to independent (e.g. demographic and background data) and dependent (e.g. categorised answers to open questions) variables to identify which were most significant in affecting respondent's attitudes (e.g. Bauer, 2003). All data were entered into the Statistical Package for the Social Sciences (SPSS) Version 11 for analysis; we accept significance when $P<0.05$ in a two-tailed test.

Results

The interviews were administered to a total of 301 respondents of whom 171 (57%) were male and 130 (43%) were female. The age of respondents ranged from 18–82 years, with the median age being 42 years. Almost 97% of interviewees had attended school, at least to junior secondary stage. Approximately 18% had attended senior secondary school and 2% had received higher education to undergraduate or postgraduate level. All but one, a Christian woman, identified themselves as Buddhists.

There are clear differences between the nine villages in the number of interviewees that reported either purple-faced langurs or toque macaques on their land, differing from around 10% in the village of Boralhuena to 95% in Usbimjanapadaya (Tab. 2). Overall, few people reported red slender lorises on their land, ranging from zero in Boralhuena to 33% of people in Usbimjanapadaya. For most villages the number of people that reported purple-faced langurs on their land was higher than for toque macaques. Within villages the number of people reporting

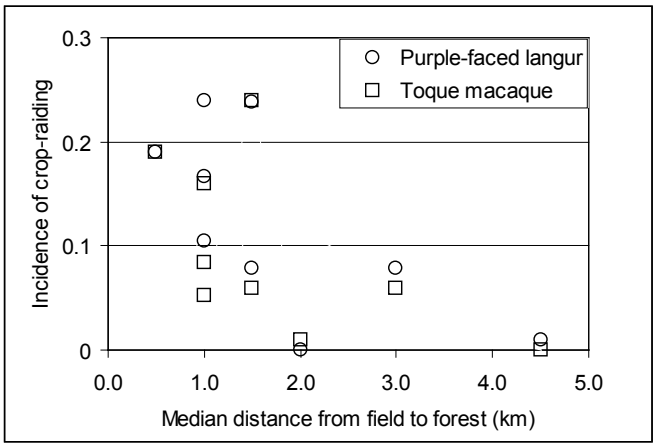


Fig. 2 - Incidence of crop-raiding by two species of primate reported by interviewees in nine villages in southwestern Sri Lanka (expressed as proportion of interviewees indicating crop-raiding) in relation to the median distance from the field to the nearest forest. The relationship is significant for the arboreal purple-faced langur but not for the more terrestrial toque macaque.

purple-faced langurs or toque macaques on their land was are very similar. The proportion of interviewees that indicated red slender loris, purple-faced langurs or toque macaques to be present on their field was not related to the distance from the field to the forest edge (Spearman's rho=-0.04, N=9, P>0.50, rho=-0.60, N=9, P=0.09 and rho=-0.54, N=9, P=0.14 for loris, langurs and macaques, respectively). However, the proportion of interviewees indicating purple-faced langurs as crop-raiders was significantly related to the distance to the forest, with a higher incidence of crop-raiding in villages closed to the forest (Spearman's rho=0.71, N=9, P=0.03) (Fig. 2).

A minority of people (10%) indicated to have hunted or killed primates, but all but 3 interviewees indicated that this was a thing of the past. This low incidence of hunting / killing may be related to the interviewees adhering to Buddhism or to the relatively high numbers of interviewees that was aware that primates were protected, although we did not find a statistically significant relationship between proportion of interviewees that reported hunting to occur or to have occurred and levels of knowledge on the protective status of primates (Spearman's rho=0.30, N=9, P>0.50).

Attitudes towards primates

Landowners having their fields in closest proximity (<500 m) to the rainforest were significantly more likely to have seen all three species of primate on their property in the past year than land owners that were further away from the forest's edge (χ^2=8.3, d.f.=1, P<0.01). Male respondents reported to have seen all three species more often than female respondents (χ^2=3.9, d.f.=1, P<0.05). Most respondents spoke fondly of all three species of primate or expressed neutral feelings about their living in such close proximity. Approximately 55% of females and 62% of males gave positive responses overall. Sex, occupation, and primary source of income had no significant influence on attitudes. However, the most educated respondents (senior secondary school and above) were more positive to primates than respondents with little or no schooling (χ^2=5.1, d.f.=1, P<0.05). Respondents aged 18-25 years gave consistently more positive responses than any other age group (χ^2=23.5, d.f.=4, P<0.001).

Landowners living in closest proximity to the rainforest were most likely to have experienced problems associated with primates in the past year. The proportion of interviewees indicating having experienced problems with primates

(crop-raiding or otherwise) got progressively less as the distance to the forest increased from a high 22% within 1 km of the forest to a low 6% at 5 km distance (Spearman's rho=0.90, N=5, P=0.05). However, amongst interviewees who had experienced problems growing crops in the past year, only 2.5% considered crop loss or damage by primates to be significant. Respondents most often jokingly complained about them stealing fruits and coconuts. Furthermore only 3 interviewees considered the toque macaque the most significant crop-raider (one each in Liyanagamakande, Ihalahewesa and Thiniyawala) and 2 the purple-faced langur (both in Thiniyawala); for >60% of the respondents wild boar *Sus scrofa* was considered the most significant crop-raider.

The comments made by respondents who gave negative answers when asked about their feelings towards the primates suggest that these people perceived them as pests and as dangerous or ugly animals. Opinions were significantly more often negative among those respondents who had experienced problems associated with primates in the past than respondents that lacked such experiences (χ^2=16.1, d.f.=1, P<0.02). None of the respondents considered any of the primates sacred. The vast majority of respondents (96%) have never kept primates as pets but almost 4% had done in the past. Two households (0.7% of the sample) currently keep primates as pets. Some 52 percent of respondents knew that all primates were indeed protected by law. Almost five percent did not know. Most respondents (83%) answered 'yes' to the question 'should primates be protected?' Age, sex, occupation, primary source of income and level of education had no significant influence on responses. Surprisingly, a significant majority (76%) of those respondents who had reported problems associated with primates also indicated that primates indeed deserve to be protected.

Attitudes towards wildlife conservation

Most of the respondents reported a decline in all three primate species over the past three years. Male respondents and farmers reported a decrease in primate population numbers significantly more often than female respondents and respondents holding other occupations (χ^2=18.9, d.f.=1, P<0.001; χ^2=33.0, d.f.=1, P<0.001, respectively). Respondents who had experienced problems associated with primates were most likely to report an increase in population numbers (χ^2=4.0, d.f.=1, P<0.05).

There was widespread local support for the protection of the rainforest (99%). The strongest motivation for protecting the rainforest was 'for water conservation'. Farmers were significantly more likely to answer 'for water conservation' and 'for timber resources' than any other occupation (χ^2=7.1, d.f.=1, P<0.01 and χ^2=7.0, d.f.=1, P<0.01, for water conservation and timber resources respectively). The most educated respondents answered 'to prevent climate change' more often than respondents with no formal education or those with less schooling (χ^2=4.8, d.f.=1, P<0.05). Sex, age, occupation, primary source of income and level of education had no significant influence on responses.

Discussion

Humans living in sympatry with primates

The people in southwestern Sri Lanka have lived sympatrically with primates for 10s of thousands of years (Kennedy, 2000). Almost all of the interviewees considered themselves Buddhist and in line with the tenets of this religion there was a high level of tolerance towards primates. The large majority of respondents have positive attitudes towards primates and there is widespread local support for their protection. Non-human primates were rarely cited as major crop pests and in general any losses that did occur were tolerated. Of the three non-human primate species the red slender loris was rarely recorded by the human inhabitants, whereas the purple-faced langur and the toque macaque were ubiquitous. Primate species vary in their propensity to raid crops (Sillero-Zubiri & Switzer, 2001). The cercopithecoids [macaques, baboons, colobines], are frequent culprits (Chakravarthy & Thyagaraj, 2005; Lee & Priston, 2005; Strum,

2010; Jones-Engel, 2011b). The toque macaque in particular, is reported to cause extensive crop damage throughout its range (Nekaris & de Silva Wijeyratne, 2008; Nijman & Nekaris, 2010b). In southwestern Sri Lanka relatively few respondents reported crop damage by toque macaques, only slightly more by purple-faced langurs and red slender loris are clearly not perceived as a problem.

Those respondents living in closest proximity to the rainforest were significantly more likely to have experienced problems associated with primates in the past year. However, levels of crop-raiding by toque macaques was not related to the distance between the farmland and forest edge – their terrestrial mode of locomotion allow the macaques to cross large distances of open land. In contrast, for the purple-faced langur levels of perceived crop-raiding were related to the distance to the forest – being reluctant to leave the trees it needs at least some arboreal pathways to reach fields. Our results corroborates with studies which identify the presence of an edge effect along which damage events are confined (e.g. Priston, 2005; Naughton-Treves *et al.,* 1998; Linkie *et al.,* 2007). Priston (2005) suggests that forest animals are often reluctant to stray from the cover of trees and most crop-raiding occurs in a relatively narrow strip of farmland where cultivated areas are immediately adjacent to wild habitats.

The respondents' primary source of income and occupation had no significant influence on their feelings towards primates; one would expect farmers, and respondents who relied on the sale of agricultural products to hold less favourable attitudes (e.g. King & Lee, 1987). However, as fruits were raided preferentially and are cultivated in proliferation for subsistence only, minor losses may be considered acceptable within general yields (e.g. Fuentes, 2002). By contrast, a cash economy which promotes surpluses that can be sold exacerbates the cost of crop damage (Fuentes, 2002) and the loss of cash crops is less likely to be tolerated.

Interview respondents who had experienced problems associated with primates were most likely to have negative attitudes and react by scaring them or chasing them away from their land. King & Lee (1987) observed somewhat similar attitudes to vervet monkeys *Chlorocebus* in Blantyre, Malawi. Their study identified that the most negative attitudes were held by respondents such as gardeners who had direct exposure to primate damage. Hill (2005) maintains that human attitudes to primates are a function of past contact between them. However, the fact that those respondents who had experienced problems associated with primates still affirmed the importance of their conservation denotes a level of tolerance which is unusual in a subsistence agricultural context (King & Lee, 1987; Lee & Priston, 2005). A number of respondents reported that they relied on scaring or chasing methods to control primates but none admitted to trapping or killing them. This is in direct contrast to studies by among many others, King & Lee (1987), Chalise & Johnson (2005) and Tweheyo *et al.* (2005) who noted that frustrated residents often resort to using guns, traps, and poisons.

Most respondents reported an overall decline in all three primate species in the last five years. Interestingly, respondents who had experienced problems associated with primates in the past were more likely to report an increase in primate numbers. This may be attributed to the fact that people who experience crop-raiding events often develop an attribution of blame that outweighs the true extent of the damage and exaggerates the threat (e.g. Gillingham & Lee, 1999; Lee & Priston, 2005; Nijman & Nekaris, 2010b).

The influence of sex, age and level of education on attitudes towards primates

Women are often reported to be less tolerant of wildlife (Priston, 2005). Gillingham and Lee (1999) for example, identified that women in Muslim societies were most likely to have negative attitudes to conservation because their marginalised position excluded them from public issues. Priston (2005) suggests that women are often less successful at deterring raiding species and as such, have direct experience of wildlife-related costs. In this study, although men gave more positive responses than women overall, this was not significant.

Male respondents were more likely to have seen all three primate species on their land in the past year than female respondents. This may be attributed to the fact that most men worked in the field as farmers or agrarian labourers and as such, were more likely to have contact with primates than women, who typically worked at home as housewives (e.g. Gillingham & Lee, 1999). The level of direct interaction with primates may also explain the difference in perception of men and women regarding primate population trends.

The youngest respondents and those with the highest level of education were most positive to primates. This may be attributed to the fact that the Sri Lankan Ministry of Education is currently developing a new emphasis on education for sustainability and since 1983 domestic conservation issues have been included in the school curriculum. The expansion of free education into rural localities and the recent proliferation of conservation-development projects (Peries, 1998) may have influenced younger people to be more supportive of wildlife conservation. Bandara & Tisdell (2003) observed somewhat similar results in a study of attitudes towards the conservation of Asian elephants *Elephas maximus* in Sri Lanka. In their study they revealed that respondents with the highest educational attainment were most likely to have positive attitudes towards elephants, and conservation issues in general. The same was observed by Infield (1988) and Heinen (1993) in an attitudinal survey of residents living adjacent to the Hluhluwe Game Reserve, South Africa, and in rural communities of Kosi Tappu, Nepal, respectively. The findings of these studies and ours, clearly demonstrate the value of environmental education in creating local support for conservation.

Religious tolerance

None of the primates were considered sacred. The role of primates in Hindu culture, for example, is a major factor influencing the tolerance of agricultural-based communities (Wheatley 1999; Srivastava & Begum, 2005). Chakravarthy & Thyagaraj (2005) emphasise that in India and parts of Nepal, cultural reverence alone is protecting commensal primate populations. However, traditional attitudes towards wildlife are changing and people who were once adverse to harming primates are becoming increasingly indifferent to trapping and even killing them (Srivastava & Begum, 2005; Lee & Priston 2005; Parker *et al.,* 2008). Repeated crop raiding events cause people to become increasingly intolerant to primates, in spite of religious sentiment (Lee & Priston, 2005; Srivastava & Begum, 2005). Thus in Thailand and Japan, primates are worshipped in Buddhist temples but shot in neighbouring fields (Lee & Priston, 2005). In parts of India, Hindus now espouse religious belief and trap or kill crop raiding macaques (e.g. Srivastava & Begum, 2005). Livelihoods take precedence and societal expectations are ignored (Chakravarthy & Thyagaraj, 2005).

However, the Buddhist tenet of vegetarianism was significant in deterring the consumption of primate meat and at the time of this study there was little evidence to suggest a local trade or demand for it. Although the three predominant religions in Asia proscribe the eating of flesh, many societies still hunt and eat primates (Lee & Priston, 2005; Meijaard *et al.,* 2012). On the island of Sulawesi in Indonesia for example, Balinese Hindus and Muslims readily consume primate meat whenever it becomes available (Jones-Engel *et al.*, 2011; Priston, 2005). As primate pets are usually a by-product of subsistence hunting when infants are captured as their mothers are killed (Jones-Engel *et al.*, 2011) it is perhaps unsurprising that primate ownership in the study area was also limited. There was certainly no evidence to suggest a specific demand or trade for primate infants which in some countries intensifies domestic hunting pressure (Cowlishaw & Dunbar, 2000; Jones-Engel *et al.*, 2011).

Attitudes towards conservation of primates and their habitats

The overall findings of this study suggest that the majority of respondents have positive attitudes towards wildlife conservation in general, and that positive attitudes towards primates make them a suitable flagship to promote the initiative. Gillingham & Lee (1999) observed somewhat

similar attitudes in the Selous Game Reserve in Tanzania. More recently, Alexander (2000) revealed the same in a case study of the Community Baboon Sanctuary in Belize. Harcourt *et al.* (1986), who explored public attitudes towards wildlife conservation in developing countries, maintain that in general such attitudes differ very little, if at all, from more developed nations.

This prevailing pro-conservation sentiment suggests that contrary to predominant assumptions (Bandara & Tisdell, 2003) people in the developing world are not completely antagonistic towards commensal wildlife or ignorant of conservation issues. The beliefs that rural resistance to Protected Areas and conservation projects is high, and that subsistence agricultural societies have little interest in wildlife conservation (e.g. Infield, 1988) were not warranted by this study.

There was widespread local support for the protection of the rainforest. Reasons given were not only based on utilitarian motives but also with explicit reference to intrinsic values and later generations. The use of non-utilitarian arguments therefore, may help to maintain local support for wildlife or ameliorate conflict should it arise (e.g. Kuriyan, 2002). The fact that farmers were most likely to answer 'for water conservation' and 'for timber resources' may be attributed to specific resource requirements for livelihood activities (e.g. Alexander, 2000; Bauer, 2003). Opinions on who should be responsible for protecting the rainforest were mixed. However, most respondents believed that the government and local landowners should take responsibility (e.g. Bandara & Tisdell, 2003). A considerable number of respondents acknowledged that, given financial restraints, the government alone could not fulfil the task and commended partnerships with non-governmental organisations.

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References

Alexander S.E. 2000. Resident attitudes towards conservation and black howler monkeys in Belize: The Community Baboon Sanctuary. *Environ. Conserv.*, 27: 341-50.

Bandara R. & Tisdell C. 2003. Comparison of rural and urban attitudes to the conservation of Asian elephants in Sri Lanka: empirical evidence. *Biol. Conserv.*, 110: 327-42.

Bauer H. 2003. Local perceptions of Waza National Park, northern Cameroon. *Environ. Conserv.*, 30: 175-81.

Bernede L. 2009. *Effects of habitat fragmentation on the behaviour and ecology of the red slender loris (*Loris tardigradus tardigradus*) in the Southern Province of Sri Lanka*. PhD dissertation, Oxford Brookes University.

Bowen-Jones E. & Entwistle A. 2002. Identifying appropriate flagship species: the importance of culture and local contexts. *Oryx*, 36: 189-95.

Brown K. 2003. Three challenges for a real people-centred conservation. *Global Ecol. Biogeog.*, 12: 89-92.

Cincotta R.P., Wisnewski J. & Engelman R. 2002. Human population in the biodiversity hotspots. *Nature*, 404: 990-991.

Chakravarthy A.K. & Thyagaraj N.E. 2005. Coexistence of bonnet monkeys (*Macaca radiata radiata*) with planters in the cardamom (*Elettaria cardamum*) and coffee (*Coffea arabica* L.) plantations of Karnataka, South India: hospitable or hostile? In Paterson D. & Wallis J. (eds): *Commensalism and conflict: the human-primate Interface*, pp 270-293. American Society of Primatologists, Norman.

Chalise M.K. & Johnson R.L. 2005. Farmer attitudes toward the conservation of 'pest' monkeys: The view from Nepal. In Paterson D.

& Wallis J. (eds): *Commensalism and conflict: the human-primate Interface*, pp 222-239. American Society of Primatologists, Norman.

Cowlishaw G. & Dunbar R. 2000. *Primate conservation biology*. University of Chicago Press, Chicago.

Curran B., Tshombe R. & Wilkie D. 2000. Socio-economic data and their relevance to protected area management. In White L. & Edwards A. (eds): *Conservation research in the African rain forests – a technical handbook*, pp 331-351. Wildlife Conservation Society, New York.

Dela J.D.S. 2007 Seasonal food strategies of a colobine frugivore, *Semnopithecus vetulus nestor*, at Panadura and Piliyandala, Sri Lanka. *Int. J. Primatol.*, 28:607-626

Dietz J.M., Dietz L.A. & Nagagata E.Y. 1993. The effective use of flagship species for conservation of biodiversity. In Mace G. Olney P. & Feistner A. (eds): *Creative conservation: interactive management of wild and captive animals*, pp. 32-49. Chapman and Hall, London.

Entwistle A.C. & Stephenson P.J. 2000 Small mammals and the conservation agenda. In Entwistle A.C. & Dunstone N. (eds): *Priorities for the conservation of mammalian diversity: has the panda had its day*? pp. 369-387. Cambridge University Press, Cambridge

Erdelen W. 1988. Forest ecosystems and nature conservation in Sri Lanka. *Biol. Conserv.*, 43: 115-135.

Eschmann C., Moore R. & Nekaris K.A.I. 2008. Calling patterns of western purple-faced langurs (Mammalia: Primates: Cercopithecidea: *Trachypitchecus vetulus nestor*) in a degraded human landscape in Sri Lanka. *Contrib. Zool.*, 77: 57-65.

Fuentes A. 2002. Monkeys, humans, and politics in the Mentawai Islands: no simple solutions in a complex world. In Fuentes A. & Wolfe L.D. (eds): *Primates face to face*. Cambridge University Press, Cambridge.

Fuentes A. 2012. Ethnoprimatology and the anthropology of the human-primate interface. *Ann. Rev. Anthropol.*, 41:101–117.

Gillingham S. & Lee P.C. 1999. The impact of wildlife-related benefits on the conservation attitudes of local people around the Selous Game Reserve, Tanzania. *Environ. Conserv.*, 26: 218-28.

Harcourt A.H., Pennington H. & Weber A.W. 1986. Public attitudes to wildlife and conservation in the Third World. *Oryx,* 20: 152-4.

Heinen J.T. 1993. Park-people relations in Kosi Tappu Wildlife Reserve, Nepal: a socio economic analysis. *Environ. Conserv.*, 20: 25-34.

Hladik C.M. 1977. A comparative study of the feeding strategies of two sympatric species of leaf monkeys: *Presbytis senex* and *Presbytis entellus*. In Clutton-Brock T.H. (ed): *Primate ecology: studies of feeding and ranging behaviour in lemurs, monkeys and apes*, pp. 323-353. Academic Press, London.

Infield M. 1988. Attitudes of a rural community towards conservation and a local conservation area in Natal, South Africa. *Biol. Conserv.*, 45: 21-46.

Jones-Engel L., Engel G.A. & Fuentes A. 2011. An ethnoprimatological approach to interactions between human and non-human primates. In Setchell J. & Curtis D.J. (eds): *Field and laboratory methods in primatology: a practical guide, 2nd ed.*, pp. 21–32. Cambridge University Press, Cambridge.

Jones-Engel L., Engel G.A., Gumert M.D. & Fuentes A. 2011. Developing sustainable human-macaque communities. In Gumert M. D., Fuentes A. & Jones-Engel L. (eds): *Monkeys on the edge: ecology and management of long-tailed macaques and their interface with humans*, pp. 295-327. Cambridge University Press, Cambridge.

Kapila S. & Lyon F. 1994. *Expedition field techniques. People oriented research*. Royal Geographic Society, London.

Kennedy K.A.R. 2000. *God-apes, and fossil man: paleoanthropology in South Asia*. University of Michigan Press, Michigan.

King F.A. & Lee P.C. 1987. A brief survey of human attitudes to a pest species of primate – *Cercopithecus aethiops*. *Primate Conserv.*, 8: 82-4.

Kleiman D.G. & Mallinson J.J.C. 1998. Recovery and management committees for lion tamarins:

partnerships in conservation planning and implementation. *Conserv. Biol.*, 12: 27-38.

Kuriyan R. 2002. Linking local perceptions of elephants and conservation: Samburu pastoralists in Northern Kenya. *Soc. Nat. Res*., 15: 949-57.

Lammertink M., Nijman V. & Setiorini U. 2003. Population size, red list status and conservation of the Natuna leaf monkey *Presbytis natunae* endemic to the island of Bunguran, Indonesia. *Oryx*, 37:472-479

Linkie M., Dinata Y., Nofrianto A. & Leader-Williams N. 2007. Patterns and perceptions of wildlife crop raiding in and around Kerinci Seblat National Park, Sumatra. *Animal Conserv.*, 10: 127-135.

Lee P.C. & Priston N.E.C. 2005. Human attitudes to primates: perceptions of pests, conflict and consequences for primate conservation. In Paterson D. & Wallis J. (eds): *Commensalism and Conflict: The Human-Primate Interface*, pp 1-23. American Society of Primatologists, Norman.

Lindsey P.A., du Toit J.T. & Mills M.G.L. 2005. Attitudes of ranchers towards African wild dogs *Lycaon pictus*: Conservation implications on private land. *Biol. Conserv*., 125: 113-121.

Lee P.C. 2010. Sharing space: Can ethnoprimatology contribute to the survival of nonhuman primates in human-dominated globalized landscapes? *Am. J. Primatol*., 72:925–931.

Loudon J., Howell M. & Fuentes A. 2006a. The importance of integrative anthropology: a preliminary investigation employing primatological and cultural anthropological data collection methods in assessing human-monkey co-existence in Bali, Indonesia. *Ecol. Environ. Anthropol*., 2:2–13.

Loudon J.E., Sauther M.L., Fish K.D., Hunter-Ishikawa M. & Ibrahim Y.J. 2006b. One reserve, three primates: applying a holistic approach to understand the interconnections among ring-tailed lemurs (*Lemur catta*), Verreaux's sifaka (*Propithecus verreauxi*), and humans (*Homo sapiens*) at Beza Mahafaly Special Reserve, Madagasar. *Ecol. Environ. Anthropol.*, 2:54–74.

Mehta J.N. & Kellert S.R. 1998. Local attitudes toward community-based conservation policy and programmes in Nepal: a case study in the Makalu Conservation Area. *Environ. Conserv*., 25: 320-33.

Mill R.R. 1995. Regional overview: Indian Subcontinent. In Davis R. (ed): *Centres of plant diversity: a guide to strategy for their conservation, Volume 2: Asia, Australia and the Pacific,* pp. 62-135. WWF and IUCN, Cambridge.

Naughton-Treves L. 1998. Predicting patterns of crop damage by wildlife around Kibale National Park, Uganda. *Conserv. Biol*., 12, 156-168.

Naughton-Treves L. & Treves A. 2005. Socio-ecological factors shaping local support for wildlife: crop-raiding by elephants and other wildlife in Africa. In Woodroffe R., Thirgood S. & Rabinowitz A. (eds): *People and wildlife: conflict or coexistence?* pp 252-277. Cambridge University Press, Cambridge.

Naughton-Treves L., Treves A., Chapman A., Chapman C. & Wrangham R. 1998. Temporal patterns of crop-raiding by primates: linking food availability in croplands and adjacent forest. *J. Appl. Ecol*., 35: 596-606.

Nekaris K.A.I. & de Silva Wijeyratne G. 2008. *The primates of Sri Lanka*. Colombo, Jetwing Hotels and Jetwing Eco Holidays.

Nekaris K.A.I. & Jayewardene J. 2003. Pilot study and conservation status of the slender loris (*Loris tardigradus* and *Loris lydekkerianus*) in Sri Lanka. *Primate Conserv*., 19: 83-90.

Nekaris K.A.I. & Jayewardene J. 2004 Distribution of slender lorises in four ecological zones in Sri Lanka. *J. Zool*., 262:1-12.

Nekaris K.A.I., Jaffe S. & Donati G. 2012. Forest fragmentation imperils red slender lorises (*Loris tardigradus tardigradus*) in south-western Sri Lanka. In Masters J., Genin F. & Crompton R. (eds): *Leaping ahead: Advances in prosimian biology*. Springer, New York (in press).

Nijman V. 2005 Rapid decline of Hose's langur in Kayan Mentarang National Park. *Oryx*, 39: 223-226.

Nijman V. 2012. Purple-faced langurs in human-modified environments feeding on cultivated fruits: a comment to Dela (2007, 2012). *Int. J. Primat*., 33:743–748.

Nijman V. & Nekaris K.A.I 2010a. Changes in levels of tolerance towards commensal primates

in relation to deforestation in Sri Lanka. *International Journal of Pest Management,* 56: 153-158.

Nijman V & Nekaris K.A.I. 2010b. Testing a model for predicting primate crop-raiding using crop- and farm-specific risk values. *App. Animal Behaviour Science*, 127: 125-129.

Nyhus P.J., Tilson R. & Sumianto R.T. 2000. Crop-raiding elephants and conservation implications at Way Kambas National Park, Sumatra, Indonesia. *Oryx*, 34: 262-274.

Nyhus P.J., Osofsky S.A., Ferraro P., Madden F. & Fisher H. 2005. Bearing the cost of human-wildlife conflict: the challenge of compensation schemes. In Woodroffe R., Thirgood S. & Rabinowitz A. (eds): *People and wildlife: conflict or coexistence?* pp 107-121. Cambridge University Press, Cambridge.

Olsen D.M. & Dinerstein E. 1998. The global 200: A representation approach to conserving the Earth's most biologically valuable ecoregions. *Conserv. Biol.*, 12: 502-515.

Osborn F.V. & Parker G.E. 2003. Towards an integrated approach for reducing the conflict between elephants and people: a review of current research. *Oryx*, 37**:** 1-5.

Parker L., Nijman V. & Nekaris K.A.I. 2008. When there is no forest left: fragmentation, local extinction, and small population sizes in the Sri Lankan western purple-faced langur. *Endang. Species Res.*, 5: 29-36.

Peries M. 1998. Sri Lanka. In Palmer J.A. (ed): *Environmental education in the 21st century. Theory, practice, progress and promise*. Routledge Falmer, London.

Priston N.E.C. 2005. *Crop-raiding by* Macaca Ochreata Brunnescens *in Sulawesi: Reality, perceptions and outcomes for conservation*. PhD thesis. University of Cambridge, Cambridge.

Richard A.F., Goldstein S.J. & Dewar R.E. 1989. Weed macaques: the evolutionary implications of macaque feeding ecology. *Int. J. Primatol.*, 10: 569-594.

Riley E. 2006. Ethnoprimatology: toward reconciliation of biological and cultural anthropology. *Ecol. Environ. Anthropol.*, 2: 75–86.

Riley E.P., Wolfe L.D. & Fuentes A. 2011. Ethnoprimatology: contextualizing human/primate interactions. In Campbell C., Fuentes A., MacKinnon K., Bearder SK & Stumpf R (eds): *Primates in Perspective 2nd ed*, pp. 676-686. Oxford University Press, Oxford.

Sillero-Zubiri C. & Switzer D. 2001. *Crop raiding primates: searching for alternative, humane ways to resolve conflict with farmers in Africa*. Wildlife Conservation Research Unit, Oxford University Press, Oxford.

Sponsel L.E. 1997 The human niche in Amazonia: explorations in ethnoprimatology. In Kinzey W.G. (ed): *New World Primates*, pp. 143-165. Aldine De Gruyter, New York.

Srivastava A. & Begum F. 2005. City monkeys (*Macaca mulatta*): A study of human attitudes. In Paterson D. & Wallis J. (eds): *Commensalism and conflict: The human-primate interface*. American Society of Primatologists, Norman.

Strum S.C. 2010. The development of primate raiding: Implications for management and conservation. *Int. J. Primatol.*, 31: 133-156.

Wheatley BP. 1999. *The sacred monkeys of Bali*. Prospect Heights, Waveland.

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