

An Ethnoprimateological Approach to Mitigating Sri Lanka's Human-Monkey Conflicts

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Abstract: Human-monkey conflicts became a serious problem in Sri Lanka due to extensive deforestation during and after the country's 26-year ethnic war that ended in 2009. By 2015, these conflicts had affected most of the country's administrative districts, and the Department of Wildlife Conservation (DWC) was under severe public and political pressure to resolve the problem. To help the underfunded and understaffed DWC to address this issue, SPEARS Foundation, a local non-governmental organization, reviewed the complaint letters the agency had received from different districts. Next, it adopted an ethno-primateological approach to deal with the problem and conducted field surveys in several districts to interview residents and document their experiences with human-monkey conflicts. Those who lived in most of these districts followed Buddhism, which is steeped in the philosophy of compassion towards all living beings. In two districts, however, the interviewees were predominantly Hindus, whose religion also promoted reverence and respect for animals. Nevertheless, during the field surveys these people were dealing with problems of reclaiming the homes and croplands they had abandoned several years before, when they fled the war zone. Their hardships included clearing the jungle and defending their crops against monkeys and other wildlife that had invaded their abandoned properties during the war. While experiencing such threats to their survival, they seemed to have ignored their ancient religious doctrine of reverence and respect for living things. Ignoring these noble traditions of peaceful coexistence could have been avoided if a comprehensive plan was available to mitigate people's conflict with monkeys. This article presents such a plan, rooted in the country's cultural attributes and strengthened by the views expressed by those interviewed during the surveys.

Key Words: Field surveys, interviewee responses, evidence-based conflict mitigation plan, community participation

Introduction

Sri Lanka's monkey populations consist of four subspecies of the purple-faced langur (*Semnopithecus vetulus*), three subspecies of the toque macaque (*Macaca sinica*) and a single subspecies of the gray langur (*Semnopithecus priamthersites*). The purple-faced langur and the toque macaque subspecies are distributed in all three climatic zones of the country, while the gray langur is found only in Sri Lanka's dry zone (Fig. 1). Episodes of human-monkey conflicts were, therefore, more widely distributed in the country than human-elephant conflicts, which are mainly limited to the dry zone (Prakash *et al.* 2020). Thus, human-monkey conflicts impact more Sri Lankans than problems caused by

elephants. Furthermore, all monkey species are endemic to Sri Lanka (Molur *et al.* 2003) and are also identified on the IUCN Red List of Threatened Species as either endangered or threatened with extinction (Rudran 2019; Dittus 2020; Dittus and Watson 2020; Rudran *et al.* 2020).

Despite their unique contribution to the world's biological diversity and the threats facing their future survival, the people who complained to the Department of Wildlife Conservation (DWC) about crop and property damage were clearly hostile towards these monkeys (Cabral *et al.* 2018). The harsh solutions many suggested to resolve human-monkey conflicts also indicated a trend that was seriously at odds with Sri Lanka's deep-rooted culture of respect for all living things. It was important, therefore, for the DWC

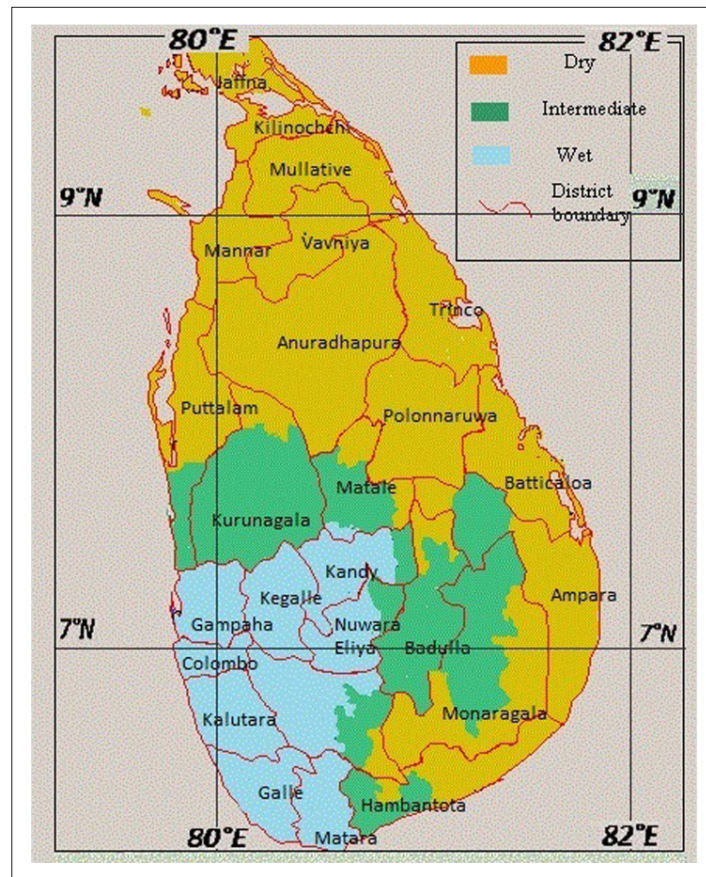


Figure 1. Climatic Zones of Sri Lanka (from Karunaweera *et al.* 2014).

to determine whether this trend was limited only to the complainants or reflected the views of a larger population, before deciding to fulfill the agency's official mandate to protect wildlife. Taking the wrong decision would have likely resulted in widespread backlash and condemnation of DWC, not only by conservationists but also by all Sri Lankans who cherish their cultural roots.

Since the DWC had practical limitations to determine whether the trend was widespread, the SPEARS Foundation stepped in to conduct field surveys in several districts and interview a large number of people to record their views on human-monkey conflicts. The methods used to collect data during and after the field surveys, and the results obtained during both periods are presented below. This information should provide the DWC with valuable insights into Sri Lanka's human-monkey conflicts, and how the agency should deal with this culturally sensitive problem, while fulfilling its official responsibility to help conserve a unique component of the country's wildlife.

Methods

A team of university graduates familiar with this investigation's data collection techniques conducted the field surveys. The surveys focussed mainly on administrative districts that had submitted the largest number of public

complaints to the DWC between 2007 and 2015 (Cabral *et al.* 2018). Before conducting a survey, our team used an open-source GIS software (QGIS, 2015) to lay a 2 km × 2 km grid over a digital map of the district. The team then estimated the number of quadrats from which it could collect data during a six-day period. This estimate was based on factors such as the condition of the road network available to access different parts of the district and its human population density. If the district was large, the team planned more than one six-day survey and determined the number of quadrats to be visited during each of them.

About 50% of the quadrats chosen for data collection included the residence of at least one person who had complained to DWC. Quadrats from which there had been no complaints were chosen with the help of a random selection tool in the QGIS software. If the randomly selected quadrat without complaints fell on an area without houses (for example, forest/cropland) either the adjacent or closest quadrat with a road network was selected. If the quadrat fell adjacent to or on a quadrat with complaint(s), the subsequent quadrat selected for data collection was at least 2 km away.

During the survey, our team visited homes in each quadrat selected for data collection and conducted semi-structured interviews with occupants who were willing to provide information needed to fill a standard questionnaire

(see Appendix). A similar, questionnaire-based survey of residents was used recently to investigate the island-wide distribution of primates (Pastorini *et al.* 2021). The questionnaire used by our team collected data on people's personal background, their attitudes towards monkeys, and when possible, estimates of financial losses these animals had caused through crop and property damage.

Our team was unable to collect data for six days in some districts because of inclement weather, temporary shortage of project funds and inability to communicate with local people due to language differences. The quadrat method of data collection was also not feasible in certain sparsely populated districts with large plantations of export crops such as tea and cut flowers. When faced with such situations our team used the questionnaire to collect data opportunistically when it met people with whom it shared a common language.

The team was also unable to collect sufficient information on average monthly losses that interviewees sustained due to crop and property damage. Its inability to obtain this information was probably due to the relatively short duration of the interviews, when interviewees were unable to calculate average monthly losses. To overcome this problem, after the surveys were completed our team mailed the questionnaire to several divisional secretariats of the government requesting them to distribute it to local communities. This method of collecting data provided a larger pool of crop and property damage information that is discussed below.

Results and Discussion

Field survey details

The SPEARS team conducted 13 field surveys of 11 administrative districts from January 2016 to June 2018 (Table 1). During these surveys, the team used the questionnaire (see Appendix) to conduct 1,623 semi-structured interviews and collect people's personal data, including their views about monkeys. Surveys conducted in the districts of Nuwara Eliya, Badulla, Jaffna, and Kilinochchi lasted less than six days due to one or more of the reasons already mentioned. Due to the shorter duration, fewer interviews were conducted in these districts than in others (Table 1).

Interviewee details

Those interviewed included men (46%) and women (54%), who ranged from 18 to 65 years or older in age. Nearly 63% were between 36 and 65 years of age and 79% had either secondary or tertiary level education (Table 2). These statistics indicate that the majority of interviewees were literate and able to read at least local newspapers to keep up with events related to human-monkey conflicts in the country.

With respect to employment, farmers (20.8%) constituted the largest proportion of those interviewed (Table 3). For many of them, conflicts with monkeys were an

Table 1. Number of people interviewed in 11 districts in Sri Lanka.

District	#	%
Colombo	147	9.06
Kalutara	183	11.28
Kandy	282	17.38
Matara	229	14.11
Galle	240	14.79
Gampaha	180	11.09
Polonnaruwa	321	19.78
Nuwara Eliya	11	0.68
Badulla	2	0.12
Jaffna	18	1.10
Kilinochchi	10	0.61
Total	1623	

Table 2. Age and education of Interviewees.

Age category (yrs)	#	%	Education	#	%
18–25	75	4.62	None	21	1.3
26–35	223	13.7	Primary	191	11.8
36–45	323	19.9	Secondary	1210	74.6
46–55	344	21.2	Tertiary	70	4.3
56–65	349	21.5	Not listed	131	8.1
>65	261	16.1			
Not listed	48	2.96			

Table 3. Types of Employment of Interviewees.

Employment category	#	%
Unemployed	257	15.8
Housewife	120	7.4
Unskilled worker	78	4.8
Skilled worker	219	13.5
Entrepreneur	228	14.1
Government employee	45	2.8
Farmer	337	20.8
Other	139	8.6
Not mentioned	200	12.3

occupational hazard because they grew food crops for human consumption. For similar reasons, entrepreneurs who sold foodstuff, and housewives who maintained home gardens, also experienced conflicts with monkeys. Such conflicts have also been reported by other investigators (Dela 2011; Nahallage and Huffman 2013; Dittus *et al.* 2019). Additionally, interviewees reported damage caused by monkeys to roofs, water taps, television antennas, phone lines and other fixtures around their homes (Table 4). Nearly half of the interviewees reported they had more than one type of conflict with monkeys. Monkeys harassing or attacking humans was uncommon, but they were reported as well.

Species involved in conflicts

The majority of interviewees (55.64%) reported conflicts with a single species (Table 5), most often with the purple-faced langur (25.75%). However, the frequency of conflicts with toque macaques (24.28%) was also substantial. About 31% of those interviewed reported conflicts with two species, most often with the toque macaque and the purple-faced langur. Conflicts with both langurs were limited to the dry zone and contributed only a negligible amount to the overall total of two-species conflicts (0.25%). Very few interviewees (<1%) reported conflicts with all three species. Just over 12% of those interviewed reported no conflicts with any of the monkey species.

Causes of conflict

Nearly two-thirds of those interviewed (n = 1031; Table 6) were unable to suggest a reason for their conflicts with monkeys. Most of the others said that human-monkey conflicts were the result of habitat destruction (13.43%). Some (5.42%) said conflicts in their areas were due to local authorities releasing monkeys they had captured elsewhere. While the two reasons were supported by corroborating evidence, other suggestions such as increases in the sizes of monkey populations and amount of food available to them were clearly conjectural. They cannot, therefore, be considered fact-based causes of human-monkey conflicts.

Duration of conflicts

Nearly half of those interviewed said they experienced conflicts with monkeys for less than five years to more than ten years (Table 7). These responses suggest that deforestation and encroachment of human communities into habitats occupied by monkeys have been going on for a long time. The 12% who said that there were no monkeys around their homes may have been in areas where long-term deforestation had extirpated all monkeys.

Frequency of monkey visits

More than 60% of the interviewees said that monkeys visited their homes more than once a week and characterized these incursions as very frequent (Table 8). The high frequency of visits to people's homes by all three monkey species indicated that all of them had lost substantial portions of their former territories to human habitations. It also suggests that people had to deal with monkeys around their homes quite frequently. Their reactions under such circumstances reflect how tolerant or intolerant they were of monkeys.

People's reactions when monkeys visit them

The reactions of interviewees to monkeys visiting their homes were classified into six categories (Table 9). The first three categories describe people's aggressive or intolerant reactions towards monkeys. The next three categories reflect different levels of tolerance towards monkeys.

Table 4. Types of conflict reported by interviewees.

Conflict type	#	%
No conflict	290	17.87
Crop damage	303	18.67
Roof damage	18	1.11
Infrastructure damage	8	0.50
Nuisance	5	0.31
Food theft	5	0.31
Wounding humans	3	0.19
>1 conflict	794	48.9
No monkeys	197	12.1

Table 5. Number of species in conflict with interviewees.

Conflict Species	#	%
<i>Semnopithecus vetulus</i>	418	25.75
<i>Semnopithecus priam</i>	91	5.61
<i>Macaca sinica</i>	394	24.28
<i>S. vetulus</i> + <i>M. sinica</i>	303	18.67
<i>S. vetulus</i> + <i>S. priam</i>	4	0.25
<i>M. sinica</i> + <i>S. priam</i>	205	12.63
<i>M. sinica</i> + <i>S. priam</i> + <i>S. vetulus</i>	11	0.68
No conflicts (=no monkeys)	197	12.14

Table 6. Causes attributed to conflicts by interviewees.

Cause of conflict	#	%
Habitat destruction	238	13.43
Recent releases	88	5.42
Monkey population increase	62	3.82
Availability of food from home gardens	17	1.05
Close proximity to forest	9	0.55
Other	1	0.06
Don't know	1031	63.52
No monkeys	197	12.14

Table 7. Duration of conflicts reported by interviewees.

Duration of conflict	#	%
< 5 years	292	17.99
5 –10 years	152	9.37
>10 years	374	23.04
Not mentioned	608	37.46
No monkeys	197	12.14
Total	1623	

People's tolerance or intolerance towards monkeys varied with the species in question. With respect to purple-faced langurs, nearly 57% of the interviewees were mildly to very highly tolerant of their presence around homesteads (Table 9). In contrast, less than half of the interviewees

Table 8. Frequency of visits by monkeys to homesteads of interviewees.

Frequency	Category	Sv #	Sv %	Ms #	Ms %	Sp #	Sp %
< 1/year	Very rare	77	11.03	151	17.84	38	12.83
< 6/year	Rare	60	8.59	59	6.97	16	5.40
>1/month	Frequent	74	10.60	126	14.89	44	14.8
>1/week	Very frequent	487	69.77	510	60.28	198	66.89
		698		846		296	

Sv = *Semnopithecus vetulus* (Purple-faced langur, Kalu wandura)

Sp = *Semnopithecus priam thersites* (Gray langur, Sudu wandura)

Ms = *Macaca sinica* (Toque macaque, Rilawa)

with males and females weighing about 5–6 kg and 3 kg, respectively (Dittus, 2013). They pose less of a challenge, therefore to evict them than the grey langur. The extremely arboreal purple-faced langur, on the other hand, also indulges in spectacular leaps when exploiting its strictly vegetarian diet. It is much smaller, however, than the grey langur (Phillips 1980), and the crop and property damage it causes while travelling through trees and across roofs is likely to be less destructive, and therefore, relatively inconsequential than the damage caused by the heftier grey langur.

Table 9. Tolerance/intolerance levels of interviewees towards the three monkey species.

Tolerance/Intolerance level – Description	SV (n)	SV (%)	MS (n)	MS (%)	SP (n)	SP (%)
Aggressive – Shoot, poison, kill, capture and translocate	4	0.5	12	1.3	2	0.6
Intolerant 2 – Chase using air rifles, stones and catapult	147	20	260	28	98	32
Intolerant 1 – Throw firecrackers, make loud noises with pots and pans	167	23	246	27	94	30
Mildly tolerant – Shout, clap hands, wave sticks, use water hose, employ guard dogs	121	16	90	9.9	31	10
Highly tolerant – cover crops with burlap, eliminate arboreal pathways	6	0.8	10	1.1	2	0.6
Very highly tolerant – tolerate monkeys around homes	291	40	295	32	84	27
N =	736		913		311	

(43%) felt mildly to very highly tolerant towards toque macaques. Even fewer interviewees (37%) felt the same way towards gray langurs. These differences in people's tolerance levels towards the three monkey species were statistically significant (*S. vetulus* vs. *M. sinica* $p < 0.0001$; *S. vetulus* vs. *S. priam*, $p < 0001$, 2-tailed Fisher exact tests; Preacher and Briggs 2001).

Differences in people's tolerance towards the three species were likely due to physical and behavioral differences of the monkeys. For instance, an adult grey langur weighs anywhere from 7 to 14 kg, depending on the animal's sex (Phillips 1980), and it exploits arboreal as well as terrestrial resources for its vegetarian diet. When exploiting arboreal resources, it often indulges in spectacular leaps to move from place to place. Such movements of this relatively large monkey can cause substantial damage to roofs and infrastructure of houses as well as to food trees in home gardens. Additionally, when it exploits food resources on the ground like kitchen refuse and piles of garbage, it can use its body size to intimidate people who try to chase it away. These are probably some of the reasons why interviewees were least likely to tolerate the grey langur around their homes than the other two species.

Like the grey langur, the toque macaque also exploits terrestrial as well as arboreal resources to satisfy its omnivorous diet. However, it is much smaller than the grey langur,

People's reactions to monkeys across districts

In eight of ten districts surveyed, the average levels of tolerance of interviewees were above 3.0 for all monkey species (Table 10). In other words, interviewees in these districts expressed, on average, medium to high levels of tolerance towards monkeys. It is noteworthy that 70% to 94% of the population in seven of these districts were Buddhists (Sri Lanka, Central Bank of Sri Lanka 2019) whose attitudes towards monkeys were likely influenced by the doctrine of compassion towards all living beings (Rudran *et al.* 2020). Likewise, the average tolerance level of the interviewees in the Nuwara Eliya district where Hindus were in the majority was also above 3.0 for the two monkeys inhabiting the area.

The two districts where people's average tolerance levels fell below 3.0 for at least one monkey species inhabiting the area were Jaffna and Kilinochchi. These scores indicate that people living in these districts were antagonistic towards monkeys although the majority of them followed Hinduism (Table 10), a religion replete with symbols of animal worship best exemplified by Hanuman the Monkey God and the elephant-faced deity, Lord Ganesh. The likely explanation for their antagonism is that their traditional reverence for animals was overshadowed by their fight to prevent the financial ruin they faced at the hands of wildlife that had invaded their properties after they fled the war zone.

Table 10. Average levels of tolerance of monkeys by people living in different districts. N = no. of interviewee responses. 0 = Not found in the district.

District	Attribute	Purple-faced langur	Toque macaque	Gray langur	% Buddhists (Hindus)
Kandy	Tolerance		3.25		73.4 (9.7)
	N =	0	249	0	
Jaffna	Tolerance		2.67	2.93	0.4 (83)
	N =	0	3	17	
Kilinochchi	Tolerance		3.25	2.4	1.1 (82)
	N =	0	4	10	
Nuwara Eliya	Tolerance	5.13	3.55		40 (51)
	N =	8	11	0	
Kalutara	Tolerance	3.83	4.35		83 (3.2)
	N =	144	88	0	
Galle	Tolerance	3.98	4.64		94 (1.5)
	N =	185	76	0	
Gampaha	Tolerance	4.7	4.6	0	71.5 (2.5)
	N =	100	109	0	
Colombo	Tolerance	4.3	4.2		70.2 (8)
	N =	141	49	0	
Polonnaruwa	Tolerance	4.89	3.37	3.63	90 (1.7)
	N =	17	208	250	
Matara	Tolerance	4.1	3.78	3.36	94 (2.0)
	N =	142	118	26	

Table 11. Monthly cost of crop/property damage reported by interviewees.

Estimated cost: Local currency (Rs)	N (%)
<500	20 (1.2%)
501–1000	19 (1.2%)
1001–5000	36 (2.2%)
>5000	54 (3.4%)
Not mentioned	1297 (79.9%)
No monkeys	197 (12.1%)
Total	1623

The efforts of these interviewees to prevent financial losses after living an austere life as internally displaced persons for several years, may have caused them more stress than the aggravation felt by those who dealt with human-monkey

conflicts in other districts. Regardless of whether human-monkey conflicts were precipitated by political instability or other factors such as deforestation, the end result was financial loss; and the stress created thereby was probably an important reason why people resorted to actions that were in conflict with their cultural attributes. Mitigating financial losses should, therefore, be considered a top priority in any attempt to resolve human-monkey conflict.

Estimating financial losses

In order to estimate financial losses due to crop and property losses the SPEARS team collected relevant data during its field surveys (Table 11). Although 92% of the interviewees were unable to estimate average monthly crop and property damage, 42% of those who provided an estimate (n = 54) indicated that this damage was in excess of Rs 5,000.

The questionnaire mailed to divisional secretariats provided a larger sample of average monthly cost of crop and property damage in eight localities (n = 2756, Table 12). The largest proportion of damage reported in two of these districts (Colombo and Kalutara) was between Rs. 501 and 1,000. These districts are the country's first and third most densely populated areas (Sri Lanka, Department of Census and Statistics, 2012), and where monkey populations were likely decimated due to extensive urbanization. The reduction of monkey populations may explain why monthly crop and property damage losses were relatively low in these two districts. Even within a district, however, monthly cost of crop damage varied considerably between localities. For instance, in Padukka and Akuressa, localities in the districts of Colombo and Matara, respectively, a larger proportion of respondents reported greater financial losses to crop and property damage than in other parts of these districts (Table 12).

In a country where 81% of the human population is rural (Sri Lanka, Department of Census and Statistics 2012) and wages in those areas are around Rs.700/per day (Sri Lanka, Central Bank of Sri Lanka, 2019), monthly losses due to human-monkey conflicts in many districts, exemplified by the above information must be considered substantial. Efforts to mitigate these conflicts that cause people substantial financial hardships should, therefore, be considered an important national priority.

Table 12. Percentage of respondents who reported monthly cost of damage (COD) in different localities. Numbers in bold are the highest percentage of respondents that reported crop and property damage in the different localities.

Locality/COD	Padukka	Colombo	A'pura	K'tura	Badulla	Matara	Kandy	Akuressa	Total (%)	Total (N)
<Rs 500	4.4	19.4	0.7	3.4	1.2	6.1	4.4	0.0	5.4	150
Rs.501–1000	31.1	36.4	22.1	35.6	19.3	23.0	30.5	8.6	28.2	777
Rs. 1001–5000	55.6	28.2	49.7	33.3	48.6	40.0	39.1	42.9	40.0	1102
>Rs, 5000	8.9	16.0	27.5	27.6	30.9	31.0	26.0	48.6	26.4	727
N =	45	294	298	174	243	413	1254	35	100.0	2756

Rationale for mitigating human-monkey conflicts

These conflicts are precipitated by deforestation, which is the initial step in transferring ownership of areas occupied by monkeys and other wildlife to humans. Such transfers are often undertaken without considering the impact they will have on the life of the former owners and also the new occupants. The end result of such thoughtless transfers is that they create “winners” and “losers”. The “winners”, i.e., those who benefit most from deforestation, are those involved in the sale of timber extracted from the cleared areas. Many of these people are commercial contractors who do not have any vested interest in the cleared areas after the timber is removed. Without doubt they belong to the “winners” category. Deforestation may also benefit those who occupy newly cleared lands through the sale of crops they grow at these sites. Accruing these benefits, however, could involve conflicts with displaced monkeys and other wildlife. They cannot, therefore, be classified easily as either “winners” or “losers”. On the other hand, the definite “losers” in the process of deforestation are monkeys and other wildlife that have lost their homes and livelihood to the new occupants. This is the situation that currently prevails in Sri Lanka as a result of deforestation. In the best interest of the country’s human population and wildlife, therefore, steps must be taken to adopt a plan that mitigates human-monkey conflicts and allows both parties to share space (Fuentes 2012) and coexist in peace.

Proposed plan to mitigate human-monkey conflicts

This plan is based mainly on unbiased information collected by the SPEARS team from a relatively large sample of local people, many of whom had been affected by conflict with monkeys. This information provides a strong foundation, therefore, to develop an evidence-based plan to mitigate human-monkey conflicts. Such information was not available or even considered prior to deforestation. However, its current availability creates an opportunity to develop a new paradigm for mitigating conflicts between people and monkeys. Implementing the new paradigm is certainly not going to be easy because it does not provide a quick fix. Nevertheless, it provides an alternative approach to help mitigate a long-standing problem that people as well as monkeys have experienced due to conflicts between them. What is required is for people in rural communities to become actively involved in establishing a network that is truly effective in mitigating human-monkey conflicts and allowing peaceful coexistence between them. Details of this approach are discussed below.

Payments for crop and property damage by monkeys

Throughout Sri Lanka, it is the rural people that are impacted most by human-monkey conflicts. Their earning power is relatively low, so they should be paid in some way for the losses they incur from crop loss and damage to their property. Payments could be made either through a government sponsored compensation scheme, similar to the

one established for human-elephant conflicts (Prakash *et al.* 2020) or through a private insurance scheme. Although it has been more than a decade since human-monkey conflicts reached crisis proportion, it is still not too late to develop a scheme to compensate for future losses people incur due to crop and property damage.

Estimates of crop and property damage collected during the surveys (Tables 11 and 12) could provide baseline information to establish either a compensation or an insurance scheme. These estimates are comparable to those reported by Wijethilaka *et al.* (2021) from the Gampaha district. If compensation or insurance schemes were available, it is unlikely that people who complained to the DWC and those that lived in Sri Lanka’s northern districts would have forsaken their culture’s deep-rooted respect for living beings and become intolerant of monkey depredations (Table 10).

When compensation or insurance schemes are developed, local communities should take responsibility to introduce checks and balances to prevent false claims for crop and property damage. Community organizations should also play a significant role in other ways to mitigate monkey depredation. For instance, they should recruit the relatively large segment of unemployed and underemployed youth and adults (Table 3) and give them gainful employment in a crop and property protection brigade that is trained to evict monkeys that enter home gardens and agricultural lands. The urgent need to establish such a brigade is illustrated by the fact that more than 60% of the interviewees mentioned that one or more species of monkeys visited their homesteads more than once a week (Table 8). The negative impacts of such frequent visits could therefore be substantial. Given the widespread availability of smart phones and relatively inexpensive modes of transport such as bicycles and motor bikes, the brigade could act swiftly and be paid to evict monkeys that enter agricultural areas. Generating gainful employment should be a key feature of community participation in mitigating human-monkey conflicts.

The proposed plan illustrates the important role that community organizations can play. Being on-site, community organizations would be far more effective in mitigating human-monkey conflicts than the understaffed and underfunded DWC could ever be. Furthermore, unlike crop and property damage by elephants which can occur during the day or night (Prakash *et al.* 2020), community organizations could act swiftly to prevent monkey incursions that occur only during daytime. Their actions would reduce losses due to crop and property damage as well as the need for large compensation and insurance payments. Giving community organizations the responsibility to deal with monkey depredations would also help DWC from being the target of unreasonable public and political pressure.

Sri Lanka’s cultural attributes

Field surveys conducted in most districts indicated that interviewees were mildly- to very highly- tolerant of the presence of monkeys on their property, despite the potential

for conflict between the two (Table 10). The majority of the interviewees in most of these districts practiced Buddhism which preaches compassion towards all living beings. Likewise, Sri Lanka's other major religions also view wildlife as God's creation that people must protect. This widely prevalent cultural belief confers Sri Lanka with a huge audience of people of all religions who have the potential to actively help mitigate human-monkey conflicts. Those who can play a significant role in realizing this potential are those with expertise in mass communication through TV and Radio. Additionally, priests and lay preachers who deliver sermons to large congregations of devotees on days of special significance to different religions could help promote wildlife protection. Their support would be especially valuable in rural areas where people are more deeply entrenched in cultural practices than in urban areas. Every effort must be made to harness the support of such people to help mitigate human-monkey conflicts.

Sri Lanka's education system

The field surveys indicated that nearly 89% of the interviewees (n=1623) had at least secondary school education (Table 2) and they could read and assimilate information from newspaper articles and journals. However, despite the high literacy rate, nearly 64% of them were unable to suggest a reason for conflicts between humans and monkeys (Table 6). This inability is at least partly due to the fact that environmental issues are not included as part of the science curriculum of primary and secondary schools (Rudran *et al.* 2020). Immediate attention should be paid to this problem because solving it is likely to take a long time.

Initially, primary and secondary school teachers should be trained to conduct lectures and practical lessons on topics related to the environment. Their teachings would gradually create a cadre of an environmentally-conscious, younger generation, some of whom could become politicians equipped with the knowledge to effectively deal with complex issues such as the rapidly declining forest cover, increasing human population, global warming and other environmental challenges. Until Sri Lanka's political system includes personnel with an understanding and strong commitment to environmental protection, the country will likely be mired in conflicts with monkeys and other wildlife. It is so important, therefore, that Sri Lanka's education system include subjects related to environmental issues.

Sri Lanka's tourism potential

For several years after the ethnic war ended in 2009, Sri Lanka was designated as one of the top tourist destinations in the world. Tourist traffic plummeted after the Easter Sunday bombings of churches in 2019, and the CoVID-19 pandemic in 2020 and 2021. These incidents are likely to be temporary setbacks because Sri Lanka's sandy beaches, scenic mountains, ancient historical monuments, and unique opportunities to watch wildlife such as elephants, leopard and sloth bear will continue to remain as major tourist

attractions. It is only a matter of time, therefore, before Sri Lanka's international tourism potential will rise to its former money earning potential.

Monkeys, in particular, have shown their potential to attract foreign tourists to Sri Lanka. For instance, monkeys living around the Sacred Area of Polonnaruwa have become habituated to human presence through long-term research conducted by scientists from the Smithsonian Institution (Ripley 1967,1970; Dittus 1974, 2012; Dittus *et al.* 2019; Eisenberg *et al.* 1970; Rudran 1973a, 1973b). There, they are easy to observe, and there is a well-equipped tourist lodge that provides meals and accommodation to nature-loving tourists. Furthermore, movie companies from many countries have visited Polonnaruwa to film outstanding footage of monkey behavior, paying substantial amounts of foreign exchange to the tourist lodge for meals and accommodation (Dittus *et al.* 2019). This business enterprise is not well known, but it has been around for more than 30 years, which attests to its profitability. Local entrepreneurs could replicate it at other sites, helping rural communities earn valuable foreign exchange from tourists. To achieve this objective local youth should be trained as naturalists, to interpret behavior of monkeys and other animals, and also identify indigenous plants and explain their medicinal properties (Venart 2021). Local communities could provide food and lodging in a clean but rustic setting for tourists to enjoy overnight stays. The concept of tourist guide associations is flourishing in Madagascar, providing incentives for villages and local communities to protect their forest and wildlife as a significant source of income and livelihoods. These ideas could be expanded in many ways to develop a community-based tourism program that could help mitigate any animosity there may be between monkeys and people. The potential to turn the problem with monkeys into a profitable business is available for those who wish to take up the challenge.

Final remarks

The proposed plan relies heavily on the participation of local people in mitigating human-monkey conflicts. Their participation is targeted towards minimizing the impact of monkeys and other wildlife on people's crops and property. People's participation in dealing with wildlife challenges is becoming increasingly common throughout the world. This has resulted in successful programs to conserve the black rhino in Namibia, the vicuña in the Peruvian Andes, Grevy's Zebra in Kenya (Roe 2014), 16 ungulates in Tanzania (Lee 2018), and marine turtles that nest along the coast of Costa Rica (Hocking 2019). It is time that Sri Lanka garners the support of local communities and adopt a more modern ethno-primatological approach to mitigating human-monkey conflicts.

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Appendix

The questionnaire used to collect data on human-monkey conflicts.

Quadrat: No: Date: / / 17 Time: Data entry by:	District: Location: GPS location: Habitat type:		SU/HG/D V/HG/D Plant/RUB Plant/COCO				
Age: 18-25, 26-35, 36-45, 46-55, 56-65, >65		Education: No/Primary/ L Secondary (6-8)/ U secondary (9-13) / Tertiary		Commercial crop plants: Gender: Male/Female			
Species	Present?	How often (every day, Every other day, once a week)	Seasonal/ all year round	If seasonal which month	How many	With infants?	Problems? Y/N
Purple faced langur (PFL)							
Toque macaque (TM)							
Grey langur (GL)							
Red slender loris							
Grey slender loris							

Human monkey conflict						
Type of issue	PFL	TM	GL	Remarks	Remarks	Amount of damage per month (E.g. kg of mangoes, number of roof tiles, number of bulbs)
Damage to commercial crop (CCD)						
Damage to non-commercial crop (NCCD)						
Roof Tile damage						
Roof Sheet damage						
Infrastructure damage				Tells wire: Electric wire	Lightbulb: antennal	
Nuisance (stealing clothes/ aggressive behaviour)						
Food theft?						
Wounding humans?						
Road kills?						
Electrocution?						
Dog bites?						
Injury caused by humans, shooting/hunting/						
Poisoning						
Garbage						
Other						

Species	Any precaution/ action taken to prevent problem Firecrackers, stones, catapult, shoot, chase by shouting	Living since when	Monkeys present since when	Problem since when?	Reason for conflict	Remarks
PFL						
MS						
GL						

Cost of damage per month
 Rs 0 Less than Rs 500 Rs 500-1000 Rs 1000- 5000 More than Rs 5000

Other animals causing conflict:
 Rats civet Porcupine Wildboar Crocodiles Land monitor Mongoose Dog Giant squirrel Peafowl

Monkey problem is greater/ lesser?

Remarks: