

*Full Length Research Paper*

# **Attitudes of the local community towards the conservation of the common langur (*Semnopithecus entellus*) in Keshabpur, Bangladesh**

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Accepted 5 June, 2012

This paper analyses human-langur interactions and people's attitudes towards common langur (*Semnopithecus entellus*) conservation in six villages of Keshabpur Upazila, Jessore, Bangladesh. The data for this study are based on responses to a questionnaire administered over a period of 12-months from September 2009 to August 2010. Habitat alterations have increased the number of human-langur interactions in this area of Bangladesh. Langurs depend primarily on foods cultivated in home gardens and orchards, a fact that creates significant problems with the locals, some of whom are afraid of being attacked or bitten. Despite the anxiety regarding potential attacks and crop damage, many people enjoy seeing langurs as their ancestors used to do. Overall, 90% of people had a positive view of langur conservation and the establishment of a langur park in the area. Seventy-five percent were optimistic that the establishment of a park would provide economic benefits through job creation. A logistic regression analysis showed that factors such as the conservation status, religion, occupation, and landholding status of the respondents significantly influenced their attitudes towards conservation. Therefore, these aspects need to be clearly addressed to generate support for the conservation of common langurs by the local people, which may lead to the sustainable conservation of this species in Bangladesh.

**Key words:** Bangladesh, common langur, attitudes, conservation.

## **INTRODUCTION**

Human-wildlife conflicts play a complex role in biological conservation and can create intense hostility between poor farmers from rural areas and wild animals that destroy their crops and threaten their livelihoods (Adams and McShane, 1992; Naughton-Treves, 1997). Economic interests, such as logging and/or agriculture, are responsible for much of the habitat destruction that contributes to the decline of non-human primates throughout the world (Grove, 1992; Wheatley and Putra, 1994). In addition, such activities are significant threats to the survival of native species in habitats that are in close

proximity with humans (Teas, 1978).

On the other hand, in many countries, non-human primates have received a degree of protection through religious context and cultural beliefs and are sometimes viewed as brethren (Strum, 1994). In northern India, Indonesia, and other areas in Asia, monkeys are worshipped, protected, and provisioned by villagers; in spite of this, people are still reluctant to share their crops with the monkeys (Eudey, 1994; Strum and Southwick, 1986; Wheatley and Putra, 1994). For example, in Japan and Thailand, while monkeys are provisioned in one temple and/or in a village (Knight, 1999), they are killed in some neighbouring fields (Eudey, 1994). In contrast, capuchin monkeys (*Cebus capucinus*) and humans live harmoniously in Curu, a wildlife refuge in Costa Rica, as these monkeys are perceived to have a beneficial

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pruning effect on crops (Baker and Schutt, 2005). These findings suggest that the perceptions, attitudes, and relationships between humans and non-human primates depend on the costs and benefits of the interactions. Therefore, primate groups may obtain protection by such beliefs and attitudes, which may significantly contribute to successful conservation efforts (Naughton-Treves, 1998).

The high-growth rate of the human population, particularly in Asia, is leading to the increasing encroachment on wildlife habitats. As a result, wildlife is forced to come into direct contact and competition with humans for resources. Crop raiding by wildlife is hypothesised to be one of the many adaptations to the loss of original habitat, and many species have adapted their feeding repertoire to include crops as part of their ecological strategy (Naughton-Treves, 1998), thus creating conflict with humans. Siex and Struhsaker (1999) share the viewpoint that the term "conflict" is often used to describe the extent of an interaction, and may, in fact, contribute to the escalation of such relationships between humans and wildlife into conflict situations (Lee, 2004). Therefore, it is important to accurately determine whether an interaction actually leads to a conflict situation before assigning such a negative assumption (Priston, 2005). In this regard, priority should be given to the careful labelling of primates as a weed or pest and the human-primate interaction as a conflict (Paterson, 2005). Otherwise, support for primate conservation in countries with primate habitats may suffer if an increasing number of farmers begin to view primates as agricultural pests (Chalise and Johnson, 2005; Malik and Johnson, 1994).

Multiple factors cause primates to damage crops. A close association with humans, crop cultivation patterns, distance of the farm to the forest boundary, and scarcity and temporal availability of edible foods are responsible for crop vulnerability to damage by raiding species (Hill, 1998; 2000; Humle, 2003; Naughton-Treves, 1998; Priston, 2005; Reynolds, 2005; Ross and Warren, 2006; Saj et al., 2001).

Bangladesh is the seventh most populated country in the world but has the highest population density (UN, 2005). The tremendous pressure from the steadily growing human population threatens the country's wildlife as well as their habitats. The major threats facing biological conservation in Bangladesh are the increasing human population, the increased numbers of human settlements in new areas, and the development and expansion of agricultural fields. Common langurs (*Semnopithecus entellus*) live in the southwestern part of Bangladesh (Ahsan, 1984). This species is critically endangered in Bangladesh (IUCN, 2006) and needs to be highly protected according to the Bangladesh Wildlife (Preservation) (Amendment) Act of 1974 (which is under revision). However, a total of 246 individuals in 11 groups are living in the six villages of KeshabpurUpazila in the Jessore district in southwestern Bangladesh (Khatun et al., in press). The area was covered predominantly with

vast homestead vegetation, but now it has mostly been cleared for farming and new settlements. The langurs co-exist in the 1120 people/km<sup>2</sup> area with a dense human population (BBS, 2009). However, this co-existence complicates the survival of langurs in Bangladesh.

Local subsistence farmers have changed their farming practices to grow higher valued crops, such as eggplants (*Solanum melongena*), maize (*Zea mays*), lentils (*Lens culinaris*), oilseeds (*Brassica napus*), wheat (*Triticumaestivum*) and jute (*Corchorus olitorius*). They have converted their agricultural fields into fruit orchards to grow mangoes (*Mangifera indica*), jackfruits (*Artocarpus heterophyllus*), bananas (*Musa sapientum*), papayas (*Carica papaya*) and jujubes (*Ziziphus mauritiana*), or converted them into nurseries and/or fish farms. Moreover, the villagers are interested in planting higher valued exotic trees (e.g., *Swietenia mahogani* and *Dalbergia sissoo*) in the fields near their homestead. Some native plant species are therefore hardly observed in the area (e.g., sheora *Streblus asper*, balloon vine *Cardiospermum halicacabum*, arhar *Cajanus cajan*, fig trees *Ficus* spp., and deodar *Polyalthia longifolia*) because they have been substituted by exotic tree species. This substitution caused a scarcity of food, shelter, and safety for the langurs. Therefore, the common langur is a conservation concern in Bangladesh.

Generally, local farmers sell their products at local markets for cash that they use to sustain their livelihoods. Thus, local farmers often develop negative attitudes towards langurs that frequently raid crops that are mostly cultivated in the farmers' home gardens, orchards, and fields (Khatun et al., 2012a). As a result, human-langur interactions can create negative perceptions among the locals towards langur conservation. Studies of the local attitudes towards crop-raiding species are therefore important in determining the conservation strategies that could help locals to develop positive attitudes towards such species (Hill, 1998). In this regard, priority should be given to the assessment of individuals' opinions because different households within the same village may experience different levels of conflict (Hill, 2004).

In Bangladesh, studies of human-wildlife conflicts and crop damage have primarily concentrated on human-elephant interactions at the outer edges of forests (Aziz, 2002; Aziz and Feeroz, 2007; Aziz et al., 2005; Feeroz et al., 2003; Islam et al., 1999; Miah et al., 2001; Sarker and Røskft, 2010, 2011). No papers have been published on human-langur interactions and how they might affect conservation strategies.

The aim of this study was therefore to gather knowledge concerning whether local people understand the conservation status of langurs and their perceptions towards the conservation of this critically endangered species. We recorded the customs (e.g., human-langur interactions, problems caused by langurs, competition for resources, etc.) of how locals interact with langurs and the factors that shape their attitudes towards langur



Figure 1. Map of the study area (Source: www.googleearth.com).

conservation.

## METHODS

### Study area

This study was conducted in six villages (Keshabpur, Baliadanga, Brahmakati, Ramchandrapur, Durgapur, and Madhyakul) of KeshabpurUpazila (a sort of sub-district) in southwestern Bangladesh from September 2009 to August 2010. Upazila is approximately located between 22° 25' and 23° latitude and 89° 25 and 89° 38 longitude (Figure 1). Upazila's area is 259 km<sup>2</sup>, and it comprises 9 union *parishads*, 142 *mouzas* and 143 villages. In 2009, the total population was approximately 200,229, and the majority of inhabitants were Muslims (80.1%) (BBS, 2009). Most households are predominately dependent on agriculture. In general, men are the primary breadwinners, and women spend most of their time as homemakers.

Langurs have been residing in KeshabpurUpazila for over 100 years. One pair of Hanuman langurs was released into Ramchandrapur village by devotees. Since the initial release, the langurs have been living in the area and spread to the other villages of the Upazila (personal communication with an octogenarian Hindu person). Currently, a sizable population lives in the study villages, especially Ramchandrapur, Durgapur and Madhyakul, which are home to the majority of the langurs. Eight of eleven groups live in these three villages (Khatun et al., in press). Langurs come into conflict with humans because of their crop-raiding habits (Khatun et al., 2012a). To minimise crop damage, as well as for the conservation of the langurs, the governmental 'Biodiversity Conservation and Nature Development Project' supplies food to the langurs in the study villages. We therefore divided the study villages into the following two areas based on how much additional food was distributed to the villages by the conservation project:

(1) A high conservation status area (Keshabpur, Baliadanga, and Brahmakati), which is close to the Upazila headquarters. The langurs also received handouts from the villagers.

(2) A low conservation status area (Ramchandrapur, Durgapur, and Madhyakul), which is approximately 12 km north of the Upazila headquarters. Visitors hardly visit the area to see the langurs.

### Data collection

We collected data on people's attitudes and perceptions towards the conservation of crop-raiding langurs using a semi-structured questionnaire (Box 1). In total, 410 people were randomly interviewed: 51% were males, and 49% were females. Additionally, 57.4% were Muslims, and 42.6% were Hindus. Data were collected by a main researcher (UHK, female PhD candidate) and three trained field assistants who were familiar with the local language. Among those interviewed were the household heads, their wives, and other adults (≥18 years) in the house who were willing to answer the questions because some adults felt too shy to speak in front of the researcher and the assistants.

The questionnaire had a combination of closed- and open-ended questions regarding background information (age, gender, level of education, religion, and household size) and socio-economic status (occupation, landholding status, and cultivated farm size in acres) of the household. The open-ended questions asked for an assessment of the respondent's thoughts concerning the conservation of common langurs in the area (Box 1).

### Statistical analyses

Demographic variables were coded as follows: gender (male or female), age (young ≤ 40 years or old > 40 years), household size (small household ≤ 4 or large household > 4), and religion (Muslim or Hindu). Socio-economic variables included the following: access to mass media (yes or no), education (uneducated- no schooling/less than three years of basic education or educated- at least three years of basic education), landholding status (low < 0.1 acres, 0.1 < medium < 0.5, and high ≥ 0.5 acres), and occupation (farmers, who were engaged in crop production and farming, and non-farmers, who were service holders, businessman, students,

1. Are you afraid to see langurs?	yes / no
2. Do langurs visit your homestead?	yes / no; if yes, how often a) rarely b) sometimes c) frequent
3. Do langurs cause any problem?	yes / no; if yes, please state which is the serious?
4. Do you observe any change of habitats since langurs' came to the area. If yes, what is the change?	yes / no a) increase b) decrease
5. Do you think government law protecting langurs is necessary?	yes / no
6. What is your opinion towards establishing a gazetted area/langur park for langurs' conservation?	a) positive b) negative c) don't know if positive, please state the reasons
7. Would you like to conserve langurs in your area?	a) like b) dislike c) don't know if you like, please state why you would like?
8. What are your recommendations towards the improvement of the langurs' present situation?	

**Box 1.** The questions that were addressed to the respondents.

elected representatives of villages, day labourers, van pullers, etc.). All demographic and socio-economic variables were considered as independent variables in the analyses.

Pearson Chi-square tests were used to evaluate differences in the answers of respondents. Stepwise regression analyses were applied to determine which independent variables controlled the locals' attitudes in relation to the various dependent variables. In the analyses, independent variables were coded as dummy variables. Only significant results are reported in the results. For all tests,  $p < 0.05$  was considered to be statistically significant. The SPSS (version 16) statistical package was used to perform all analyses.

Throughout the text, respondents are referred to as households, people, locals, or villagers. A household is defined as those who reside under the same roof, share income, and are typically close relatives. We considered "do not know" responses to be missing values in the analyses.

## RESULTS

### Socioeconomic status of the respondents

A total of 410 respondents were interviewed, which

included 209 (51%) men and 201 (49%) women. The age of the respondents was 18 to 94 years; 41.7% were from small households (family size), and 58.3% were from large households (Table 1). Muslims represented 57.4% of the respondents, and the Hindus represented 42.6%; 62% had access to mass media, while 38% had no access. Moreover, 14.4% of the respondents were educated, while 85.6% were uneducated; 31% had high landholding status, 46% had low landholding status, and 23% had intermediate landholding status (Table 1). Regarding occupation, 61.2% were farmers, and 38.8% were non-farmers (Table 1). The demographic and socioeconomic profile of the respondents did not differ statistically significant between the villages regarding gender ( $\chi^2 = 9.6$ ,  $df = 5$ ,  $p = 0.083$ ), age class ( $\chi^2 = 6.2$ ,  $df = 5$ ,  $P = 0.283$ ), household size ( $\chi^2 = 6.9$ ,  $df = 5$ ,  $P = 0.221$ ), access to mass media ( $\chi^2 = 2.8$ ,  $df = 5$ ,  $P = 0.729$ ), and education ( $\chi^2 = 8.1$ ,  $df = 5$ ,  $P = 0.149$ ). However, the socioeconomic variables varied significantly between the villages in terms of religion ( $\chi^2 = 41.8$ ,  $df = 5$ ,  $P < 0.0001$ ), landholding status ( $\chi^2 = 39.6$ ,  $df = 10$ ,  $P <$

**Table 1.** Socioeconomic profiles (in percentages) of the 410 respondents from the study villages in relation to gender, age, household size, religion, access to mass media, education, landholding status and occupation.

Villages	N	Gender		Age		Household size		Religion		Access to mass media		Education		Landholding status			Occupation	
		Male (%)	Female (%)	Young (%)	Old (%)	Small (%)	Large (%)	Muslims (%)	Hindus (%)	Yes (%)	No (%)	Yes (%)	No (%)	High (%)	Medium (%)	Low (%)	Farmer (%)	Non-farmer (%)
KSB	71	56.3	43.7	59.2	40.8	39.4	60.6	74.6	25.4	62.0	38.0	22.5	77.5	49.3	19.7	31.0	76.1	23.9
BBL	87	49.4	50.6	47.1	52.9	37.9	62.1	70.1	29.9	62.1	37.9	12.6	87.4	17.2	17.2	65.5	56.3	43.7
BKT	67	59.7	40.3	49.3	50.7	32.8	67.2	67.2	32.8	56.1	43.9	11.9	88.1	34.3	25.4	40.3	73.1	26.9
RMT	67	56.7	43.3	44.8	55.2	50.7	49.3	44.8	55.2	64.2	35.8	19.4	80.6	38.8	29.9	31.3	53.7	46.3
DGT	66	47.3	53.0	60.6	39.4	39.4	60.6	30.3	69.7	59.0	41.0	7.6	92.4	30.3	25.8	43.9	54.5	45.5
MDK	52	36.7	63.3	63.5	36.5	53.8	46.2	51.9	48.1	76.9	23.1	11.5	88.5	17.3	19.2	63.5	51.9	48.1
Total	410	51.0	49.0	53.4	46.6	41.7	58.3	57.6	42.4	62.0	38.0	14.4	85.6	31.0	23.0	46.0	61.2	38.8

KSB = Keshabpur, BBL = Baliadanga, BKT = Brahmakati, RMT = Ramchandrapur, DGT = Durapur, MDK = Madhyakul. (Source: Khatun et al., 2012a).

0.0001), and occupation ( $\chi^2 = 16.8$ ,  $df = 5$ ,  $P = 0.006$ ). Most households in the high-conservation status areas were Muslims and involved in agriculture. Hindus comprised most of the population of the low-conservation status areas and were primarily non-farmers.

### Impressions of seeing langurs

Most respondents (96%) reported being unafraid of seeing langurs. The small proportion of respondents that feared that langurs regarded them as clever and were capable of identifying a human who had harmed them and would even attack a guilty human if they were alone. Even these respondents reported that the victims of langur attacks had all previously hurt langurs. Over the last one hundred years, two people have died and five have suffered injuries from documented langur attacks. People from the high-conservation status areas feared langurs more (6.2%) than those from the low (2.2%)-

conservation status areas ( $\chi^2 = 3.98$ ,  $df = 1$ ,  $P = 0.04$ ; Table 2).

### Langur visits and problems caused by langurs

All respondents had observed langurs in their homestead. When asked, "How often do langurs come to visit your homestead," the majority (71.5%) answered 'frequently,' more than one-fourth (26.7%) stated 'occasionally,' and few (2.5%) reported 'rarely' (Table 2). There were no differences between the two conservation status categories in this respect ( $\chi^2 = 0.50$ ,  $df = 2$ ,  $P = 0.77$ ; Table 2). However, 72.8% of the households in low-conservation status areas and 70.3% of those in high-conservation status areas reported that langurs frequently raided their home gardens (Table 2). High-status landholders reported more visits by langurs than low- or medium-status landholders did ( $\chi^2 = 15.72$ ,  $df = 4$ ,  $P = 0.003$ ).

All respondents stated that langurs create problems. The most common problem was crop

damage (69.3%), followed by household disturbances (breaking roof tiles, damaging furniture, and stealing food) (22%), threats from langurs (chasing, attacking, and biting) (5.6%), and damage to fences in gardens (1.7%) and nurseries (1.5%) (Table 3). The respondent's view of crop damage differed significantly between the two conservation status areas ( $\chi^2 = 8.80$ ,  $df = 1$ ,  $P = 0.003$ ). Although, the majority of respondents from high-conservation status areas were involved in farming, they had fewer complaints of crop raiding by langurs than their counterparts from low-conservation status areas.

### Changes in langur habitats

Nearly 90% of the respondents reported that langur habitats have changed and that this process is still occurring (Table 4). Approximately 70% of the respondents reported that habitat loss began on a large scale in 1983 when the large-scale construction of government offices started

**Table 2.** Frequency of langur visits to homestead and fearfulness of their interactions among locals.

Variables	Locals experiences	High conservation status areas % (n)	Low conservation status areas % (n)	$\chi^2$	df	P value
Afraid to see langurs	Yes	6.2 (14)	2.2 (4)	3.98	1	0.04
	No	93.8 (211)	97.8 (181)			
Experienced langur visits to your homestead	Rarely	3.2 (7)	1.6 (3)	0.50	2	0.77
	Occasionally	26.5 (58)	25.5 (47)			
	Frequently	70.3 (154)	72.8 (134)			

**Table 3.** Frequency of locals' responses to the questions of langurs caused problems and observed change of langurs habitat in the area.

Variables	Local experiences	High conservation status areas % (n)	Low conservation status areas % (n)	Total (%)
Langur-caused	Crop raiding	63.1 (142)	76.8 (142)	69.3
Problems	Household disturbance	26.7 (60)	16.2 (30)	22.0
	Chase	3.6 (8)	3.2 (6)	3.4
	Bite	1.3 (3)	0	0.7
	Attack	0.9 (2)	2.2 (4)	1.5
	Damage to gardens fences	2.7 (6)	0.5 (1)	1.7
	Damage to nurseries	2.8 (4)	1.1 (2)	1.5
Any change in langur habitat	Yes	86.6 (194)	93.0 (172)	89.5
	No	13.4 (30)	7.0 (13)	9.9

**Table 4.** Frequency of local responses towards questions regarding alteration of langurs habitat in the area.

Variables	Local experiences	High conservation status areas % (n)	Low conservation status areas % (n)	$\chi^2$	df	P value
Changes of habitat	Increase	28.9 (56)	30.2 (52)	0.08	1	0.77
	Decrease	71.1 (138)	69.8 (120)			

in the area. At that time, many large trees that had provided food and shelter for langurs were cut down. This resulted in the shrinkage of langur habitats. Approximately 30% of the respondents stated that langur habitats are increasing because of government planting of fruit trees in the study areas since 1981. No difference was observed between the respondents from the two conservation status areas with respect to habitat shrinkage ( $\chi^2 = 0.08$ ,  $df = 1$ ,  $P = 0.77$ ; Table 4).

### Government laws for the protection of langurs

More than half of all respondents (53.3%) supported the opinion that the law to protect langurs is necessary because otherwise, people would force langurs to leave the area. Those who did not support the law claimed that

a conservation law would affect their economic condition through potential land requisitions or movement restrictions against harvesting on government lands. The respondents from high-conservation status areas had more positive opinions towards conservation laws than those from low-conservation status areas ( $\chi^2 = 6.26$ ,  $df = 1$ ,  $P = 0.01$ ; Table 5). Females supported the conservation laws more than males ( $P = 0.01$ ), and the Hindus supported conservation laws more than Muslims ( $P < 0.001$ ; Table 5). Educated people were more in favour of conservation laws than those who were uneducated ( $P = 0.04$ ). Non-farmers were more in favour of conservation laws than farmers ( $P < 0.0001$ ).

Additionally, a household with a low-landholding status was more frequently in favour of conservation laws than their high- or medium- landholding counterparts ( $P < 0.0001$ ) (Table 5).

**Table 5.** Respondents' views towards the Government law protecting langurs.

Demographic variables	Necessity of Government law		Final logistic model		
	Yes % (n)	No % (n)	$\chi^2$	df	P value
Villages					
High conservation status area	59.5 (132)	40.5 (90)	6.26	1	0.01
Low conservation status area	47.0 (85)	53.0 (96)			
Gender					
Male	47.8 (98)	52.2 (107)	6.12	1	0.01
Female	60.1 (119)	39.9 (79)			
Age					
Young	56.9 (123)	43.1 (93)	1.78	1	0.18
Old	50.3 (94)	49.7 (93)			
Household size					
Small household	55.6 (95)	44.4 (76)	0.39	1	0.55
Large household	52.6 (122)	47.4 (110)			
Religion					
Muslim	46.6 (109)	53.4 (125)	11.85	1	0.001
Hindu	63.9 (108)	36.1 (61)			
Access to mass media					
No	49.7 (77)	50.3 (78)	1.75	1	0.18
Yes	56.6 (140)	43.5 (108)			
Education					
Uneducated	51.7 (178)	48.3 (166)	4.17	1	0.04
Educated	66.1 (39)	33.9 (20)			
Landholding status					
High	47.2 (158)	52.8 (65)	16.40	2	0.000
Medium	41.3 (38)	58.7 (54)			
Low	64.4 (121)	35.6 (67)			
Occupation					
Farmer	45.9 (113)	54.1 (133)	15.90	1	0.000
Non-farmer	66.2 (104)	33.8 (53)			

A stepwise linear regression analysis with law support as the dependent variable identified three independent variables as significant: the status of the conservation programme, religion, and occupation. However, the combined effects of these variables explained only 10% of the opinion variation of the respondents regarding the law ( $r^2 = 0.10$ ,  $n = 9$ ; Table 11).

#### Opinions on the establishment of a park/gazetted area for the langurs

The majority of the respondents (74.7%) from both

conservation status areas supported a proposal of establishing a langur park in the area ( $\chi^2 = 0.24$ ,  $df = 1$ ,  $P = 0.62$ ; Table 6). Many believed that they would receive some benefits from this proposal, and all respondents thought it would create jobs. Another common expectation was that the park would be a source of income through tourism and recreation, which would also be helpful for the development of the area (Table 7).

The majority (66.3%) of respondents who opposed a park for the langurs claimed that declaring the area as protected would reduce their farmland, but less than one-third (30.3%) thought that their access to the area would be restricted. Finally, few respondents (3.4%) considered

**Table 6.** The opinions of respondents towards establishing a gazetted area/langur park in the area for langur conservation.

Demographic variables	Opinion towards gazetted area		Final logistic model		
	Positive % (n)	Negative % (n)	$\chi^2$	df	P value
<b>Villages</b>					
High conservation status area	75.7 (162)	24.3 (52)	0.24	1	0.62
Low conservation status area	73.5 (119)	26.5 (43)			
<b>Gender</b>					
Male	68.8 (132)	31.2 (60)	7.44	1	0.006
Female	81.0 (149)	19.0 (35)			
<b>Age</b>					
Young	79.8 (162)	20.2 (41)	6.00	1	0.004
Old	68.8 (119)	31.2 (54)			
<b>Household size</b>					
Small household	72.8(115)	27.2 (43)	0.54	1	0.45
Large household	76.1 (166)	23.9(52)			
<b>Religion</b>					
Muslim	67.7 (147)	32.3 (70)	13.28	1	0.000
Hindu	84.3 (134)	15.7 (25)			
<b>Access to mass media</b>					
No	66.3 (90)	33.8 (46)	8.26	1	0.004
Yes	79.6 (191)	20.4 (49)			
<b>Education</b>					
Uneducated	84.7 (50)	15.3 (9)	3.78	1	0.056
Educated	72.9 (231)	27.1 (86)			
<b>Landholding status</b>					
High	83.6 (97)	16.4 (19)	22.27	2	0.000
Medium	86.4 (70)	13.6 (11)			
Low	63.7 (114)	36.3 (65)			
<b>Occupation</b>					
Farmer	66.1 (154)	33.9 (79)	24.21	1	0.000
Non-farmer	88.8 (127)	11.2 (16)			

that the establishment of the park might affect the local culture. These differences in respondent opinion towards a proposed protected area for a langur park were significantly explained by six of the nine independent variables: 1) gender ( $P = 0.006$ ), 2) age ( $P = 0.004$ ), 3) religion ( $P < 0.0001$ ), 4) access to mass media ( $P = 0.004$ ), 5) landholding status ( $P < 0.0001$ ), and 6) occupation ( $P < 0.0001$ ). Females and young people with access to mass media supported the proposal the most. Hindus had a more positive opinion of the park than Muslims, and respondents of low-landholding status and farmers disfavoured the proposal more than their

ponding counterparts (Table 6).

A stepwise regression analysis with opinion towards the establishment of a langur park as the dependent variable identified four variables (conservation status of the village, religion, occupation status, and landholding status) as significant, explaining 20% of the variation in the respondent's opinion ( $r^2 = 0.20$ ,  $n = 9$ ; Table 11).

### Conservation of common langurs

The majority (89.1%) of the respondents had a positive



**Table 7.** Opinions of the respondents towards establishing a gazetted area/langur park in the area.

Variables	Locals experiences	High conservation status areas % (n)	Low conservation status areas % (n)	Total (%)
Answers regarding Positive opinion	Tourism	18.4 (30)	27.7 (33)	23.3
	Recreation	17.2 (28)	13.4 (16)	15.8
	Job	100 (162)	100 (119)	100
	Development of infrastructure	12.3 (20)	15.1 (18)	13.6
Answers regarding Negative opinion	Decrease farming land	73.1 (38)	58.1 (25)	66.3
	Prohibition to access	19.2 (10)	34.9 (15)	26.3
	Affect local culture	7.7 (4)	7.0 (3)	7.4

opinion towards the conservation of common langurs in the area. Of those respondents, the majority were living in the high-conservation status areas. This attitude differed significantly between the two conservation status areas ( $\chi^2 = 11.02$ ,  $df = 1$ ,  $P < 0.001$ ; Table 8). Additionally, people of high-landholding status had a higher opinion of langur conservation than people with a lower landholding status ( $\chi^2 = 8.90$ ,  $df = 1$ ,  $P = 0.01$ ; Table 8).

Of those respondents who supported conservation, 65.4% considered langurs to be a part of the local heritage of their forefathers, enjoyed seeing the langurs and thought that the species should be conserved for future generations. Others felt that langurs resembled humans or had aesthetic or ecological values [e.g., seed dispersal of guava (*Psidium guajava*)] (Table 9). Opinions regarding the value of langurs did not differ significantly (although a trend was observed) between the two conservation status areas ( $\chi^2 = 7.68$ ,  $df = 3$ ,  $P = 0.053$ ; Table 9).

A stepwise regression analysis of the respondents' perceptions regarding the conservation of common langurs identified three significant independent variables that partially explained the variation in the perception of respondents (the level of conservation status in the villages, religion, and landholding status of the respondents). However, these variables explained only 5% of the total variation in people's opinion towards the langur conservation in the area ( $r^2 = 0.05$ ,  $n = 9$ ; Table 10).

### Recommendations of locals to improve the conservation status of the langur

According to the majority (89.8%) of the respondents, an awareness programme would help improve people's opinion of langur conservation. Other suggestions for the follow-up of the langur conservation were as follows: (1) stopping the supply of food on private land, (2) ensuring the appropriate timing and location of supplied food, (3)

increasing the involvement of the village community, (4) declaring an area for the establishment of a langur park, (5) planting more general food trees, and (6) taking a census on the langurs' present situation. In contrast, only 8.4% of the respondents wanted translocation of the langurs and prohibition of providing them food as methods to improve the present situation (Table 10).

## DISCUSSION

### Impressions of seeing langurs

Only a small proportion of respondents feared seeing langurs, and most of these respondents were fearful of the intelligence of langurs and their ability to identify and exact revenge on people who had offended or harmed them previously (by attacking them). Several recent studies have provided evidence that some primate species can be harmful. There is also ample evidence regarding human-primate conflicts (e.g., attitudes towards human-orangutan (*Pongo abelii*) conflicts (Campbell-Smith et al., 2010), the perceptions of primates (Hill and Weber, 2010), agonistic interactions between humans and monkeys (Chauhon and Pirta, 2010), and the effects of deforestation on the attitudes and levels of tolerance towards primates in Sri Lanka (Nijman and Nekaris, 2010).

### Problems caused by langurs

Most respondents considered langurs to be problematic animals due to their crop raiding habit. This attitude differed significantly between the two conservation status sites. The respondents from the high-conservation status areas were more tolerant towards crop-raiding langurs than those from the low-conservation status areas. Tolerance was probably due to a combination of three factors: (1) the availability of food trees in places where langurs spend most of their time, (2) the sufficient

**Table 8.** Respondents attitudes towards the conservation of common langur in the area.

Demographic variables	Opinion towards conservation (%)		Final logistic model		
	Like	Dislike	$\chi^2$	df	P value
<b>Villages</b>					
High conservation status area	93.8 (210)	6.2 (14)	11.02	1	0.001
Low conservation status area	83.4 (151)	16.6 (30)			
<b>Gender</b>					
Male	87.4 (181)	12.6 (26)	1.25	1	0.26
Female	90.9 (180)	9.1 (18)			
<b>Age</b>					
Young	90.7 (195)	9.3 (20)	1.15	1	0.28
Old	87.4 (166)	12.6 (24)			
<b>Household size</b>					
Small household	90.5 (153)	9.5 (16)	0.58	1	0.44
Large household	88.1 (208)	11.9 (28)			
<b>Religion</b>					
Muslim	86.6 (201)	13.4 (31)	3.49	1	0.06
Hindu	92.5 (160)	7.5 (13)			
<b>Access to mass media</b>					
No	86.1 (130)	13.9 (21)	2.30	1	0.12
Yes	90.9 (231)	9.1 (23)			
<b>Education</b>					
Uneducated	89.5 (221)	10.5 (26)	0.07	1	0.78
Educated	88.6 (140)	11.4 (18)			
<b>Landholding status</b>					
High	94.9 (107)	5.1 (19)	8.90	2	0.01
Medium	84.8 (78)	15.2 (14)			
Low	84.1 (176)	15.9 (11)			
<b>Occupation</b>					
Farmer	89.5 (221)	10.5 (26)	0.07	1	0.78
Non-farmer	88.6 (140)	11.4 (18)			

provision of food by conservation authorities, and (3) the overall positive attitudes towards langurs. These results suggest that local people who derive benefits from areas where the conservation process is perceived as effective are more likely to be tolerant of some degree of crop damage (Gillingham and Lee, 1999; Naughton-Treves, 1997). The respondents of high-landholding status were more tolerant of crop damage and had more positive opinions of conservation (Priston, 2005; Rao et al., 2002).

#### **Habitat alteration and the subsequent scarcity of resources for langurs**

The majority of respondents indicated that langur habitats

have already been greatly changed. The activities that altered these habitats were the large-scale expansion of sub-district areas that began in 1983, the increased number of human settlements and the increased conversion of langur habitats into agricultural farms. As a result, langurs have had to address food and shelter scarcity and a lack of safety, which has resulted in their close proximity with humans.

A total of 91 plant species in 39 families are known to provide nourishment to langurs. Of these, 12 species, all of which are also important to villagers, provide for approximately 70% of the langur's diet (Khatun et al., 2012b). Mangoes (*Mangifera indica*) are perhaps the most important food for both nutritional and commercial

**Table 9.** Respondent answers regarding their positive outlook on the conservation of langurs in the area.

Variables	Locals experiences	High conservation status areas % (n)	Low conservation status areas % (n)	$\chi^2$	df	P value
Positive outlook towards conservation	Aesthetic	13.8 (29)	17.0 (26)	7.68	3	0.053
	Local heritage	71.0 (148)	57.6 (87)			
	Recreation	13.3 (28)	21.2 (32)			
	Ecological	1.9 (5)	4.0 (6)			

**Table 10.** Respondents recommendations for the improvement of langur conservations in the area.

Recommendations from locals	High conservation status areas yes % (n)	Low conservation status areas yes % (n)	Total % (n)
Census	74.7 (168)	65.4 (121)	70.5 (285)
Awareness programme	94.2 (212)	84.3 (156)	89.8 (368)
Prohibit feeding on private land	59.1 (133)	62.7 (116)	60.7 (249)
Translocate some langurs	4.9 (11)	13.5 (70)	8.8 (36)
Langur park	88.0 (198)	65.4 (120)	77.8 (319)
Supply food at the appropriate time and place	90.2 (203)	81.1 (150)	86.1 (353)
Involve the community in conservation projects	88.0 (198)	75.7 (140)	82.4 (338)
Plant more food trees	33.3(75)	37.8 (70)	35.4 (144)

**Table 11.** Results of stepwise regression analyses on the effects of different independent variables and different aspects of respondent attitudes towards conservation of common langurs in the area.

Independent variables	Opinion towards govt. law to protect langurs (t-value)	Opinion towards establishing a gazetted area (t-value)	Attitude towards conservation of langurs t-value
Conservation status	-4.12***	-2.69**	-4.05***
Gender	1.14	1.39	0.69
Age	-0.96	-2.64	-0.82
Religion	3.63***	4.32***	2.62**
Education	1.81	0.47	0.65
Household status	-0.44	0.77	0.80
Mass media access	0.41	1.38	1.67
Occupation	2.71**	5.40***	-1.21
Landholding status	1.89	-6.48***	2.46*
Constant	0.95	4.27***	7.90***
$r^2$	0.10	0.20	0.057

\* P &lt; 0.05, \*\* P &lt; 0.001, \*\*\* P &lt; 0.001.

market value in the villages. However, langurs also prefer mangoes even when other natural foods are available in the area. The protection of valuable human foods is a significant goal in minimising crop damage (Riley, 2007). For example, Naughton-Treves (1996) observed that banana raiding decreased when the fruit of *Mimusops bagshawei* increased in Uganda, Africa.

It is worth mentioning that many locals have begun to plant valuable timber trees (e.g., *Swietenia mahogany*, *Dalbergia sissoo*, etc.) that do not provide a sufficient food source for langurs (Khatun et al., 2012b). It will be

important to keep this information in mind when devising methods to enhance langur survival and minimise crop damage in langur-populated areas.

### Government laws for the protection of langurs

Over 50% of the respondents had positive views of laws regarding the protection and conservation of langurs. Those who did not support these types of laws thought that the ratification of these laws would cause them

economic harm. However, the majority of respondents opposed to the laws were still in favour of langur conservation in these areas. They believed that the conservation of langurs should be handled by the Forest Department because the common langur is a critically endangered species (IUCN, 2006) and a protected animal in Bangladesh [Bangladesh Wildlife (Preservation) (Amendment) Act of 1974]. However, langur survival will likely depend largely on the attitudes of the local people towards them.

### **Attitudes towards establishing a langur park**

The majority of respondents in both conservation status areas supported the proposal of establishing a langur park in the area. This support appears to arise from the belief that locals would derive economic benefits from the establishment of such a park. This is in line with previous studies that have suggested that people generally have more positive attitudes towards protected areas when benefits are associated with the protected area (e.g., attitudes towards conservation and wildlife tourism in India (Sekhar, 2003), conservation outside of parks in Kenya (Gadd, 2005), the impact of community-based conservation in Nepal (Bajracharya et al., 2006), and factors influencing conservation attitudes of locals (Kideghesho et al., 2007). However, other studies have observed that beneficiaries are more likely to hold negative attitudes towards the conservation areas (Akiyama and Nishio, 1996; Fiallo and Jacobson, 1995; Heinen, 1993; Newmark et al., 1993; Parry and Campbell, 1992; Studsrød and Wegge, 1995). These differences of opinion may derive from the concern that wildlife-induced crop damage would significantly limit their agricultural production.

The minority, respondents who did not support the proposal of establishing a park, thought that a park would threaten their economy by reducing farmlands and restrict access to the area. Therefore, an evaluation of local interests is important when designing any mitigation measure in an area. Otherwise, the success of such measures may be reduced if the local people feel excluded from the process, as other studies have previously described (Bajracharya et al., 2006; Ghimire and Pimbert, 1997; Infield, 1988; McNeely, 1995; Spergel, 1997). Thus, a community-based conservation protocol should be applied to reduce potential human-langur conflicts. India has appreciated the value of such an approach to conservation (Sekhar, 2003).

### **Conservation of common langurs**

A significant majority of the respondents had a positive attitude towards the conservation of common langurs in the area. This attitude, however, differed significantly between the two conservation status areas. The

respondents from the low-conservation status areas were less likely to support langur conservation than those from the high-conservation status areas. This attitude is possibly because low-conservation status areas are home to eight of the eleven groups of langurs and thus suffer more frequent crop damage. For example, Naughton-Treves et al. (1998) reported that crop damage is significantly correlated with the population abundance of the raiding species, especially species that live in close proximity with humans. This suggests that economic costs might diminish the tolerance of locals towards the conservation of the raiding species (Røskoft et al., 2007).

However, the majority of the respondents who had experienced crop damage and held negative attitudes towards the langurs still wanted to conserve langurs because langurs resemble humans and have an aesthetic and ecologic value. Similar results have also been observed for other large mammals (Fuentes and Wolfe, 2002; Gadd, 2005; Hill, 1998).

Stepwise regression analysis identified three variables (status of conservation programme, religion, and land-holding status of the respondents) that had significant effects on people's attitudes towards langur conservation. The results indicated that people in high-conservation status areas and those having a high-landholding status were more willing to support conservation. This view may be a result of the respondents in the high-conservation status areas perceiving more potential benefits from the conservation programme. Alternatively, the high-landholding persons were less concerned about crop damage because their financial situations were more secure. Gadd (2005) also noted that the positive attitudes of Kenyans towards large mammals were related to their perceived benefits from conservation and the primary land use of the respondents.

Our results also indicated that religion significantly influenced attitudes towards conservation. This may result from the fact that Hindus are primarily involved in non-farming activities or the fact that some Hindus regard langurs as their Hanuman-God. This is in accordance with other studies. Balinese Hinduism is related to aspects of Tri Hita Karana (the three sources of happiness that is, one's relationship with God, humans, and the environment). This form of Hinduism hypothesizes that happiness is dependent on a harmonious relationship between God, humans, and the environment. Macaques are aspects of the environment that closely inhabit with and are closely related to humans; thus, they are often considered to be a sacred animal (Fuentes et al., 2005; Loudon et al., 2006; Wheatley and Putra, 1994). It is possible for primates to gain cultural significance by appearing in religious contexts (Nivendita and Coomaraswamy, 1985, cited in Wolfe, 2002). Consequently, cultural and religious sentiments can promote tolerance and the conservation of primates in urban and rural areas of Asia (Hill, 1998; Pirta et al., 1997). The above findings suggest that the factors that influence locals' attitudes are important for addressing the

approach to langur conservation in this area.

## Conclusions

From the above discussion, it appears that the positive attitudes of locals represent a significant source of hope for langur conservation. The study suggests that the conservation attitudes of the locals have not yet been severely affected by the present human-langur interactions in the area. Despite this, careful consideration of the locals' fear of langur attacks, langur-related problems, locals' interest in planting non-edible Hanuman foods, their attitudes towards conservation laws regarding langur protection, the poverty levels of locals, and respondent's perceptions towards establishing a langur park must be given prior to planning any conservation strategy in the area. Otherwise, the results could be detrimental for both humans and langurs. In this regard, further studies are recommended to investigate the behavioural adaptations of langurs in the area and to characterise langur raiding behaviour.

Our results have led us to the following conclusions. Initially, a community-based conservation education programme is essential to improve people's awareness, which could lead to a social movement for Hanuman langur conservation. Second, the reintroduction of plant species that were once present in the area would provide food for the langurs and would be a critical step towards langur conservation. To do this effectively, a thorough understanding of the importance of habitat protection and resource preservation for langurs is essential. Third, the management of planting should take into account the preferred foods of langurs. The natural foods of the langur that are not edible by humans but are ecologically important (e.g., *Leucaena leucocephala*, *Albizia procera*, *Samanea saman*, *Polyalthia longifolia*, *Mimusops elengi*, *Acacia nilotica*, *Azadirachta indica*, *Moringa oleifera*, *Eugenia operculata*, *Anthocephalus cadamba*, *Aegle marmelos*, and *Salmalia malabarica*) should be planted in public areas, such as roadsides and surrounding homesteads, to establish viable habitats for the langur and to minimise crop damage. The conservation value of such areas, particularly of agro-forest vegetation, has received increasing recognition by conservation biologists throughout the world (Donald, 2004; Moguel and Toledo, 1999; Petitt and Petitt, 2003). Finally, the establishment of a langur park is fundamental for the sustainable development of langurs. A park would result in the development of the area, and people would benefit from new jobs and might be encouraged to participate in income-generating programmes that might improve their socio-economic conditions. The promotion of tourism in the area would positively change the perceptions of the local community towards langur conservation. Protected area management regarding biodiversity conservation is now being highly appreciated (Bajracharya et al., 2006) in

developing countries.

## ACKNOWLEDGEMENTS

This project was made possible by grants from the Norwegian Council of Universities' Committee for Development Research and Education (NUFU), funded Project 'Ecology Behaviour and Conservation of Some Wildlife of Bangladesh'. We are grateful to our field assistants Saiful Islam, Raju Ahmad, Alamgir Hossain, and Md. Saeed for their amiable assistance and help during the fieldwork. We thank Prof. Dr. M. A. Gofur Khan and two anonymous reviewers for valuable comments on an earlier version of this paper. The authors would like to thank the local administration and the people of Keshabpur Upazila for their friendly assistance, tolerance and helpfulness throughout the study period.

## REFERENCES

- Adams JS, McShane TO (1992). The myth of wild Africa. New York, W. W. Norton.
- Ahsan MF (1984). Study on primates in Bangladesh: determination of population status and distribution of non-human primates in Bangladesh with emphasis on rhesus monkey. Dhaka, Bangladesh, University of Dhaka. Mphil (issue).
- Akiyama T, Nishio A (1996). Indonesia's cocoa boom: hands-off policy encourages smallholder dynamism. World Bank Policy Research Working Paper No. 1580. Washington, DC, World Bank.
- Aziz MA (2002). Ecology of Asian elephant, *Elephas maximus* and its interactions with man in Chittagong and Chittagong Hill Tracts. Dhaka, Bangladesh, Jahangirnagar University.
- Aziz MA, Feeroz MM (2007). Damage to agricultural crops by mammalian fauna at the fringes of Lawachara National Park, Bangladesh. Tiger Paper 34:29-32.
- Aziz MA, Feeroz MM, Shahriar AFM (2005). Feeding movements of the Asian elephants in the Northern side of the River Karnaphuli in the Chittagong Hill Tracts, Bangladesh. Bangladesh J. Life Sci. 17:51-58.
- Bajracharya SB, Furlley PA, Newton AC (2006). Impacts of community-based conservation on local communities in the Annapurna Conservation area, Nepal. Biodiv. Conserv. 15:2765-2786.
- Baker M, Schutt A (2005). Managing monkeys and mangoes. Commensalism and conflict: the human-primates interface. Paterson JD, Wallis J. Oklahoma Am. Soc. Primatol. pp.444-463.
- BBS (2009). Statistical year book. Bangladesh Bureau of Statistics. Dhaka, Bangladesh, Government of People's Republic of Bangladesh.
- Campbell-Smith G, Simanjan HVP, Leader-Williams N, Linkie M (2010). Local attitudes and perceptions toward crop-raiding by orangutans (*Pongo abelii*) and other nonhuman primates in Northern Sumatra, Indonesia. Am. J. Primatol. 71:1-11.
- Chalise MK, Johnson RL (2005). Farmer attitudes toward the conservation of pest monkeys: the view from Nepal. Commensalism and conflict: the human-primates interface. Paterson JD, Wallis J. Oklahoma Am. Soc. Primatol. pp. 222-239.
- Chauhan A, Pirta RS (2010). Public opinion regarding human-monkey conflict in Shimla, Himachal Pradesh. J. Hum. Ecol. 30:105-109.
- Donald PF (2004). Biodiversity impacts of some agricultural commodity production systems. Conserv. Biol. 18:17-37.
- Eudey AA (1994). Temple and pet primates in Thailand. Revue d'écologie: la terre et la vie 49:273-280.
- Feeroz MM, Aziz MA, Islam MT, Islam MA (2003). Human-elephant conflicts in Southeastern hilly areas of Bangladesh. Proceedings of the Symposium on Human-Elephant Relationships and Conflicts, Colombo, Sri Lanka.

- Fiallo EA, Jacobson SK (1995). Local communities and protected areas: Attitudes of rural residents towards conservation and Machalilla National Park, Ecuador. *Environ. Conserv.* 22(3):241-249.
- Fuentes A, Southern M, Suaryana KG (2005). Monkey forests and human landscapes: is extensive sympatry sustainable for *Homo sapiens* and *Macaca fascicularis* in Bali?. Commensalisms and conflict: the primate human interface. Patterson JD, American Society of Primatology Publications.
- Fuentes A, Wolfe L (2002). Primates face to face: conservation implications of human-nonhuman primates interconnections. Cambridge, Cambridge University Press.
- Gadd ME (2005). Conservation outside of parks: attitudes of local people in Laikipia, Kenya. *Environ. Cons.* 32(1):50-63.
- Ghimire KB, Pimbert MP (1997). Social change and conservation: an overview of issues and concepts. Social change and conservation: environmental politics and impacts of national parks and protected areas. Ghimire KB, Pimbert MP. London, Earthscan Publ. Limit. pp.1-45.
- Gillingham S, Lee PC (1999). The impact of wildlife-related benefits on the conservation attitudes of local people around the Selous Game Reserve, Tanzania. *Environ. Conserv.* 26(3):218-228.
- Grove RH (1992). Origins of western environmentalism. *Sci. Am.* 30:42-47.
- Heinen JT (1993). Park people relations in Kosi Tappu Wildlife Reserve, Nepal-a socio-economic analysis. *Environ. Conserv.* 20:25-34.
- Hill CM (1998). Conflicting attitudes towards elephants around the Budongo Forest Reserve, Uganda. *Environ. Cons.* 26:218-228.
- Hill CM (2000). Conflict of interest between people and baboons: crop raiding in Uganda. *Int. J. Primatol.* 21(2):299-315.
- Hill CM (2004). Farmer's perspectives of conflict at the wildlife-agriculture boundary: some lessons learned from African subsistence farmers. *Hum. Dimen. Wildl.* 9:279-286.
- Hill CM, Weber AD (2010). Perceptions of nonhuman primates in human-wildlife conflicts scenarios. *Am. J. Primatol.*, 72: 919-924.
- Humble T (2003). Chimpanzees and crop raiding in West Africa. West African chimpanzees. Status survey and conservation action plan. Kormos R, Boesch C, Baker MI, Butynski TM. IUCN, Gland, Switzerland and Cambridge, UK, IUCN/SSC Primate Specialist Group pp.147-155.
- Infield M (1988). Attitudes of a rural community towards conservation and a local conservation area in Natal, South Africa. *Biol. Conserv.* 45:21-46.
- Islam MA, Khan MMH, Kabir MM, Das AK, Chowdhury MM, Feeroz MM, Begum S (1999). Man-elephant conflict in Bangladesh. *Banglad. J. Life Sci.* 11:31-36.
- IUCN (2006). IUCN Red List of Threatened Species. Retrieved accessed 22 December 2009, from <http://www.iucnredlist.org>.
- Khatun MUH, Ahsan MF, Røskaft E (2012a). Local people's perception of crop raiding by common langurs (*Semnopithecus entellus*) and human-langur conflict in Keshabpur, Bangladesh. *American Journal of Primatology* submitted.
- Khatun MUH, Ahsan MF, Røskaft E (2012b). Feeding behaviour and ecology of the common langurs (*Semnopithecus entellus*) of Keshabpur in Bangladesh. *Proceedings of the International Conference on Biodiversity – Present State, Problems and Prospects of its Conservation*, Chittagong, Bangladesh, NTNU.
- Khatun UH, Ahsan F, Røskaft E (in press). Population, composition, age and sex ratio in common langur (*Semnopithecus entellus*) groups of Bangladesh.
- Kideghesho JR, Røskaft E, Kaltenborn BP (2007). Factors influencing conservation attitudes of local people in Western Serengeti, Tanzania. *Biodiv. Conserv.* 16(7): 2213-2230.
- Knight J (1999). Monkeys on the move: the natural symbolism of people macaque conflict in Japan. *J. Asian Stud.* 58:622-647.
- Lee PC (2004). Who wins? Human-primate conflict in the context of conservation, development and gender. *Primate Eye* 84:15-16.
- Louden JE, Howells ME, Fuentes A (2006). 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.
- Malik I, Johnson RL (1994). Commensal rhesus in India: the need and cost of translocation. *Revue D Ecologie-La Terre Et La Vie* 49:233-244.
- McNeely JA (1995). Expanding partnership in conservation. Washington, DC, Island Press.
- Miah DM, Rahman LM, Ahsan MF (2001). Assessment of crop damage by wildlife in Chunati Wildlife Sanctuary, Bangladesh. *Tiger Paper* 28:22-28.
- Moguel P, Toledo VM (1999). Biodiversity conservation in traditional coffee system of Mexico. *Conserv. Biol.* 13:11-21.
- Naughton-Treves L (1996). Uneasy neighbours: wildlife and farmers around Kibaale National Park, Uganda. Department of Forest Resources and Conservation. Miami, USA, University of Florida. Ph.D. dissertation (issue).
- Naughton-Treves L (1997). Farming the forest edge: Vulnerable places and people around Kibale National Park, Uganda. *Geogr. Rev.* 87:27-46.
- Naughton-Treves L (1998). Predicting patterns of crop damage by wildlife around Kibale National Park, Uganda. *Conserv. Biol.* 12(1):156-168.
- Naughton-Treves L, Treves 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(4):596-606.
- Newmark WD, Leonard NL, Sariko HI, Gamassa DGM (1993). Conservation attitudes of local people living adjacent to five protected areas in Tanzania. *Biol. Conserv.* 63(2):177-183.
- Nijman V, Nekaris KAI (2010). Effects of deforestation on attitudes and levels of tolerance towards commensal primates (Cercopithecidae) in Sri Lanka. *Int. J. Pest. Manag.* 56:153-158.
- Parry D, Campbell BM (1992). Attitude of rural communities to animal wildlife and its utilization in Chobe Enclave and Mababe Depression, Botswana. *Environ. Conserv.* 19(3):245-252.
- Paterson JD (2005). Residents and immigrants: reactions and perceptions of crop raiding in Misindi District, Uganda. Commensalism and conflict: the human-primate interface. Paterson JD, Wallis, J. Norman Am. Soc. Primatol. 76-89.
- Petitt LJ, Petitt DR (2003). Evaluating the importance of human modified land for Neotropical bird conservation. *Conserv. Biol.* 17:687-694.
- Pirta RS, Gadgil M, Kharshikar AV (1997). Management of the rhesus monkey, *Macaca mulatta* and hanuman langur *Presbytis entellus* in Himachal Pradesh, India. *Biol. Conserv.* 79:97-106.
- Priston NEC (2005). Crop raiding by *Macaca ochreata brunescens* in Sulawesi: reality, perceptions and outcomes for conservations. Cambridge, UK, University of Cambridge. PhD (issue).
- Rao KS, Maikhuri RK, Nautiyal S, Saxena KG (2002). Crop damage and livestock depredation by wildlife: a case study from Nanda Devi Biosphere Reserve, India. *J. Environ. Manag.* 66(3):317-327.
- Reynolds V Ed. (2005). The chimpanzees of the Bodungo Forest: Ecology, behaviour and Conservation. Oxford, UK, Oxford University Press.
- Riley EP (2007). The human-macaque interface: conservation implications of current and future overlap and conflict in Lore Lindu National park, Sulawesi, Indonesia. *Am. Antropol.* 109:473-484.
- Ross C, Warren Y (2006). Primate and other mammalian maize pests in Gashaka, Nigeria. *Int. J. Primatol.* 27(S1):403.
- Røskaft E, Händel B, Bjerke T, Kaltenborn BP (2007). Human attitudes towards large carnivores in Norway. *Wildl. Biol.* 13(2):172-185.
- Saj TL, Sicotte P, Paterson JD (2001). The conflict between vervet monkeys and farmers at forest edge in Entebbe, Uganda. *Afr. J. Ecol.* 39(2):195-199.
- Sarker AHMR, Røskaft E (2010). Human attitudes towards conservation of Asian elephants (*Elephas maximus*) in Bangladesh. *Int. J. Biod. Conserv.* 2(10):316-327.
- Sarker AHMR, Røskaft E (2011). Human-wildlife conflicts and management options in Bangladesh with special reference to Asian elephants (*Elephas maximus*). *Int. J. Biod. Sci. Ecosyst. Serv. Manag.* 6(3):164-175.
- Sekhar NU (2003). Local people's attitudes towards conservation and wildlife tourism around Sariska Tiger Reserve, India. *J. Environ. Manag.* 69:339-347.
- Siex KS, Struhsaker TT (1999). Ecology of the Zanzibar red colobus monkey: Demographic variability and habitat stability. *Int. J. Primatol.*

- 20(2):163-192.
- Spergel B (1997). Compensation and substitute programmes. Seeking social sustainability in conservation. Borrini-Feyerabend G. Gland Switzerland IUCN: pp.91-93.
- Strum SC (1994). Prospects for managements for primate pests. *Revue d'écologie: la terre et la vie* 49:295-306.
- Strum SC, Southwick CH (1986). Translocation of primates. *Primates: the road to self-sustaining populations*. Benirschke K. New York, USA, Springer-Verlag Incorporated pp.949-957.
- Studsørd JE, Wegge P (1995). Park-people relationships - the case of damage caused by park animals around the Royal Bardia National Park, Nepal. *Environ. Conserv.* 22:133-142.
- Teas J (1978). Behavioural ecology of rhesus monkey (*Macaca mulatta*) in Kathmandu, Nepal. Baltimore, Maryland, USA, Johns Hopkins University.
- UN (2005). World population prospects: The 2004 revision.
- Wheatley BP, Putra DK (1994). The effects of tourism and conservation at the monkey forest in Ubud, Bali. *Revue d'écologie: la terre et la vie* 49:245-257.
- Wolfe LD (2002). Rhesus macaques: a comparative study of two sites, Jaipur, India and Silver springs, Florida. *Primates face to face*. Fuentes A, Wolfe LD. Cambridge, UK, Cambridge University Press pp.310-330.