Journal for Nature Conservation 68 (2022) 126223

Contents lists available at ScienceDirect

Journal for Nature Conservation

journal homepage: www.elsevier.com/locate/jnc

What determines attitude of local people towards tiger and leopard in Nepal?

Rajendra Dhungana [a,*], Tek Maraseni [b,c], Thakur Silwal [d], Kishor Aryal [b], Jhamak Bahadur Karki [e]

[a] Ministry of Forests and Environment, Singhadurbar, Kathmandu, Nepal
[b] University of Southern Queensland, Toowoomba, Queensland, Australia
[c] University of Sunshine Coast, Sunshine Coast, Queensland, Australia
[d] Tribhuvan University, Institute of Forestry, Pokhara, Nepal
[e] Kathmandu Forestry College, Koteshwor, Kathmandu, Nepal

ARTICLE INFO

Keywords:
Attitude
Big cat
Chitwan
Human-tiger conflict
Human-leopard conflict
Wildlife conservation

ABSTRACT

Understanding attitude of local people towards big cats is vital for conservation interventions to succeed. Taking tigers and leopards as focal species, we investigated local peoples' attitude towards four subjects—tiger, tiger conservation, leopard, and leopard conservation—considering demographic and socio-economic factors as well as past experience with such predators in Nepal's first national park and a world heritage site, Chitwan National Park. The data were collected from 414 local people using structured questionnaires and their attitude towards the four subjects determined. We performed ordinal logistic regression analysis to identify the best fitted model and significant variables affecting attitudes. While majority of the people (51%) strongly liked tigers, fewer people (38%) had similar view while it came to leopard. However, a greater proportion of people strongly agreed that the conservation of tigers (61%) and leopards (53%) is important. About 12% people had negative attitude towards both big cats. We found women and low income respondents to likely have negative attitudes and higher caste Hindus to have positive attitudes towards both big cats and their conservation. Better educated persons and the owners to larger herds of livestock only agreed on conservation of tiger but not leopard. Past experience with the predator negatively affected attitude towards tiger but not leopard. We suggest the identified cohort of people with negative attitudes be more targeted in conservation initiatives. The reasons behind the similarities and differences in peoples' attitudes are discussed and designation of species-specific programmes for both cats is recommended.

1. Introduction

Human-carnivore conflict is one of the most significant threats to conservation of carnivores worldwide. Whether it arises from predators wandering into human-dominated landscapes or from humans during use of wildlife habitats, the costs are paid by both (Gurung et al. 2008; Bhattarai and Fischer 2014). Felids are frequently reported to be involved in conflicts with humans in many areas where they share landscape. Big cats are found to be significantly involved in conflicts compared to smaller ones, with the Eurasian lynx (*Lynx lynx*), jaguar (*Panthera onca*), puma (*Puma concolor*), and snow leopard (*Uncia uncia*) experiencing 'high' conflicts, and tiger (*Panthera tigris*), leopard (*Panthera pardus*) and lion (*Panthera leo*) facing 'severe' conflict with humans (Inskip and Zimmermann, 2009).

To address conflict between humans and big cats, various conservation initiatives are underway in different countries. The success of such initiatives requires understanding the ecological and human dimensions of conflict including the perceptions and response of local affected communities towards these species (Mir et al. 2015). However, most of the studies have paid greater focus to the ecological side of conflict with little consideration towards anthropological aspects (Treves et al. 2006). Ecologists and wildlife managers often focus on management of wildlife populations and their impacts using ecological theories (Messmer 2009). As humans form a major part of the conflict problem (Kansy et al. 2014), consideration of human dimensions is crucial to articulate various policies and programmes to address

* Corresponding author.
E-mail address: rajendra.dhungana2@gmail.com (R. Dhungana).

https://doi.org/10.1016/j.jnc.2022.126223
Received 7 June 2021; Received in revised form 15 June 2022; Accepted 15 June 2022
Available online 21 June 2022

conservation issues (Treves et al. 2006). Human dimensions involves adoption of interdisciplinary approach including social sciences to improve management of wildlife (Decker et al. 2012; Bennett et al. 2017).

'Attitude' refers to positive or negative appraisal of an object (e.g., towards wildlife), and it consists of two components: cognitive (beliefs) and affective (feelings) (Verplanken et al. 1998; Glikman et al. 2012). Understanding attitudes could provide insights on how people would respond to various situations such as damages from wildlife, wildlife species acceptability in private or communal land, public compliance with conservation legislations, support for desired population size of a species, and willingness to cohabit with wild animals (Kansky, Kidd, & Knight, 2014; Manfredo, Vaske, Brown, Decker, & Duke, 2009). Globally, a number of studies have examined attitude of local people towards carnivores and have reported different factors including demographic, socioeconomic, past experience with wildlife, geographical proximity to reserve, culture, religion, and media news to determine peoples' attitudes (Oli et al. 1994; Morzillo et al. 2010; Bhattarai and Fischer 2014; Carter et al. 2014; Kansy et al. 2014; Mir et al. 2015; Reddy and Yosef 2016).

Nonetheless, the attitudes of local people are reported to vary across the carnivore species and socio-ecological settings. Many studies on tigers and leopards have focused on biology, predator–prey relationship, population modeling, conflict, and conservation (Reddy and Yosef 2016; Krishnakumar and Nagarajan 2020) and relatively fewer have investigated attitudes towards tigers (Bhattarai and Fischer 2014; Carter et al. 2014; Reddy and Yosef, 2016) and leopards (Mir et al. 2015; Mkonyi et al. 2017; Krishnakumar and Nagarajan 2020). As knowing general attitudes provides limited value for designing interventions (St John et al., 2011), species-specific studies involving several factors which affect attitude towards the predators are vital to design conservation programmes (Kidd et al. 2019). Such analysis will help to identify which cohort of people (e.g. male or women, low earning or high earning, particular ethnic community, etc.) should be targeted for the big cat conservation.

In this backdrop, this study was conducted in Nepal's Chitwan National Park to investigate local peoples' attitude towards two big cats — tigers and leopards — and identify a range of drivers affecting such attitudes. The significance of this study could be explained from three perspectives. First, this is apparently the first attitude survey contemporarily conducted for two sympatric big cats in Nepal which have comparable dietary and ecological requirements yet possess notable differences in nature, magnitude and extent of the conflict in which they get involved. For instance, in Chitwan National Park, tigers alone killed 120 persons during 1979–2014 (Gurung et al. 2008; Dhungana et al. 2018) and leopards reportedly killed no people and injured 36 people during 1998–2016 (Lamichhane et al. 2018). The differential attitudes towards these cats could be of importance to design species specific conservation interventions. Secondly, as the populations of both tigers and leopards in the park have increased over the past decades (CNP 2018; DNPWC and DFSC 2018), this study could be a measure to get insights on degree of public tolerance and acceptability towards these cats. Third, local peoples' attitudes are likely to shift over time (Carter et al. 2014) with conservation interventions and changing ecological scenarios. As such, this study can provide insights on any temporal change in attitude of local people towards tiger in Chitwan National Park considering the results of Carter et al. (2014) which investigated the spatial clusters of attitudes towards tigers using data from 2010.

In 2010 St. Petersburg Tiger Summit in Russia, Nepal along with other 12 tiger range countries had committed to double tiger populations by 2022. As Chitwan National Park harbors the largest population of tigers in Nepal, it obviously has the greatest role to fulfill the national commitment (CNP 2018; DNPWC and DFSC 2018). Leopards on the other hand are the most persecuted big cat and exhibit widespread distribution (Hunter and Balme 2004). As both big cat species experience frequent involvement in conflicts and it is imperative to garner local support for their conservation (Inskip and Zimmermann, 2009) understanding local peoples' view on these big cats and their conservation is of utmost importance. Such information can provide conservation managers with an opportunity to predict and design management interventions that are potentially supported by local communities (Kansy et al. 2014). Therefore, this paper aims to (1) examine the attitude of local people towards four subjects — tiger, tiger conservation, leopard, and leopard conservation, and (2) identify the determinants (demographic, socioeconomic, and past experience of tiger/leopard attacks on human and/or livestock) affecting attitude of local people towards the four subjects in Chitwan National Park, Nepal. We hypothesize better educated, employed, and young males of higher caste belonging to smaller households and with no experience of tiger/leopard encounter in the past to hold positive attitude towards tiger, leopard and their conservation.

2. Methods

2.1. Study area

Chitwan National Park is the first protected area of Nepal and currently covers 953 km^2 (Fig. 1). Located in Southern Central part of the country along Nepal-India border, it is one of the global biodiversity hotspots that harbors globally endangered species including the tiger, one-horned rhinoceros (*Rhinoceros unicornis)*, Asian elephant (*Elephas maximus)*, and gharial crocodile (*Gavialis gangeticus)*. It encompasses a mosaic of Sal (*Shorea robusta)* forests, grasslands, water bodies, and exposed surfaces (sandy banks of river and eroded areas).The park is internationally recognized as a World Heritage Site, Ramsar Site and has become the first site to be accredited as Conservation Assured Tiger Standard (CA|TS), for demonstrating its excellence in tiger conservation and protection (CNP 2018).

The buffer zone currently spanning over 729 km^2 around the national park was officially designated in 1996 (CNP 2018). It comprises forest patches, grasslands, farmlands, human settlements, and water bodies. The area provides forest resources to local people and serves as a wildlife habitat and corridor for their movement between the park and adjoining landscape (Dhungana et al. 2019). As of 2012, nearly 70,000 households reside in the buffer zone (CBS 2012), majority of whom are dependent on forest resources for farming and livestock husbandry. The buffer zone has been divided into 22 user committees which elect a Buffer Zone Management Committee as an apex body. These committees are vital in mobilizing local people in conservation (Dhungana et al. 2016). Thirty to fifty percent of the annual park revenue is channeled back to these committees to conduct conservation, community development, income generating activities, and conservation awareness programmes among local communities (Silwal et al. 2017; CNP 2018).

2.2. Data collection

Household survey was the primary method of data collection, which was complemented by key informant interview and literature review. The key informant interviews and literature review contributed in development of questionnaire for conducting the survey. Data were collected from local communities in the buffer zone of Chitwan National Park using a couple of structured questionnaires in Nepali – one each for tiger and leopard. The communities in general exhibit homogeneity in distribution, socio-economic status, and knowledge on leopard and tiger. The first questionnaire (tiger survey) involved details on attitude towards 'tiger' and 'tiger conservation' whereas the second questionnaire (leopard survey) involved details on attitude towards 'leopard' and 'leopard conservation'. A total of 414 people of randomly selected households were surveyed, among which 202 respondents participated in tiger survey and 212 in leopard survey. For each tiger and leopard surveys, five different hamlets/villages were first purposively selected from each of the four management units of Chitwan National Park. Then,

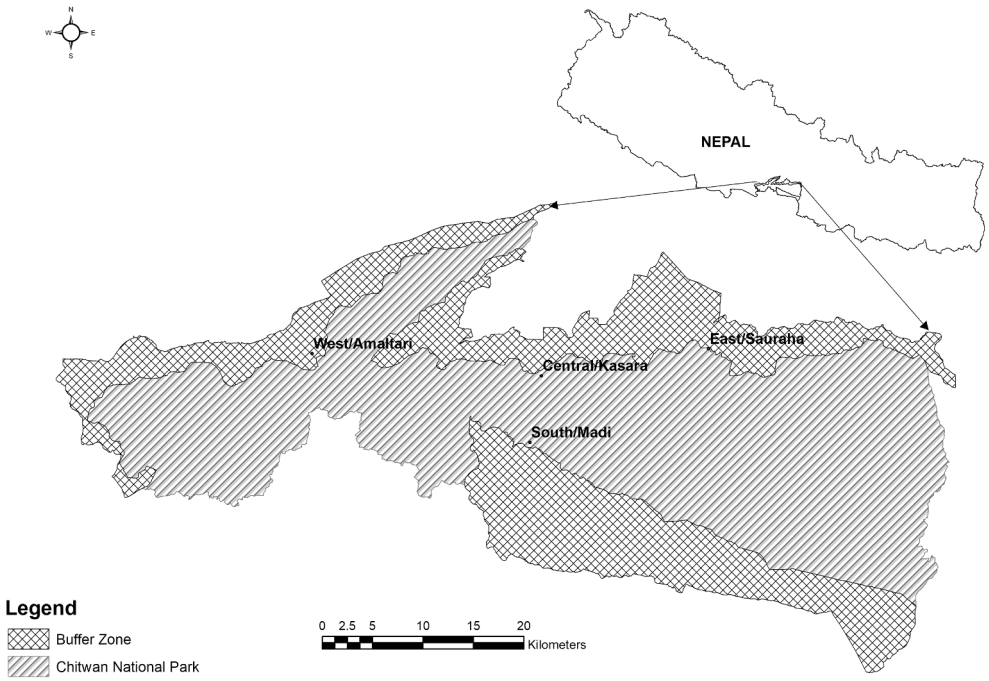

Fig. 1. Map of Chitwan National Park depicting its buffer zone and four management units.

11 households from each hamlet/village were randomly selected using a table of random numbers considering the complete list of households in respective hamlet/village. The households from one of the five hamlets/villages in each management unit participated in both surveys (overlapped) accounting ~20% (n = 44) of surveyed households. Thus, two sets of 220 households were selected as candidate respondents for tiger and leopard surveys with the response rates being 91.8% (n = 202) and 96.4% (n = 212) respectively. As the study area exhibits homogeneity in socio-economic, ecological and geographic attributes, and geographical representativeness of the household was well maintained while selecting the sample, we believe that the sample is representativeness of the population.

The respondents were preferably the household head and if unavailable was other family member but had to be an adult of 18 years or older. The questionnaires in Nepali were pre-tested with 19 community members and then administered with the help of trained local field assistants. Prior to each household survey, aim of this study was briefed to each respondent and their consent received. In addition, using a checklist, key informant interview (n = 12) was conducted with a national park warden, farmers, community forest users, tourist guides, and hotel operators to get insights on various dimensions of human-big cats conflict in the park. The checklist included a set of open ended questions aimed at collecting qualitative information in various aspects including the scenario of human-big cats conflict and their impacts, adopted conflict mitigation measures, and the role and perspective of different stakeholders in conflict mitigation. The interview was conducted in Nepali upon receiving consent of the interviewees and their responses were translated to English during evaluation. The household survey and key informant interview were conducted during August-November 2020.

Each of the two questionnaires included three sections: (i) socio-demographic (gender, age, household size, education, occupation, income, livestock holding, ethnicity) and geographic details (management unit of the park), and past experience of the respondent with tiger or leopard (any human casualties or livestock depredation by these species in respondents' family in the last 10 years) (ii) Question regarding attitude towards tiger/leopard - To what degree you like this species in your locality? The response of each respondent was recorded in a five-point likert scale as "strongly dislike", "slightly dislike", "neutral", "slightly like", and "strongly like". (iii) Question regarding attitude towards the conservation of tiger/leopard - To what degree do you agree that its conservation is important? The response of each respondent was recorded in a five-point likert scale as "strongly disagree", "slightly disagree" "neutral", "slightly agree", and "strongly agree". The 10 variables in section (i) were categorized as gender (male; women), age in years (18–39; 40–59;>60), household size (1–3 persons; 4–6; >7), education (illiterate; literate - can read and write own name; secondary level education completed; at least or higher secondary level education completed), occupation (agriculture/livestock husbandry; business-hotel, grocery, cloth shops, etc.; employed; fishing), annual income (<500 USD; 501–3,000 USD; >3,001 USD), livestock holding (none, 1–3 livestock heads; 4–6; >7), ethnicity (higher caste Hindu-Brahmin/Chhetri; hill Tibeto-Burmese; terai Tibeto-Burmese;lower caste Hindu-dalit; Carter et al. 2014), management unit of the park (Amaltari; Kasara; Madi; Sauraha), and past experience with tiger or leopard (yes; no). Within occupation variable, unlike other categories which usually refer to 'self-employed' nature of income generating activities, 'employed' category of respondents included people holding certain job/position in an organization such as government or private office, bank, etc.

2.3. Data analysis

The statistical analysis was done in R v. 3.6.3 (R Core Team, 2020). We did Chi Square tests to find any significant difference in attitude of local people towards each of the four subjects—'tiger', 'tiger conservation', 'leopard', and 'leopard conservation'.

While Logistic Regression analysis usually allows modelling of dichotomous dependent variable with the independent variables (O'Connell, 2006), its extension called "Ordinal Logistic Regression" is used to model ordinal dependent variable (e.g. Likert scale data with >3 categories) as a function of continuous or categorical independent variables (Warner, 2008; Adejumo and Adetunji, 2013; Erkan and Yildiz, 2014). So, we used Ordinal Logistic Regression using 'polr' function in R (Liang et al. 2020; Eboli and Mazzulla, 2009; Mutanga et al. 2016; Auster et al. 2019) to evaluate which independent variables affected

attitude of local people towards tiger, tiger conservation, leopard, or leopard conservation. For attitude towards 'tiger' and 'leopard', the ordinal response (1-Strongly dislike, 2-Slightly dislike, 3-Neutral, 4-Slightly like, 5-Strongly like) was treated as a dependent variable and the 10 variables mentioned in "Data collection" section above were considered as independent variables. Likewise, for attitude towards 'tiger conservation' and 'leopard conservation', the ordinal response (1-Strongly disagree, 2-Slightly disagree, 3-Neutral, 4-Slightly agree, 5-Strongly agree) was treated as a dependent variable and the 10 variables were considered as independent variables. Responses 1 and 2 represented a negative attitude of the relationship, 3 represented a neutral attitude, and 4 and 5 represented a positive attitude. The mean scores (M) illustrating attitude towards each of the four subjects were calculated by coding the responses as strongly dislike/disagree (−2), slightly dislike/disagree (−1), Neutral (0), slightly like/agree (+1), and strongly like/agree (+2) (Engel et al. 2016).

We tested our data to confirm whether it met both assumptions of ordinal logistic regression – Proportional odds and multicollinearity (Mutanga et al. 2016). All the variables met the assumptions except 'management unit of the park' which showed multicollinearity (GVIF value > 5.0) and it was therefore dropped from further analysis. Using ordinal logistic regression, we first built a set of plausible models defining attitudes towards each of the four subjects (tiger, tiger conservation, leopard and leopard conservation) by combining different potential independent variables and their interaction effects based on priori knowledge of the system. Secondly, using Akaike Information Criteria (AIC), we identified a best model defining attitude towards each of the four subjects under study (total four best models). The significant independent variables defining each best models were identified considering a criterion of Odds Ratio (OR) and Confidence Interval (Auster et al. 2019).

3. Results

3.1. Attitude of local people towards tiger, leopard and their conservation

There exist significant differences in degree to which people liked tigers and leopards and agreed on importance of their conservation (Table 1). Majority of people (51%) strongly liked to have tigers in their locality ($\chi2 = 202.01$, df = 4, $p < 0.0001$) and 61% strongly agreed that tiger conservation is important ($\chi2 = 259.7$, df = 4, $p < 0.0001$). Overall, people had positive attitude towards tigers (M = 1.19, SD = 1.14) and their conservation (M = 1.40, SD = 0.99). On the other hand, less than half people surveyed (48%) slightly liked leopards and fewer people (38%) would strongly like to have leopards in their locality ($\chi2 = 174.3$, df = 4, $p < 0.0001$). However, majority of the respondents (53%) opined that leopard conservation is strongly needed and 36% people somewhat agreed that their conservation is important ($\chi2 = 209.7$, df = 4, $p < 0.0001$). Notably, seven percent people strongly disliked tigers and leopards and four percent strongly disagreed on conservation of these big cats. Overall, people had positive attitude towards leopards (M = 1.04, SD = 1.12) and their conservation (M = 1.31, SD = 0.97).

Table 1
Attitude of people towards (a) tiger, (b) tiger conservation, (c) leopard, and (d) leopard conservation in Chitwan National Park, Nepal.

	% of respondents (n = 202)		% of respondents (n = 212)
(a) Tiger		(c) Leopard	
Strongly like	51	Strongly like	38
Slightly like	37	Slightly like	48
Neutral	1	Neutral	3
Slightly disagree	4	Slightly disagree	5
Strongly disagree	7	Strongly disagree	7
(b) Tiger conservation		(d) Leopard conservation	
Strongly agree	61	Strongly agree	53
Slightly agree	29	Slightly agree	36
Neutral	4	Neutral	6
Slightly disagree	2	Slightly disagree	2
Strongly disagree	4	Strongly disagree	4

The attitude of most local people is found to be positive towards each of the four factors examined (Fig. 2). Notably, 12% people held negative attitude towards tiger and leopard (strongly dislike/disagree and slightly dislike/disagree combined), and even fewer people had similar attitude towards conservation of these big cats.

3.2. Determinants of attitude towards 'tiger' and 'tiger conservation'

Using ordinal logistic regression analysis, we formulated two sets of 11 models with each set explaining attitude towards tiger, and tiger conservation (see supplementary material). The attitude towards tiger was best explained by a model comprising six variables — gender, age, household size, annual income, ethnicity, and past experience with the tiger. Among these, the gender, annual income, ethnicity, and past experience with the tigers were the significant ones (Table 2). People were found to likely have a negative attitude if they were women (ß = −1.50 ± 0.36, OR = 0.22), and experienced human casualties and/or livestock depredation to tigers during the last 10 years (ß = −1.76 ± 0.51, OR = 0.17), whereas the members of higher caste Hindu (ß= 1.41 ± 0.44, OR = 4.08), and the people with higher level of annual income (ß=1.47 ± 0.60, OR = 4.34) had positive attitude towards tigers. In particular, the odds of women to have positive attitudes was 78% (1–0.22; OR = 0.22) less likely than those of males. The odds of people experiencing tiger attacks in the past were likely to have negative attitudes 83% (1–0.17) higher than those who did not. The odds of higher caste Hindu having positive attitude towards tiger was four times (OR = 4.08) than people belonging to terai Tibeto-Burmese origin. Likewise, the odds of well off people to have positive attitudes was over four times (OR = 4.34) compared to those who were not. No signification association was found between other ethnic groups (e.g. Hill Tibeto-Burmese, and lower caste Hindu) and their attitude towards tiger.

Similarly, the model comprising gender, household size, education, income, livestock holding, higher caste Hindu ethnicity, and past experience with tiger best explained attitude towards tiger conservation. Among these, all six variables except household size significantly affected attitude towards tiger conservation (Table 3). As such, women are 57% (1–0.43) less likely (ß = −0.85 ± 0.4, OR = 0.43) to realize the need of tiger conservation whereas better educated persons (ß = −1.45 ± 0.48, OR = 4.27), members of higher caste Hindu (ß=1.28 ± 0.54, OR = 3.58), and those with bigger number of livestock (ß=1.05 ± 0.45, OR = 2.86) opined that their conservation is necessary. Conversely, odds of persons who suffered tiger attacks in the past were less likely (by 69%) to think that conservation of tiger is important (ß = −1.18 ± 0.61, OR = 0.31) than those who did not.

3.3. Determinants of attitude towards 'leopard' and 'leopard conservation'

Two sets of 11 models were formulated with each set explaining attitude towards leopard, and leopard conservation (see supplementary material). The attitude towards leopard was best explained by a model comprising all nine variables — gender, age, household size, education, occupation, annual income, livestock holding, ethnicity, and past experience with the tiger. However, only gender (ß = −1.17 ± 0.39, OR = 0.31), annual income (ß=1.11 ± 0.56, OR = 3.03), and ethnicity (ß=1.24 ± 0.43, OR = 3.45) significantly affected attitudes (Table 4). Often, women were less likely (by 69%) to have positive attitudes towards leopards than males whereas people with high income and the members of higher caste Hindu had positive attitudes more than three times compared to low earning people and those belonging to terai

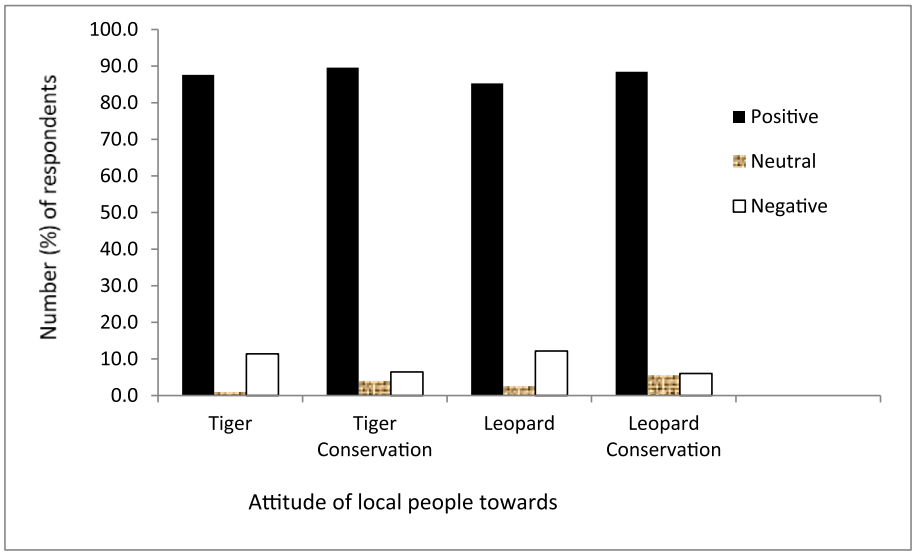

Fig. 2. Attitude of local people towards the four subjects examined —tiger, tiger conservation, leopard and leopard conservation, in Chitwan National Park, Nepal.

Table 2
Ordinal logistic regression analysis results of variables affecting attitude towards tiger in Chitwan National Park, Nepal.

					95% Confidence Interval for Odds Ratios		
Independent variable	ß	S.E.	t	Odds Ratio	Lower	Upper	p
Gender							
Female	−1.50	0.36	−4.17	0.22	0.11	0.45	0.000***
Male (reference)	0.00		0.00				
Age	−0.33	0.39	−0.86	0.72	0.34	1.55	0.391
Household Size	−0.08	0.43	−0.18	0.93	0.39	2.12	0.858
Annual Income	1.47	0.60	2.44	4.34	1.51	17.75	0.015*
Ethnicity							
Higher caste Hindu	1.41	0.44	3.23	4.08	1.77	9.84	0.001***
Lower caste Hindu	0.13	0.47	0.27	1.14	0.45	2.93	0.784
Hill Tibeto-Burmese	−0.07	0.41	−0.17	0.93	0.41	2.11	0.866
Terai Tibeto-Burmese (reference)	0.00		0.00				
Past experience with tiger							
Yes	−1.76	0.51	−3.45	0.17	0.06	0.46	0.001***
No (reference)	0.00						

Significant at: *p < 0.05, **p < 0.01 and ***p < 0.001.

Table 3
Ordinal logistic regression analysis results of variables affecting attitude towards tiger conservation in Chitwan National Park, Nepal.

					95% Confidence Interval for Odds Ratios		
Independent variable	ß	S.E.	t	Odds Ratio	Lower	Upper	p
Gender							
Female	−0.85	0.40	−2.12	0.43	0.19	0.93	0.034*
Male (reference)	0.00						
Household Size	0.54	0.49	1.10	1.71	0.65	4.53	0.272
Education	1.45	0.48	3.00	4.27	1.67	11.25	0.003**
Annual Income	1.43	0.51	−1.98	4.18	0.05	8.76	0.030*
Livestock holding	1.05	0.45	2.31	2.86	1.21	7.33	0.021
Ethnicity							
Higher caste Hindu	1.28	0.54	2.38	3.58	1.30	10.87	0.017
Lower caste Hindu	0.18	0.58	0.32	1.20	0.39	3.80	0.751
Hill Tibeto-Burmese	−0.16	0.48	−0.33	0.85	0.33	2.19	0.740
Terai Tibeto-Burmese (reference)	0.00						
Past experience with tiger							
Yes	−1.18	0.61	−1.93	0.31	0.09	1.03	0.008**
No (reference)	0.00						

Significant at: *p < 0.05, **p < 0.01 and ***p < 0.001.

Tibeto-Burmese origin respectively.

On the other hand, the attitude towards leopard conservation was best explained by a model comprising gender, age, household size, education, occupation, annual income, and ethnicity. Among these, only the gender (ß = −0.98 ± 0.38, OR = 0.38) and annual income (ß=1.98 ± 0.84, OR = 7.24) variables significantly affected attitudes (Table 5).

Table 4
Ordinal logistic regression analysis results of variables affecting attitude towards leopard in Chitwan National Park, Nepal.

Independent variable		ß	S.E.	t	Odds Ratio	95% Confidence Interval for Odds Ratios		p
						Lower	Upper	
Gender								
	Female	−1.17	0.39	−3.02	0.31	0.14	0.66	0.00***
	Male (reference)	0.00						
Age		0.19	0.44	0.44	1.21	0.51	2.88	0.66
Household Size		−0.05	0.43	0.12	0.95	0.41	2.23	0.91
Education		−0.09	0.59	0.14	0.92	0.29	2.96	0.89
Occupation								
	Business	0.82	0.57	1.44	2.27	0.76	7.08	0.15
	Fishing	−1.03	0.84	−1.23	0.36	0.06	1.83	0.22
	Employed	0.22	0.50	0.12	1.25	0.47	3.35	0.66
	Agriculture/Livestock husbandry (reference)	0.00						
Annual Income		1.11	0.56	1.99	3.03	1.04	9.40	0.05*
Livestock holding		0.04	0.38	0.11	1.04	0.45	2.03	0.91
Ethnicity		0.00						
	Higher caste Hindu	1.24	0.43	2.89	3.45	1.51	8.12	0.00***
	Lower caste Hindu	0.20	0.59	0.33	1.22	0.39	3.88	0.74
	Hill Tibeto-Burmese	−0.29	0.46	0.64	0.74	0.30	1.84	0.52
	Terai Tibeto-Burmese (reference)	0.00						
Past experience with leopard								
	Yes	1.51	1.28	1.52	4.53	0.24	141.06	0.32
	No (reference)							

Significant at: *p < 0.05, **p < 0.01 and ***p < 0.001.

Table 5
Ordinal logistic regression analysis results of variables affecting attitude towards leopard conservation in Chitwan National Park, Nepal.

Independent variable		ß	S.E.	t	Odds Ratio	95% Confidence Interval for Odds Ratios		p
						Lower	Upper	
Gender								
	Female	−0.98	0.38	−2.56	0.38	0.18	0.79	0.01*
	Male (reference)	0.00						
Age		0.13	0.42	0.30	1.13	0.50	2.62	0.77
Household Size		0.60	0.44	1.37	1.82	0.77	4.30	0.17
Education		0.52	0.60	0.86	1.67	0.52	5.49	0.39
Occupation								
	Business	−0.39	0.56	0.69	0.68	0.23	2.07	0.49
	Fishing	−0.19	0.77	−0.24	0.83	0.18	3.85	0.81
	Employed	0.23	0.52	0.45	1.26	0.46	3.62	0.79
	Agriculture/Livestock husbandry (reference)	0.00						
Annual Income		1.98	0.84	2.35	7.24	1.75	63.12	0.02*
Ethnicity		0.00						
	Higher caste Hindu	0.36	0.44	0.83	1.43	0.61	3.40	0.41
	Lower caste Hindu	−0.21	0.55	0.39	0.81	0.27	2.42	0.70
	Hill Tibeto-Burmese	−0.03	0.45	0.07	0.97	0.40	2.35	0.94
	Terai Tibeto-Burmese (reference)	0.00						

Significant at: *p < 0.05, **p < 0.01 and ***p < 0.001.

Here, the women were 62% more likely to see conservation of leopard as unimportant compared to males whereas people with higher income were in the view that leopard conservation is necessary (by seven times) than those earning less.

4. Discussion

The hypothesis of this study have been supported to a greater extent by its findings. While we found males with higher income and education and belonging to higher caste Hindu and with past experience with tiger/leopard to have positive attitudes towards tiger, leopard, tiger conservation or leopard conservation, three factors — age, occupation and household size — did not have any significant relationship with the attitudes towards both big cats or their conservation.

4.1. Local peoples' attitudes and potential reasons behind the attitudes

Our study found the local people around the park to generally show positive attitude towards tiger, leopard, and their conservation and a small fraction of respondents to depict negative attitudes (~12%). The finding is comparable to reports of positive attitude of majority of local people towards tiger in Central India (Reddy and Yosef, 2016), leopard in Western Ghats, India (Krishnakumar and Nagarajan 2020) and jaguar and puma in Brazil (Conforti and Azevedo 2003). In contrast, other studies have reported the opposite scenario where most local people held strongly negative attitudes towards the predators such as wolves (*Canis lupus*) in Mongolia (Mishra et al. 2003) and snow leopards in Annapurna Conservation Area in Nepal where locals viewed their total extermination as the only solution (Oli et al. 1994).

A number of reasons could have attributed to positive attitudes in Chitwan National Park. Particularly, the benefits garnered from the wildlife-based tourism, conservation awareness, provision of compensatory payments for predator attacks on humans and livestock as well as moral conscience, ecological and religious value of such species may have played a significant role in shaping positive attitudes (Bhattarai and Fischer 2014; Krishnakumar and Nagarajan 2020).

Similarly, the proactive response of park authorities in conflict mitigation including the removal of conflict-involved predators may

have helped develop positive attitude among communities (Inskip and Zimmermann 2009; Dhungana et al. 2016). Of the 15 tigers identified to be involved in conflict with humans in Chitwan during 2007–2014, 11 tigers were killed, relocated or kept in captivity by the authorities (Dhungana et al. 2016).

We found the 12% people potentially dislike tigers, compared to 30% that used to dislike a decade ago (Carter et al. 2014). The potential reasons behind such negative attitude could be due to lack of access to and equitable sharing of conservation benefits, lack of conservation awareness, unavailability of reasonable compensation for loss of human and livestock, and real or perceived threat of tiger and leopards, among others (Nyhus et al. 2003; Carter et al. 2014). Though the reduction in negative attitude from 30% to 12% indicates development of goodwill among people towards tiger, prevalence of such negative attitude in the community should not be overlooked. Whatever the number is, such group of people should not be excluded from conservation initiatives because persistent negative attitudes can led to retaliatory killings as is exemplified by killing of four tigers by local people during 2007–2014 in Chitwan National Park (Dhungana et al. 2016) and six tigers during 1989–2009 in Bardia National Park, Nepal (Bhattarai and Fischer 2014).

Interestingly, our study found the greater fraction of people to hold a strong affinity towards tigers than leopards (51% vs. 38%). Though both big cats belong to the same guild, the reasons for difference in peoples' attitudes towards these species could be best explained by variation in their conservation priority, level of protection offered, and public attention they receive. In addition, differential role on tourism promotion, fund generation as well as differences in their distribution and conflict involvement of these two species could be other reasons. Unlike 'vulnerable' leopards which are ubiquitous and received little conservation preferences, the 'endangered' tigers are charismatic and flagship species enlisted in the protected species category of the country and has received more attention and conservation priorities.

4.2. Factors affecting attitudes

This study explored factors governing attitude of local people towards tiger, leopard, and their conservation in Chitwan National Park. While the two species differ much in ecology, human interface and conservation domains, this study has identified two common factors—gender, income, to significantly affect attitude of local communities towards these cats and their conservation. Consistent to the report of Carter et al. (2014) based on a study a decade ago, the past experience with tiger significantly affected attitudes towards tiger and their conservation in this study as well. However, this was not the case when it came to leopard and their conservation. Among the factors examined, three factors —age, occupation, and household size, were not found to significantly affect attitude towards tiger, leopard or their conservation.

As also reported from previous studies in different areas of Nepal and India (Carter et al. 2014; Bhattarai and Fischer 2014; Mir et al. 2015, Krishnakumar and Nagarajan 2020), we found that women were likely to have a negative attitude towards tiger and leopard, and also feel that their conservation is less important. This can be attributed to a lesser exposure of women to carnivores than men, prevalence of greater fear of such animals among women (Røskaft et al., 2003; Mir et al. 2015) and the bigger costs the women pay for conflict incidents as is exemplified by social stigma attached with 'tiger widow' in Bangladesh (Islam and Chuenpagdee 2013). Likewise, the people with higher income showed greater affinity towards both cats and their conservation. This is perhaps because wealthier families suffer less from wildlife damages compared to poor ones (Dhungana et al. 2016).

Notably, annual income positively affected attitude towards both big cats and their conservation. We assume that the positive attitude of well off families may have mainly stemmed from their better access to conservation awareness, education, conservation benefits, and compensation payments as well as their enhanced capacity to cope up with potential costs of tiger and leopard conservation. Our finding has management implications especially in identifying the potential group of people whom the conservation interventions should be targeted at. As such, the marginalized and poor people with low income and limited means of livelihood should be prioritized for participation in conservation initiatives and the equitable benefits arising from conservation of tigers and leopards should be channelized back to such communities. The people with higher income on the other hand can contribute better in awareness raising and community mobilization for conservation.

On ethnicity, our findings demonstrated that higher caste Hindu have more positive attitudes towards tiger, leopard and their conservation compared to other ethnic groups, although their attitude towards leopard conservation is found to be statistically non-significant. This corroborates the finding of Heinen (1993) in Kosi Tappu Wildlife Reserve, Nepal where higher caste Hindu were more supportive of wildlife conservation. Such attitude differences among ethnic communities reflect overall disparity in Nepal where higher caste Hindus enjoy political and socioeconomic influence more than lower income communities which are most often resource dependent and could experience higher levels of negative impacts from tiger conservation efforts. In contrast to those in 2010 when the lower caste Hindu communities in Chitwan were reported to have significant negative attitude towards tigers (Carter et al. 2014), no such tendency has been found to exist among the lower caste Hindu communities currently. This indeed is a positive development occurred over a decade.

Besides the three factors discussed above (gender, income, and ethnicity), a fourth factor—past experience with tiger— is found to negatively affect peoples' attitude towards the tiger and its conservation. This finding contradicts that reported for jaguars in Brazil where no difference in attitude existed between the respondents experiencing predation to jaguars and those who did not (Conforti and Azevedo 2003). Nonetheless, our study is consistent with the finding in Kashmir which showed the people who lost human and/or livestock to wildlife in the past to have negative attitudes towards such animals (Mir et al. 2015). Interestingly, unlike tigers' case, this factor of past experience did not affect attitudes towards leopards and their conservation. This discrepancy is perhaps due to greater involvement of tigers in human and livestock attacks than leopards. For instance, in Chitwan, during 1998–2016, tigers resulted in deaths of 64 people and injury of 55 whereas leopards did not kill any people and injured 36 individuals (Lamichhane et al. 2018). By contrast, tigers and leopards were responsible for about equal levels of livestock depredation (44 heads/year vs. 42/year respectively; Dhungana et al. 2018, 2019). In Bardia National Park, Nepal, Bhattarai and Fischer (2014) reported the willingness of people to tolerate livestock losses but not human attacks. Therefore, reducing human-tiger conflict would be a key to further develop positive attitude towards tigers and their conservation in Chitwan National Park.

Our study illustrated owners with more livestock holding exhibiting positive attitudes towards tigers. This contradicts to the perception of bigger livestock owners towards predators in Kashmir (Mir et al. 2015). In Brazil, medium-sized herders tended to have positive attitudes towards jaguar and puma but small and large sized herders did not show any tendency (Conforti and Azevedo 2003). We assume a couple of reasons to have led to our finding. First, more livestock may indicate a wealthier family, the loss of few livestock from a well off family can have a little impact whereas the loss of the same number of livestock can be devastating for a poor family (Bhattarai and Fischer 2014), and thus the potential predator could be perceived as a bigger threat in a poor family. Second, a wealthier family may have a greater socio-political influence and can have better access to compensation or insurance for losses from predators and this could eventually neutralize their negative attitude towards tiger.

Regarding education, similar to those reported by Carter et al (2014) in Chitwan, we also found the less likely support of people with less formal education for tiger conservation, the result also corroborating with a finding in Sweden where less educated persons exhibited negative

perception towards wolves (Ericsson and Heberlein 2003). In contrast, in Kenya, education level did not correlate with attitude towards elephants (*Loxodonta africana*; Gadd 2005). Nonetheless, as education can enhance tolerance for carnivores through rationalization of attitudes (Woodroffe et al. 2005) and by broadening people's perspective on predator conservation and shaping their attitudes (Espinosa and Jacobson, 2012), the need ahead is to scale up conservation education programmes targeting illiterate and less educated people around the park. In addition, digging deeper into underlying reasons why these groups are less tolerant or less likely to like tiger and their conservation is of utmost importance.

All these findings of this study highlight the need to implement conservation interventions around Chitwan National Park that target groups of people likely to hold negative attitudes such as women, low income families and those belonging to Tibeto-Burmese origins. In addition to specific interventions, targeted research should be conducted so as to explore how people view government response to conflict – do they respond fast enough, are the compensation payments equitably and fairly distributed, and what else might be driving those identified specific groups to have more negative attitudes towards big cats and their conservation.

5. Study limitations and recommendations for future research

The study has mainly considered a set of 10 socio-economic and demographic factors in investigating attitude of local people around the park. As additional ecological as well as other socio-demographic variables are also likely to influence attitudes, we suggest in depth studies be conducted by including additional potential factors. As the conservation success of tiger and leopard largely depends on perspective of a range of stakeholders in addition to the local people considered in this study, we suggest future researches include other stakeholders such as local governments, community based organizations, and local non-government organizations. Our study is based on limited sample size of households ($n = 414$) and we encourage future studies to consider increasing the sample size. This study has mainly focused on identifying significant socio-demographic factors determining attitudes and falls short to analyze the causative factors leading to such attitudes. We recommend future work to also examine causative factors, and also investigate how the access and distribution of the conservation benefits influence attitude of conservation stakeholders.

6. Conclusions

Our study has some implications for conservation of tigers and leopards in Nepal and other countries having comparable socio-ecological settings. Despite frequent attacks on humans and livestock, our findings depicting prevalence of wider local support for big cats' conservation could signal support for an increase in tiger (and leopard) populations given the backdrop of a global commitment to double tiger populations by 2022 in all 13 tiger range countries including Nepal. Nonetheless, the local people who expressed resentment towards the big cats (12%) should not be overlooked as it may catalyze their retaliatory killing. As women, and people with lower income, lower education, fewer livestock and those who suffered tiger attacks in the past are found to have negative attitudes towards tigers or their conservation; such cohort of people should be identified and provided with specially designed conservation programmes. Various strategies could target affected communities, and selecting which strategies are most appropriate should be done collaboratively with involved communities, so they match social context and are more likely to garner community support. Finally, considering differences in factors affecting attitudes towards the two species, we suggest implementation of species-specific programmes focusing tigers and leopards.

7. Funding

This work was supported by the Rufford Foundation (28875-B).

8. Ethics approval

The research permit including ethical clearance was duly received from the Department of National Parks and Wildlife Conservation, Nepal (Reference no. 076/77 Eco 60, 1767) and this work also received an approval from the Chitwan National Park, Nepal. This work complies with the ethical code of conduct as specified in the guidelines of the Journal for Nature Conservation.

9. Consent to participate

The informed consent was obtained from all respondents involved in household survey and key informant interview.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

We thank the Rufford Foundation (28875-B) for providing financial support to conduct this study. We acknowledge the Department of National Parks and Wildlife Conservation, and Chitwan National Park for providing study permission. We are grateful to all field assistants as well as national park staffs and community members for their help in data collection. We thank two anonymous reviewers for their constructive comments.

References

Adejumo, A. O., & Adetunji, A. A. (2013). Application of ordinal logistic regression in the study of students' performance. *Mathematical Theory and Modeling, 3*, 10–19.

Auster, R. E., Puttock, A., & Brazier, R. (2019). Unravelling perceptions of Eurasian beaver reintroduction in Great Britain. *Area, 52*, 364–375.

Bennett, N. J., Roth, R., Klain, S. C., Chan, K., Christie, P., Clark, D. A., … Greenberg, A. (2017). Conservation social science: Understanding and integrating human dimensions to improve conservation. *Biological Conservation, 205*, 93–108.

Bhattarai, B. R., & Fischer, K. (2014). Human–tiger *Panthera tigris* conflict and its perception in Bardia National Park, Nepal. *Oryx, 48*, 522–528.

Carter, N. H., Riley, S. J., Shortridge, A., Shrestha, B. K., & Liu, J. (2014). Spatial assessment of attitudes towards tigers in Nepal. *Ambio, 43*, 125–137.

CBS (2012). National Population Census (2011). Household and Population by Sex (Ward Level) Parsa, Makwanpur, Chitwan, and Nawalparasi Districts. Central Bureau of Statistics, Kathmandu, Nepal.

CNP (2018). Management plan of chitwan national park and its buffer zone (2075/76-2079/80), Chitwan National Park Office, Kasara, Chitwan, Nepal.

Conforti, V. A., & Azevedo, F. C. C. (2003). Local perceptions of jaguars (*Panthera onca*) and pumas (*Puma concolor*) in the Iguaçu National Park area, south Brazil. *Biological Conservation, 111*, 215–221.

Decker, D.J., Riley, S.J., & Siemer, W.F. (Eds.) (2012). Human dimensions of wildlife management. JHU Press.

Dhungana, R., Savini, T., Karki, J. B., & Bumrungsri, S. (2016). Mitigating human-tiger conflict: An assessment of compensation payments and tiger removals in Chitwan National Park, Nepal. *Tropical Conservation Science, 9*, 776–787.

Dhungana, R., Savini, T., Karki, J. B., Dhakal, M., Lamichhane, B. R., & Bumrungsri, S. (2018). Living with tigers *Panthera tigris*: Patterns, correlates, and contexts of human–tiger conflict in Chitwan National Park, Nepal. *Oryx, 52*, 55–65.

Dhungana, R., Lamichhane, B. R., Savini, T., Dhakal, M., Poudel, B. S., & Karki, J. B. (2019). Livestock depredation by leopards around Chitwan National Park, Nepal. *Mammalian Biology, 96*, 7–13.

DNPWC & DFSC (2018). Status of Tigers and Prey in Nepal. Department of National Parks and Wildlife Conservation & Department of Forests and Soil Conservation. Ministry of Forests and Environment, Kathmandu, Nepal.

Eboli, L., & Mazzulla, G. (2009). An ordinal logistic regression model for analysing airport passenger satisfaction. *EuroMed Journal of Business*.

Engel, M. T., Vaske, J. J., Bath, A. J., & Marchini, S. (2016). Predicting acceptability of jaguars and pumas in the Atlantic Forest, Brazil. *Human Dimensions of Wildlife, 21*, 427–444.

Ericsson, G., & Heberlein, T. A. (2003). Attitudes of hunters, locals: And the general public in Sweden now that the wolves are back. *Biological Conservation, 111*, 149–159.
Erkan, A., & Yildiz, Z. (2014). Parallel lines assumption in ordinal logistic regression and analysis approaches. *International Interdisciplinary Journal of Scientific Research, 1*, 8–23.
Espinosa, S., & Jacobson, S. (2012). Human-wildlife conflict and environmental education: Evaluating a community programme to protect the Andean bear in Ecuador. *The Journal of Environmental Education, 43*, 55–65.
Gadd, M. E. (2005). Conservation outside of parks: Attitudes of local people in Laikipia, Kenya. *Environmental Conservation, 32*, 50–63.
Glikman, J. A., Vaske, J. J., Bath, A. J., Ciucci, P., & Boitani, L. (2012). Residents' support for wolf and bear conservation: The moderating influence of knowledge. *European Journal of Wildlife Research, 58*, 295–302.
Gurung, B., Smith, J. L. D., McDougal, C., Karki, J. B., & Barlow, A. (2008). Factors associated with human-killing tigers in Chitwan National Park, Nepal. *Biological Conservation, 141*, 3069–3078.
Heinen, J. T. (1993). Park-people relations in Kosi Tappu Wildlife Reserve, Nepal: A socio-economic analysis. *Environmental Conservation, 20*, 25–34.
Hunter, L., & Balme, G. (2004). The leopard. The world's most persecuted big cat. In: Endangered Wildlife. Businesses, Ecotourism and the Environment, Twelve annual vision. (pp. 88-94). Endangered wildlife trust.
Inskip, C., & Zimmermann, A. (2009). Human-felid conflict: A review of patterns and priorities worldwide. *Oryx, 43*, 18–34.
Islam, M. M., & Chuenpagdee, R. (2013). Negotiating risk and poverty in mangrove fishing communities of the Bangladesh Sundarbans. *Maritime Studies, 12*, 7.
Kansky, R., Kidd, M., & Knight, A. T. (2014). A meta-analysis of attitudes towards damage – causing mammalian wildlife. *Conservation Biology, 28*, 924–938.
Kidd, L. R., Garrard, G. E., Bekessy, S. A., Mills, M., Camilleri, A. R., Fidler, F., … Louis, W. (2019). Messaging matters: A systematic review of the conservation messaging literature. *Biological Conservation, 236*, 92–99.
Krishnakumar, B. M., & Nagarajan, R. (2020). Living with Leopard *Panthera pardus fusca* (Mammalia: Carnivora: Felidae): Livestock depredation and community perception in Kalakkad-Mundanthurai Tiger Reserve, southern Western Ghats. *Journal of Threatened Taxa, 12*, 16210–16218.
Lamichhane, B. R., Persoon, G. A., Leirs, H., Poudel, S., Subedi, N., Pokheral, C. P., Bhattarai, S., Thapaliya, B. P., & de Iongh, H. H. (2018). Spatio-temporal patterns of attacks on human and economic losses from wildlife in Chitwan National Park, Nepal. *PloS One, 13*.
Liang, J., Bi, G., & Zhan, C. (2020). Multinomial and ordinal Logistic regression analyses with multi-categorical variables using R. *Annals of Translational Medicine, 8*(16).
Manfredo, M. J., Vaske, J. J., Brown, P. J., Decker, D. J., & Duke, E. (2009). *Wildlife and society: The science of human dimensions*. Washington, DC: Island Press.
Messmer, T. A. (2009). Human–wildlife conflicts: Emerging challenges and opportunities. *Human-Wildlife Conflicts, 3*, 10–17.
Mir, Z. R., Noor, A., Habib, B., & Veeraswami, G. G. (2015). Attitudes of local people toward wildlife conservation: A case study from the Kashmir Valley. *Mountain Research and Development, 35*, 392–400.
Mishra, C., Allen, P., McCarthy, T. O. M., Madhusudan, M. D., Bayarjargal, A., & Prins, H. H. (2003). The role of incentive programmes in conserving the snow leopard. *Conservation Biology, 17*, 1512–1520.
Mkonyi, F. J., Estes, A. B., Msuha, M. J., Lichtenfeld, L. L., & Durant, S. M. (2017). Local attitudes and perceptions toward large carnivores in a human-dominated landscape of northern Tanzania. *Human Dimensions of Wildlife, 22*, 314–330.
Morzillo, A. T., Mertig, A. G., Hollister, J. W., Garner, N., & Liu, J. (2010). Socioeconomic factors affecting local support for black bear recovery strategies. *Environtal Management, 45*, 1299–1311.
Mutanga, C. N., Gandiwa, E., Muboko, N., & Vengesayi, S. (2016). Prospects for wildlife conservation: Local community views and factors influencing conservation relationships in Zimbabwe. *Annals of Social and Behavioural Science, 2*, 57–75.
Nyhus, P. J., Fischer, H., Madden, F., & Osofsky, S. (2003). Taking the bite out of wildlife damage: The challenges of wildlife compensation schemes. *Conservation in Practice, 4*, 37–40.
O'Connell, A. A. (2006). Logistic regression models for ordinal response variables (Vol. 146). Sage.
Oli, M. K., Taylor, I. R., & Rogers, M. E. (1994). Snow leopard *Panthera uncia* predation of livestock: An assessment of local perceptions in the Annapurna Conservation Area, Nepal. *Biological Conservation, 68*, 63–68.
Reddy, C. S., & Yosef, R. (2016). Living on the edge: Attitudes of rural communities toward Bengal tigers (*Panthera tigris*) in Central India. *Anthrozoös, 29*, 311–322.
Røskaft, E., Bjerke, T., Kaltenborn, B., Linnell, J. D., & Andersen, R. (2003). Patterns of self-reported fear towards large carnivores among the Norwegian public. *Evolution and Human Behavior, 24*, 184–198.
R Core Team (2020). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/.
Silwal, T., Kolejka, J., Bhatta, B. P., Rayamajhi, S., Sharma, R. P., & Poudel, B. S. (2017). When, where and whom: Assessing wildlife attacks on people in Chitwan National Park, Nepal. *Oryx, 51*, 370–377.
St John, F. A., Edwards-Jones, G., & Jones, J. P. (2011). Conservation and human behaviour: Lessons from social psychology. *Wildife Research, 37*, 658–667.
Treves, A., Wallace, R. B., Naughton-Treves, L., & Morales, A. (2006). Co-managing human–wildlife conflicts: A review. *Human Dimensions of Wildlife, 11*, 383–396.
Verplanken, B., Hofstee, G., & Janssen, H. J. (1998). Accessibility of affective versus cognitive components of attitudes. *European Journal of Social Psychology, 28*, 23–35.
Warner, P. (2008). Ordinal logistic regression. *Journal of Family Planning and Reproductive Health Care, 34*(3), 169.
Woodroffe, R., Thirgood, S., & Rabinowitz, A. (Eds.). (2005). *People and wildlife: Conflict or coexistence?*. Cambridge, United Kingdom: Cambridge University Press.