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Attitudes of Local People Toward Wildlife Conservation: A Case Study From the Kashmir Valley

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People's attitudes toward wildlife conservation can significantly affect the success of conservation initiatives. Understanding the factors influencing these attitudes is essential for designing strategies to alleviate human–wildlife conflict. Although this topic has been studied extensively across diverse regions, there has been no such study in the Kashmir Division of Jammu and Kashmir state, India. We surveyed 3 administrative units around Dachigam National Park through semistructured interviews (n = 384) to investigate the socioeconomic status of local people, the extent of economic damage caused by wild animals, and people's attitudes toward wildlife conservation. Results, analyzed using a generalized linear model approach, indicated that about 75% of the respondents suffered crop damage, while 23% suffered livestock predation by wild animals. The majority of respondents expressed favorable attitudes toward wildlife, with only about 16% expressing a negative perception. Gender, crop damage, livestock predation, and total livestock holdings were the strongest variables influencing the attitudes of local people in the study area. The study identified the need to use appropriate mitigation measures to minimize economic damage by wildlife in order to reduce negative local attitudes toward wildlife conservation.

Keywords: *Attitudes; Dachigam National Park; human–wildlife conflict; socioeconomic status; Jammu and Kashmir.*

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Introduction

Human–wildlife conflict has existed for centuries, but its frequency has grown in recent decades, mainly because of the exponential increase in human population and the resulting expansion of human activities (Woodroffe 2000; Conover 2002). Increasing resource use by humans at the human–wildlife interface has resulted in intensification of human–wildlife conflict (Inskip and Zimmerman 2009). Conservation of wildlife in such areas has become a challenge for policy-makers and requires multidisciplinary approaches (McShane et al 2011; Linnell and Boitani 2012). An understanding of the ecological and human dimensions of conflict is important for effective resolution of the problem, especially for understanding how crop damage and livestock losses caused by wild animals affect local people's responses to them.

A wide array of human dimensions—such as local people's perceptions of the value of wildlife, how they want wildlife to be managed, and how they affect or are affected by wildlife—influence wildlife management decisions (Decker et al 2001). Many studies have recognized the importance of incorporating these interacting human-related factors into management plans. However, most of the studies have focused solely on the ecological side of human–wildlife conflict with no input from the social sciences (Treves et al 2006).

To ensure that wildlife management policies are effective and sensitive to local conditions, it is important to understand anthropological factors, such as the attitudes of local people, which provide an overview of the cultural and sociopolitical context of human–wildlife conflicts. Assessing local people's attitudes can provide insight on how they will behave, for example, how they comply with wildlife protection regulations, how they respond to economic losses caused by wildlife, and the degree to which they are willing to coexist with wildlife (Fulton et al 1996). Attitude surveys may make it possible to predict how people's attitudes will influence conservation policies and vice versa, allowing for more effective management and planning (Fiallo and Jacobson 1995).

Attitudes toward wildlife vary because factors affecting attitudes—such as interactions with wildlife—are spatially heterogeneous (Sitati et al 2003; Naughton-Treves and Treves 2005). A number of studies have been conducted on attitudes of local people toward carnivores in Asia (Bandara and Tisdell 2003; Bagchi and Mishra 2006; Allendorf 2007; Ambastha et al 2007), including some studies in the Himalaya (Badola 1998; Jackson et al 2003; Wang et al 2006; Ogra 2009; Barthwal and Mathur

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2012; Carter et al 2013). However, no such systematic study has been conducted in Kashmir Division of the state of Jammu and Kashmir (Western Himalaya), where management of increasing human–wildlife conflict has become a challenge for policy-makers. In general, costs associated with conservation, such as crop damage and livestock predation by wildlife, have negative effects on local attitudes, while benefits from conservation may have positive effects. Other variables, such as race, sex, age, income, and educational level, can also influence people's attitudes toward wildlife. Usually, women, older people, people with a lower education level, people working in a natural-resource-dependent profession, or people living in a rural area within a carnivore distribution range tend to have more negative attitudes (Kellert 1994; Kellert et al 1996). Negative attitudes toward wildlife often encourage people to kill wild animals (Oli et al 1994; Williams et al 2002; Bagchi and Mishra 2006), which takes a toll on conservation efforts.

This study assessed the socioeconomic status of people living around Dachigam National Park and the extent of their losses caused by wild animals. It also sought to identify the factors affecting attitudes toward wildlife conservation and their relative importance at the individual scale. An understanding of these factors will assist in framing and implementing policies that can help to improve the region's social carrying capacity for carnivores in particular and wildlife in general. This study may help to address problems that evoke negative attitudes so as to improve local people's relationships with the park and reducing their antipathy toward wildlife.

Study area

The study was conducted in the temperate western Himalayan human-dominated landscape around Dachigam National Park in Kashmir Valley in the state of Jammu and Kashmir, India (34°05′N–34°11′N, 74°54′E–75°09′E). Elevation in Dachigam National Park ranges from 1650 to 4400 masl. Kashmir Valley is divided into 3 wildlife administrative divisions: northern, central, and southern; the park covers 141 km^2 itself and about 1000 km^2 together with adjacent protected areas in the central and southern wildlife administrative divisions. The mountains enclosing the park and the adjoining landscape are part of the Zanskar Range, which forms the northwest branch of the central Himalayan axis. They present a variety of slopes and aspects supporting an array of vegetation types. The central wildlife administrative division has been further divided into 3 administrative units or "ranges" administrated by an officer—Ganderbal, Dachigam, and Khrew—which form the northern, western, and southern boundaries, respectively, of Dachigam National Park (Figure 1). Within the 3 ranges, we selected 19 villages for study, of which 2 are within the national park.

Conservation issues

Understanding the attitudes of local people is critical for the success of conservation plans for wildlife species of high conservation value. The landscape around Dachigam National Park is home to the Kashmir red deer (*Cervus elaphus hanglu*), the only red deer subspecies in India, which is critically endangered and listed in Schedule I of the Jammu and Kashmir Wildlife (Protection) Act, 1978. Its distribution range has been drastically reduced in the recent past, and poaching has been reported as one of the major reasons (Charoo et al 2010). Studies have been conducted on the ecology of this endangered species, but none has highlighted local peoples' attitudes toward the species in particular or wildlife in general.

The Himalayan black bear (*Ursus thibetanus*) and leopard (*Panthera pardus*), the 2 main carnivores in the region, often come in contact with people living on the fringes of the park, resulting in human–animal conflict. A recent study on human–bear conflict around Dachigam National Park suggested that the translocation of conflict bears from other areas to Dachigam National Park may be the reason for aggravated conflict in the immediate vicinity of the park, since it causes overcrowding (Mukesh et al 2015). The rising human–animal conflict in the region has in turn resulted in an alarming increase in retaliatory killings of leopards and bears, threatening their survival (Singh et al 2007; Mukesh et al 2015). Moreover, as a result of 25 years of political instability in Jammu and Kashmir, research and conservation initiatives have taken a back seat; this has created a knowledge gap that needs to be filled as soon as possible.

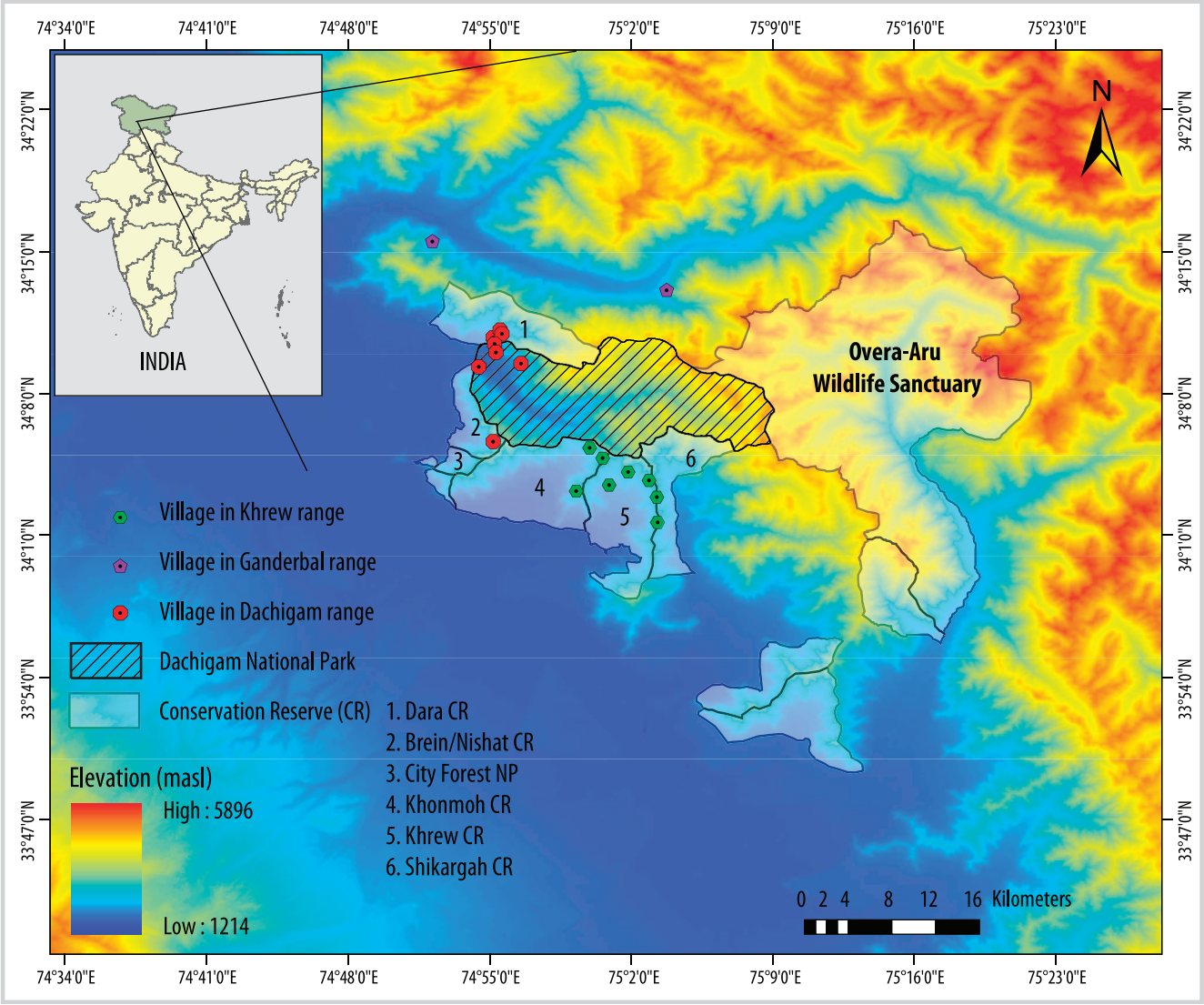
Methods

Data collection

In total, 384 households from 19 villages were interviewed between June 2011 and August 2013. Each household was considered a sampling unit, and interviews were restricted to 1 respondent per household (preferably the oldest one). Households were selected randomly, and more than 60% of households were targeted for interviews (Karanth 2007). We trained a group of volunteers to assist us in data collection, including female students who helped ensure that female respondents felt comfortable during the interviews. Both men and women older than 18 years were interviewed, although the majority of respondents were men. The reason might be that the sex ratio of the study area is male biased, and women may have been a bit reluctant to answer questions due to cultural restrictions in the rural areas. The semistructured questionnaire was designed to collect information on respondents' (1) socioeconomic and demographic characteristics (education, livestock holdings, land ownership, income sources, and economic losses), (2) experiences of crop damage and livestock

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FIGURE 1 Location of the study area. (Map by Zaffar Rais Mir)



predation by wild animals in 2011 and 2012, and (3) attitudes toward wildlife conservation (ie asking whether respondents wanted wildlife to be conserved or not). Interviewees were assured that their responses would be kept confidential so as to get unbiased statements. In cases of recent predations, carcass remains were spot-checked.

Statistical analysis

Data analysis was conducted using the Statistical Package for Social Sciences (SPSS) PC version 16.0 (SPSS 2007). Generalized linear modeling was used to determine factors influencing attitudes toward wildlife and its conservation. We quantified and analyzed 12 variables that could potentially impact peoples' attitudes toward wildlife and its conservation (Table 1). The Akaike information criterion was used to select the most suited model, with the lowest score providing the best explanation of the most important factors (Burnham and Anderson 2004; Hazzah 2006; Mazzarolle 2006; Dickman 2008). This strategy was used in order to select the best model among 20 potential models using all 12 variables. Johnson and Omland (2004) have recommended a maximum of 20 candidate models based on philosophical considerations. We interpreted the effect of variables on attitudes based on the parameter estimates (β) from the selected model.

Results

Of 384 households interviewed, 165 were in the Dachigam range, 157 in Khrew, and the remaining 62 in Ganderbal. Men accounted for 65.48% of the interviewees; ages ranged

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TABLE 1 Potential predictors of local attitudes toward wildlife conservation.

Variable	Label	Variable type	Range
Age of respondent	Age	Discrete	18–90
Gender of respondent	Gender	Categorical	Male, female
Primary occupation of respondents	Occupation	Categorical	0–6 [a)]
Total number of family members	Family members	Discrete	1–30
Number of family members earning income	Earning members	Discrete	1–7
Highest education level of respondents	Highest education	Categorical	Primary, secondary, tertiary
Total family income	Income	Continuous	INR 600–63,000 [b)]
Cultivable land owned by interviewee's family	Land owned	Continuous	0–12.5 acres
Whether crop has been damaged by wildlife	Crop damage	Categorical	0–1
How much of crop has been damaged by wildlife	Extent of damage	Categorical	Low, medium, high
Total number of livestock owned	Total livestock	Discrete	1–558
Whether livestock predation has occurred	Livestock damage	Categorical	0–1

[a)]Occupations of respondents were merged into seven broad categories.
[b)]INR, international normalized ratio.

from 18 to 90 years, with a median age of 35 years. Mean (± SE) family size was 7.16 ± 0.16 persons per household. The average female to male ratio in the population as a whole was quite unequal, with 56.30% of the population being men. Regarding literacy, 67.18% families had one or more male members who had studied at least through the primary level, whereas 39.06% families had one or more female members who had studied through the same level. The mean number of years of education for all respondents was 8.36 ± 0.27 years.

The number of income sources per family ranged from 1 to 3 (Table 2). In total, 91.66% of respondents said they owned farmland, while 8.34% did not own any. The majority of the respondents (72.65%) practiced agriculture for income generation, while the rest (19.01%) grew crops for subsistence only. A small proportion of households (12.76%) relied on farming as the sole source of revenue. About 85.67% of interviewees owned livestock, with 60.76% using it only for subsistence and 24.91% using it for income generation. Only 3 families relied solely on livestock for their living. Apart from livestock and crops, other sources of income included business, manual labor, and government and private-sector jobs. Among households owning livestock, the number of livestock owned varied from 1 to 558, with a mean of 9.54 (± 1.84). Most of the livestock held by the respondents in all ranges were sheep and goats (Figure 2).

Crop damage and livestock predation

Overall, 74.71% of landowning families reported crop damage by wild animals. The average amount of crop damage per household varied, but not to a significant degree. The greatest damage was observed in the Khrew range (55.87 ± 2.35%), followed by Ganderbal (47.27 ± 2.57%) and Dachigam (39.36 ± 1.82%) ($\chi^2 = 2.8709$, df = 2, $P > 0.01$).

The majority of the crop damage was done by Himalayan black bears (93.16%), followed by Kashmir gray langurs (*Semnopithecus ajax*) (5.70%) and porcupines (*Hystrix brachyura*) (1.14%), which usually damaged tubers of saffron (*Crocus sativus*). Among respondents, 22.90%

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TABLE 2 Sources of cash income reported by interviewees.

Income source	Dachigam		Khrew		Ganderbal		Total	
	n	%	n	%	n	%	n	%
Crop and others	53	32.12	68	43.31	34	54.84	155	40.36
Others only	52	31.52	26	16.56	8	12.90	86	22.40
Crop only	26	15.76	14	8.92	9	14.52	49	12.76
Crop, livestock, and others	16	9.70	24	15.29	5	8.06	45	11.72
Crop and livestock	9	5.45	15	9.55	6	9.68	30	7.81
Livestock and others	9	5.45	7	4.46	0	0.00	16	4.17
Livestock only	0	0.00	3	1.91	0	0.00	3	0.78

reported livestock predation by wildlife, in particular leopards, Himalayan black bears, and jackals (*Canis aureus*). A total of 88 predation incidents were reported for 2011 and 2012, resulting in the deaths of 107 head of livestock. Predation incidents by leopards (63.63%), black bears (28.40%), and jackals (7.95%) varied significantly ($\chi^2 = 48.32$, df = 2, $P < 0.001$). Jackals were only involved in predation of domestic fowl. Although predation occurred throughout the year, the majority (53.57%) of attacks by leopards took place in the summer and most of the bear attacks (57.55%) in autumn. Sheep were attacked most frequently (35.23%), followed by goats (21.59%), cows (19.32%), horses (9.09%), domestic fowl (7.95%), and guard dogs (6.82%) ($\chi^2 = 35.84$, df = 5, $P < 0.001$). On average, 1.50% of livestock was lost to predation annually.

Factors influencing local attitudes toward wildlife conservation

About 84.18% of interviewees supported wildlife conservation, whereas 15.82% opposed it. The main reason given for the latter view was the conflict with wild animals and resulting economic losses. Support for wildlife was justified primarily for ecological reasons (57.65%), followed by aesthetic (18.51%), social (8.19%), and economic (6.05%) reasons; 9.61% of respondents who supported wildlife conservation did not perceive any significant benefit from wildlife.

Generalized linear modeling results showed that the model that best explained respondents' attitudes toward wildlife conservation included 4 variables: gender, crop damage, livestock predation, and total livestock holding (Table 3). Positive attitudes toward wildlife conservation were significantly more common among men than among women ($P = 0.018$). However, respondents who had suffered crop damage or livestock predation by wild animals had significantly high negative attitudes toward wildlife conservation. The number of livestock owned also had a significant influence on attitudes: respondents with more livestock had more negative perceptions of wildlife (Table 4).

Discussion

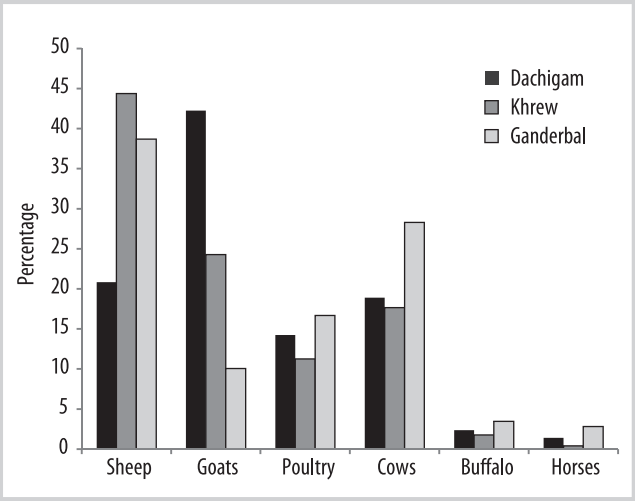
Socioeconomic conditions and extent of human–wildlife conflict

The study villages had a large mean family size (7.16), with a range of 2 to 30 family members. The female to male sex ratio of the villages (776:1000) was lower than that for India overall (940:1000) and for the rural areas of Kashmir (908:1000) (Census of India 2011). Low sex ratios have also been reported from other areas in the state, for example, from Leh (690:1000) and Kargil (810:1000) (Nazeer 2014). The causes of the declining sex ratio in many areas of Jammu and Kashmir need to be investigated. The villages were primarily agropastoral, with most residents (91.60%) engaged in either agriculture or horticulture. Some farmed part-time and engaged in other income-generating activities, such as business, manual labor, and government and private-sector jobs. The majority (83.85%) of surveyed households earned more than the international poverty threshold of US$ 1.25 (74.05 Indian rupees) per capita per day (Ravallion et al 2009).

The average household livestock holding in the surveyed villages was 9.5 head. This is lower than the average (13 head) reported for the Kibber Wildlife Sanctuary in Himachal Pradesh (Mishra 1997). Major crops cultivated in the surveyed villages include maize, cherries, rice, and wheat; almost 74.71% of land-owning respondents reported crop damage by wild animals. Maize and cherries are among the crops most often eaten by black bears (Charoo et al 2009). Although Kashmir gray langurs and porcupines also caused crop damage, Himalayan black bears were involved in the majority of the crop damage cases (93.15%), which resembles the findings of an earlier study (Charoo et al 2011).

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FIGURE 2 Breakdown of households' livestock holdings by livestock type.



In the surveyed areas, more than half of the livestock predation was attributed to leopards; a number of other studies have identified leopards as the principal predators of livestock in Himalayan regions (Chauhan et al 2002; Wang and Macdonald 2006; Sangay and Vernes 2008; Singh et al 2008; Dar et al 2009; Harihar et al 2014). Leopard attacks on livestock in the surveyed villages mainly occurred in the summer, which may be explained by low availability of wild prey inside the park during the summer (Habib et al 2014). Moreover, due to the good availability of fodder during the summer, livestock are mostly grazed outside, in contrast to winter, when they are mostly stall fed and confined to predator-proof enclosures. This makes livestock more vulnerable to predation in the summer, especially in the absence of herders and guard dogs. However, livestock predation by black bears was mostly reported during autumn, when the bears need to feed heavily to acquire fat reserves for their upcoming hibernation. Many food crops are harvested through late autumn, and the availability of wild fruits declines by the end of autumn. This prompts black bears to venture into villages and raid livestock pens to meet their food requirements. A similar seasonal pattern of livestock predation by leopards and black bears has been reported in Bhutan (Sangay and Vernes 2008).

Local attitudes toward wildlife conservation

Many study respondents expressed the view that conservationists and the government are more concerned about wildlife than about human well-being, as has also been reported for Amboseli National Park in Kenya (Roque de Pinho 2009). However, the majority of our respondents expressed a positive view of wildlife and its conservation, which is in agreement with an earlier study on attitudes of teachers toward wildlife in the Ladakh region of Jammu and Kashmir (Barthwal and Mathur 2012). Livestock losses, together with crop damage, are considered major causes of negative attitudes toward wildlife and conservation policy around protected areas (Wang et al 2006). Although only a small proportion of respondents had negative attitudes toward wildlife conservation, this proportion is significant because the small number of people who oppose conservation can substantially hamper conservation initiatives by getting involved in illegal activities against threatened wildlife species.

Among participants in our study, gender, crop damage, livestock damage, and total livestock owned were the main factors that shaped attitudes toward wildlife conservation. Other factors—including occupation and age, number of family members, number of earning members, income, and amount of land owned—did not play a significant role in predicting attitudes. The number of livestock owned by respondents affected their attitudes, as those who owned more livestock were more likely to depend on income from livestock and thus perceive potential predators as a threat. A study in Spiti, Himachal Pradesh (Suryawanshi et al 2013), also concluded that villages with higher holdings of economically important livestock (yaks and horses) perceived the snow leopard to be a greater threat.

Gender played an important role in respondents' perceptions of wildlife in general and of particular species. Women participating in our study showed significantly more negative attitudes toward wildlife than men. This could be attributed to a greater apprehension about dangerous carnivores (Roskaft et al 2003; Kaltenborn et al 2010; Prokop and Tunnicliffe 2010), possibly as a consequence of having less exposure to them than men, who frequently confront them in defense of their families and livestock (Roskaft et al 2003; Goldman et al 2010).

Formal education did not play a significant role in predicting attitudes toward wildlife conservation around Dachigam National Park, a finding that is consistent with Gadd (2005) and Groom and Harris (2008). Newhouse (1990) has also argued that attitudes toward the environment may be developed on the basis of life experiences rather than education. However, education on wildlife conservation can build a knowledge base to reinforce or rationalize attitudes (Kellert 1994; Kellert et al 1996; Woodroffe et al 2005) and may be an important tool for improving understanding and motivating local communities to cooperate on conservation and sustainable resource use initiatives (Cerovsky 1969). Thus, educating people about the needs and benefits of conserving wildlife is crucial for gaining support for conservation endeavors and to gain the public's participation in the conservation initiatives

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TABLE 3 Generalized linear modeling framework, using changes in the Akaike information criterion (Mazzarolle 2006) to identify the factors influencing local attitudes toward wildlife conservation at the scale of an individual.[a)]

Model	AIC[b)]	Δ AIC[b)]
Gender + crop damage + livestock damage + total livestock	279.984	0.00
Gender + crop damage + livestock damage + income + total livestock	280.221	0.24
Gender + highest education + crop damage + livestock damage + income + total livestock	280.490	0.51
Gender + crop damage + livestock damage + income + land owned + total livestock	282.122	2.14
Gender + crop damage + extent of damage + livestock damage + income + total livestock	282.350	2.37
Gender + crop damage + livestock damage + age + income + family members + total livestock	283.533	3.55
Gender + crop damage + livestock damage + age + income + land owned + total livestock	283.659	3.67
Gender + crop damage + livestock damage + age + income	284.811	4.83
Gender + livestock damage + income + land owned + total livestock	285.972	5.99
Gender + occupation + highest education + crop damage + livestock damage + age + family members + total livestock	287.499	7.51
Gender + highest education + livestock damage + age + income	288.570	8.59
Gender + occupation + highest education + crop damage + livestock damage + age	288.860	8.88
Gender + occupation + highest education + crop damage + extent of damage + livestock damage + age + family members + total livestock	289.541	9.56
Gender + occupation + highest education + livestock damage + age + income + total livestock	290.456	10.47
Gender + occupation + highest education + crop damage + livestock damage + age + income	290.846	10.86
Occupation + highest education + crop damage + livestock damage + age + income	292.510	12.53
Gender + occupation + highest education + crop damage + extent of damage + livestock damage + age + family members + earning members + income + land owned + total livestock	294.418	14.43
Occupation + highest education + crop damage + livestock damage + age + income + earning members + land owned	296.333	16.35
Gender + highest education + crop damage + age + income + family members + total livestock	304.884	24.90

[a)]Variables and their labels are defined in Table 1.

[b)]AIC, Akaike information criterion; Δ AIC, change in Akaike information criterion.

Conclusions and recommendations

The majority of respondents expressed a positive attitude toward wildlife conservation but said that conservationists and the government seemed to care more about wildlife than about human well-being. This perception needs to be challenged by displays of goodwill from park management, which could help build trust and improve relationships between the park and local people. Previous studies indicate that education can improve tolerance for carnivores (Woodroffe et al 2005). Yet, it can be challenging to educate people with a negative attitude about large carnivores due to their lack of enthusiasm for learning about them (Bath and Majic 2001; Kaczensky 2003). Direct positive experiences, such as safely viewing animals inside the park, can help reduce fear and encourage positive perceptions of wildlife (de Pinho et al 2014). Programs have been started in Tanzania to promote protected-area visitation by local residents (Wildlife Connection 2013). Similar programs should be arranged in this study area, and women should be encouraged to participate.

Livestock losses and crop damage were the major factors responsible for negative attitudes toward wildlife conservation policy around the park, so reducing crop and livestock damage could have a strong positive effect. Dachigam National Park and the landscape surrounding it has one of the highest-density populations of the Asiatic black bear in India (Sathyakumar 2001), and Dachigam National Park is surrounded by protected areas, though human settlements fragment protection. Corridors between these protected areas need to be secured to

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TABLE 4 Influence of factors identified in the best-fit model on local attitudes toward wildlife conservation.

Variable[a)]	Parameter estimate (β)	Standard error	Hypothesis test (p)
Intercept	−0.614	0.338	0.000
Gender	0.741	0.314	0.018
Total livestock	−0.009	0.006	0.130
Crop damage	−1.034	0.451	0.022
Livestock damage	−1.617	0.339	0.000

[a)]Dependent variable: attitude.

reduce the chances of conflict while animals move from one protected area to another.

Kaczensky (1999) argued that it is not possible for large carnivores and free-ranging unprotected sheep on forested ranges to coexist with a low conflict level. Public information efforts are needed to educate landowners on the best ways to prevent livestock predation and crop raiding—such as providing proper nocturnal management of livestock, using guard dogs, properly fencing crop fields wherever possible, and ensuring that domestic animals are accompanied by humans when grazing. Moreover, farmers should be encouraged to properly dispose of agricultural and horticultural wastes to avoid attracting wild animals.

Government and nongovernmental organizations should introduce compensation and livestock insurance schemes to make up for losses caused by wildlife; no such schemes currently exist. Carter et al (2013) studied attitudes toward tigers (*Panthera tigris*) and concluded that concentrating mitigation and conservation efforts at a specific location where wildlife-related impacts occur will likely reduce negative attitudes toward wildlife within a larger surrounding area. Similar studies need to be undertaken around Dachigam National Park to examine spatial distribution of attitudes toward wildlife and wildlife–human conflict so that mitigation efforts are focused accordingly.

While important for the conservation of wildlife in this region of Jammu and Kashmir, the results of this study have wide applicability to conservationists and policy-makers throughout the developing world and can support efforts to protect rare species and involve local people in conservation.

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