



Human Dimensions of Wildlife

An International Journal

ISSN: 1087-1209 (Print) 1533-158X (Online) Journal homepage: <https://www.tandfonline.com/loi/uhdw20>

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To cite this article: Allison M. Mitchell, Brett L. Bruyere, Tobias O. Otieno, Shivani Bhalla & Tara L. Teel (2018): A comparison between human-carnivore conflicts and local community attitudes toward carnivores in Westgate Community Conservancy, Samburu, Kenya, Human Dimensions of Wildlife, DOI: [10.1080/10871209.2018.1548671](https://doi.org/10.1080/10871209.2018.1548671)

To link to this article: <https://doi.org/10.1080/10871209.2018.1548671>



Published online: 21 Nov 2018.



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A comparison between human-carnivore conflicts and local community attitudes toward carnivores in Westgate Community Conservancy, Samburu, Kenya

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ABSTRACT

Human-wildlife conflicts are increasing globally, especially involving livestock depredation by carnivores. To understand the relationship between predation frequency and attitudes toward predators, researchers quantified livestock losses for four carnivore species—African wild dog, spotted hyena, leopard, and lion—as well as attitudes toward these carnivores in Westgate Community Conservancy, Samburu, Kenya. Methods included a three-year data collection period of conflict incidents followed by structured interviews to assess community attitudes. Results demonstrated that livestock depredation mainly involved leopards and spotted hyenas, preying most often on sheep and goats. Attitudes toward lions and hyenas were generally proportionate to their predation involvement. However, the frequency of predation did not always elicit such an expected response, as community members held positive attitudes toward leopards despite their high involvement in conflict, but disliked African wild dogs regardless of their low involvement. The discrepancy in attitudes could be attributed to cultural values, economic losses, and perceived risk.

KEYWORDS

Human-carnivore conflict; attitudes; carnivores; livestock depredation; Kenya

Introduction

At a global level, pastoralists are experiencing significant changes due to drivers such as population growth, climate change, and economic development (Dong et al., 2010). These changes have led to new or exacerbated challenges in some communities, including livestock depredation by carnivores (Hemson, MacLennan, Mills, Johnson, & Macdonald, 2009). This increase is particularly true in landscapes in which people, livestock, and wildlife spatially overlap and compete for the same resources (Ocholla et al., 2013). In such places, carnivores can cause severe economic costs by preying on livestock, a particularly traumatic event in places where livestock represents a sole economic livelihood for pastoralists (Bagchi & Mishra, 2006).

Human-wildlife conflict can be a nuanced term; this article followed Madden's (2004) definition in which conflict occurs when wildlife behavior negatively impacts the goals of

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The research was conducted with generous permission from and in partnership with Ewaso Lions, a community-based, non-governmental organization based in Samburu County, Kenya.

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humans (including livelihood-based goals), or human behavior negatively impacts the goals of wildlife. In addition to goal interference, human-wildlife conflicts can influence attitudes toward wildlife which can become deeply rooted in a society or culture (Redpath et al., 2013). Understanding attitudes of people living near wildlife can provide information to help predict the success of conservation management efforts as well as provide a means to evaluate conservation actions (Manfredo, Teel, & Bright, 2004). Given the complex social psychological aspects of how people think and feel about wildlife, perceived levels of conflict can differ from actual levels of conflict. Dickman (2010) noted that social psychological factors, such as attitudes and norms, can be more predictive of conflict than actual frequency of a species' involvement in conflict; an individual might feel more negative about a predator that is actually involved less in conflict and more positive about a species that is more involved. This sentiment can be attributed to factors such as the perceived aesthetic value of certain species, as noted by de Pinho, Grilo, Boone, Galvin, and Snodgrass (2014) in their study, in which people in Kenya assessed lions (*Panthera leo*), African elephants (*Loxodonta africana*), and rhinoceros (*Rhinocerotidae* spp.) as “beautiful,” and species such as the spotted hyena (*Crocuta crocuta*) as “unattractive.” Deep-rooted fear is often a reason for negative attitudes or hostility toward wildlife (Dickman, 2010; Treves, 2009). Carnivores are frequently believed to be problematic species because of the perceived severe threat to human livelihoods, even if such experiences are known only via stories or others' experiences, rather than through direct experience (Dickman, Hazzah, Carbone, & Durant, 2014; Inskip, Carter, Riley, Roberts, & MacMillan, 2016). These conflicts often set humans against not only the carnivore species but also the conservation efforts aiming to protect certain species (Treves & Karanth, 2003).

Many of these challenges and increased human-wildlife conflicts are occurring today in Kenya (Bruyere, Trimarco, & Lemungesi, 2016). More than half of the wildlife habitats in Kenya occur outside of protected areas where people, livestock, and wildlife interact daily, including the area for this study (Ocholla, Mireri, & Muoria, 2016). Human-wildlife conflicts are prevalent in these areas, and many pastoralists have developed negative attitudes toward carnivore species as a result.

This article analyzed livestock-carnivore conflicts and attitudes toward four carnivore species—African wild dog (*Lycaon pictus*), spotted hyena, leopard (*Panthera pardus*), and lion—in the Westgate Community Conservancy, Samburu, Kenya. From these analyses, researchers examined an assumption presented by Dickman (2010) to determine if the levels of conflict elicit a proportionate response by Westgate community members. Specific objectives of this article were to: (a) quantify the patterns of livestock-carnivore conflicts in Westgate Community Conservancy; (b) quantify local attitudes toward the four specific carnivore species; and (c) determine how the current perceptions and attitudes of Westgate residents compare with the frequency of conflict incidents by the four predator species of interest.

Methods

Study Area

The study area encompassed the Westgate Community Conservancy, situated in Samburu County in northern Kenya (Figure 1). The conservancy borders five other community conservancies and Samburu National Reserve. The Ewaso Nyiro River runs

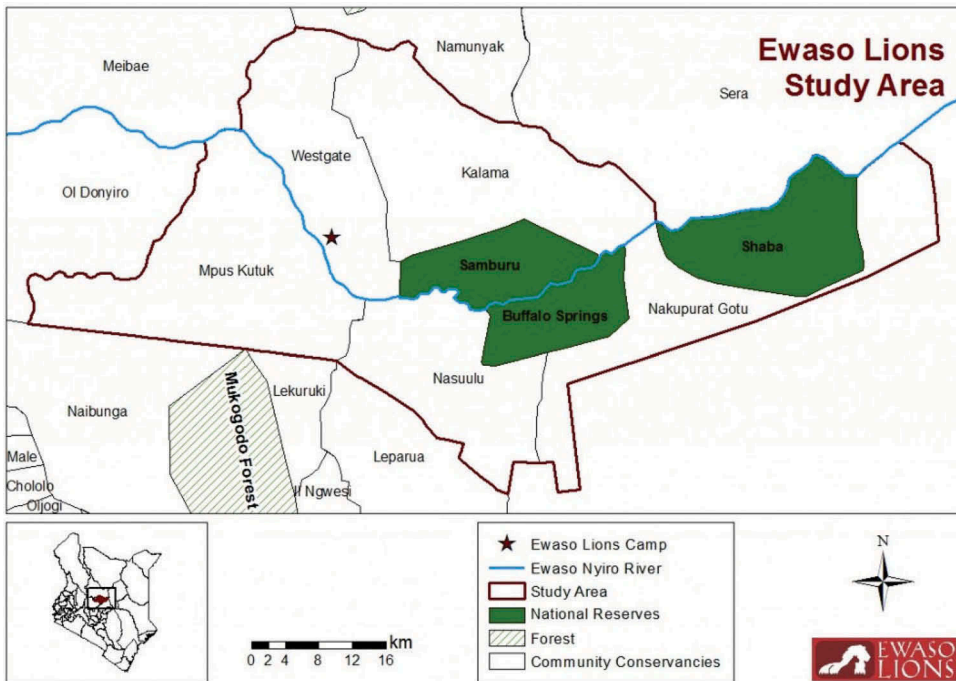


Figure 1. Study area in Westgate Community Conservancy, Samburu, Kenya. © Ewaso Lions.

through the conservancy and is one of the few natural water sources in the region. The area is characterized by rugged expanses of arid acacia bush-land and is home to a large number of wildlife species, including the African elephant, Reticulated giraffe (*Giraffa reticulata*), crocodiles (*Crocodylinae* spp.), dozens of smaller ungulate species, and many carnivore species including the four species in this study. Seasons are distinguished by four periods: January to February (short dry season), March to May (long wet season), June to October (long dry season), and November to December (short wet season).

The population in Westgate Community Conservancy includes primarily the Samburu ethnic group, with some Turkana groups. Both groups are traditionally semi-nomadic pastoralists who rely on herding livestock—sheep and goats (i.e., “shoats”), cattle, donkeys, and camels—as a primary livelihood. Livestock not only provide income-earning opportunities, but they hold significant cultural and status significance as well (Spencer, 2004). The tribes continue to practice many traditional livestock husbandry methods, including herding animals during the day and keeping livestock in enclosures (i.e., *bomas*) at night (Romanach, Lindsey, & Woodroffe, 2011). Samburu and Turkana live in small settlements called *manyattas*, which are spread across the landscape in clusters of four to ten traditional homes (Spencer, 2004). In addition, literacy and formal education levels in the region are known to be considerably low, though trustworthy statistics on such variables for this region do not exist.

Data Collection and Analysis

Data collection involved two phases. The first phase involved collecting information from reported conflict incidents involving livestock and carnivores from 2012 to 2014. The second phase involved surveying Westgate residents in 2015.

Phase 1: Human-Wildlife Conflict Data

The Samburu-based non-governmental organization Ewaso Lions trained their scouts to complete a thorough report following conflict events involving livestock and carnivores in the region. Scouts recorded information such as the species and livestock involved, incident date and location, and situational characteristics (e.g., proximity to home, presence of herders). Other information, such as the use of deterrents, boma structure type, and owner response was collected. The phase of this study analyzed data collected between 2012 and 2014.

Phase 2: Social Data

In 2015, Ewaso Lions scouts conducted structured interviews to understand Westgate residents' attitudes toward carnivores and perceptions of their involvement in depredation incidents. Surveys were administered at six village locations within the conservancy. Scouts interviewed a minimum of ten males, ten females, and ten elders (primarily males) from manyattas in each of the six locations. This approach used a convenience sample based on the practical constraints of the region, such as the absence of a viable sample frame of residents, nomadic orientation of the tribes, and rugged terrain that created accessibility challenges. The scouts who administered the surveys were from the region, spoke the local language, and were trained in survey administration.

The scouts recorded demographic information, as well as attitude measures of four carnivore species (measured as *like*, *dislike*, or *no opinion*). In addition, respondents were asked about their preference for each species' future (e.g., *increase*, *decrease*, or *remain the same*). The survey also asked respondents to rate the four carnivore species—African wild dog, spotted hyena, leopard, and lion—based on which ones they believed were most frequently involved in human-wildlife conflicts involving livestock (e.g., 1 = most often, 2 = second most often, etc.).

Results

Human-Wildlife Conflict Data

From 2012–2014, data were collected from 213 conflict incidents between livestock and carnivores. Results showed that leopards were the most involved carnivore in livestock depredation events in Westgate Community Conservancy ($n = 109$, 51%), hyenas were the second most involved ($n = 74$, 35%), followed by lions ($n = 28$, 13%), and African wild dogs ($n = 2$, 1%) (Figure 2).

Differences in carnivore predation on certain livestock species were significant ($\chi^2 = 63.99$, $p < .01$, Table 1). Of the livestock species killed, 81% of the attacks involved sheep and goats ($n = 126$), with only 19% ($n = 30$) involving other livestock species such as cattle, donkeys, and camels (Table 1). Leopards (61%) and hyenas

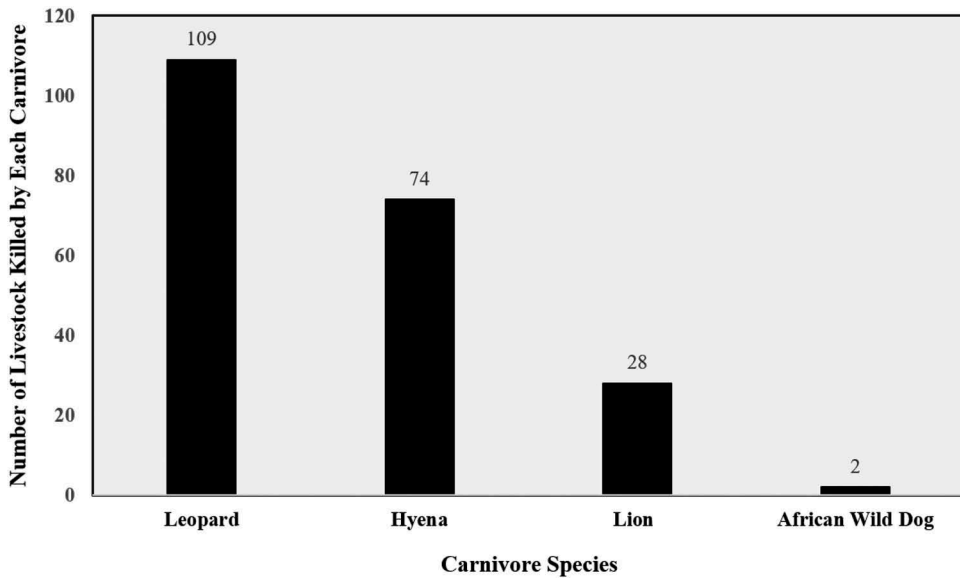


Figure 2. Number of livestock species depredated by each carnivore in Westgate Community Conservancy.

Table 1. Number of livestock species killed by three predator species in Westgate Community Conservancy^a.

Livestock Species		Carnivore Species ^b			Total
		Leopard	Lion	Hyena	
Sheep and Goats		77	3	46	126 (81%)
Other Species		3	16	11	30 (19%)
Total		80 (51%)	19 (12%)	57 (37%)	156 (100%)

^a $\chi^2 = 63.99, p < .01$.

^bDue to the low sample size, African wild dog depredation events were not included in this analysis.

(37%) preyed on sheep and goats significantly more than any other species of livestock. Lions and hyenas preyed on a variety of livestock; the main predators for cattle were lions (75%) and hyenas (25%), which is similar for donkeys (lions 56%, hyenas 44%). Camels were killed by hyenas (40%), lions (40%), and leopards (20%).

Social Data

Survey Demographics

A total of 209 structured interviews were completed. From these, 67% ($n = 139$) were male and 33% ($n = 69$) were female. In terms of education, 80% ($n = 163$) never attended school, 16% ($n = 34$) completed primary levels, and 4% ($n = 8$) completed secondary

levels. Most respondents considered themselves pastoralists or someone involved with livestock ($n = 183$, 88%), while others stated they were a student ($n = 12$, 6%), a businessman ($n = 7$, 3%), a guard ($n = 1$, 1%), or in the tourist industry ($n = 2$, 1%). Two respondents (1%) mentioned they had multiple occupations. Some reports contained unanswered fields; therefore, differences in totals for each question can be attributed to missing data.

Attitudes Toward Carnivores

Westgate residents held positive attitudes for both leopards and lions (66% and 63%, respectively). Conversely, the prevailing sentiments toward hyenas and African wild dogs were negative, with 68% expressing dislike for hyenas and 55% for African wild dogs. When asked if population numbers of these carnivore species should increase, decrease, or remain the same, attitudes generally reflected these same trends, with a majority of respondents wanting leopard (55%) and lion (62%) populations to remain the same, but wanting hyena (68%) and African wild dog (52%) populations to decrease (Table 2). When asked to rank each carnivore species involvement in livestock predation, most respondents (86%) ranked hyenas first. Leopards were most often ranked second (46%), lions third (57%), and African wild dogs as the species least involved (42%; Table 2).

Table 2. Westgate community evaluations toward four carnivore species^a.

Species	Positive	No opinion	Negative	Preferences for Future Population Size
African Wild Dog	16%	29%	55%	Decrease
Hyena	5%	26%	66%	Decrease
Leopard	66%	24%	10%	Remain the Same
Lion	63%	34%	2%	Remain the Same

^a $n = 209$

Community Responses to Carnivores

The predation frequency of the four carnivore species and the average community attitudes toward each species did not always follow assumed levels. Based on low/high livestock predation and positive/negative community attitudes, lions were placed in the “low predation/positive attitude” quadrant, leopards in the “high predation/positive attitude,” African wild dogs in the “low predation/negative attitudes,” and hyenas in the “high predation/negative attitudes” (Figure 3). Hyenas and lions followed the common assumption presented by Dickman (2010) that the levels of predation should elicit a proportional response; however, the results demonstrate that African wild dogs and leopards do not follow this assumption. The predator rankings of actual involvement in livestock predation (1 = most involved, 2 = second most involved, etc.) with community perceptions of predator involvement did not always result in the expected outcomes either (Figure 4).

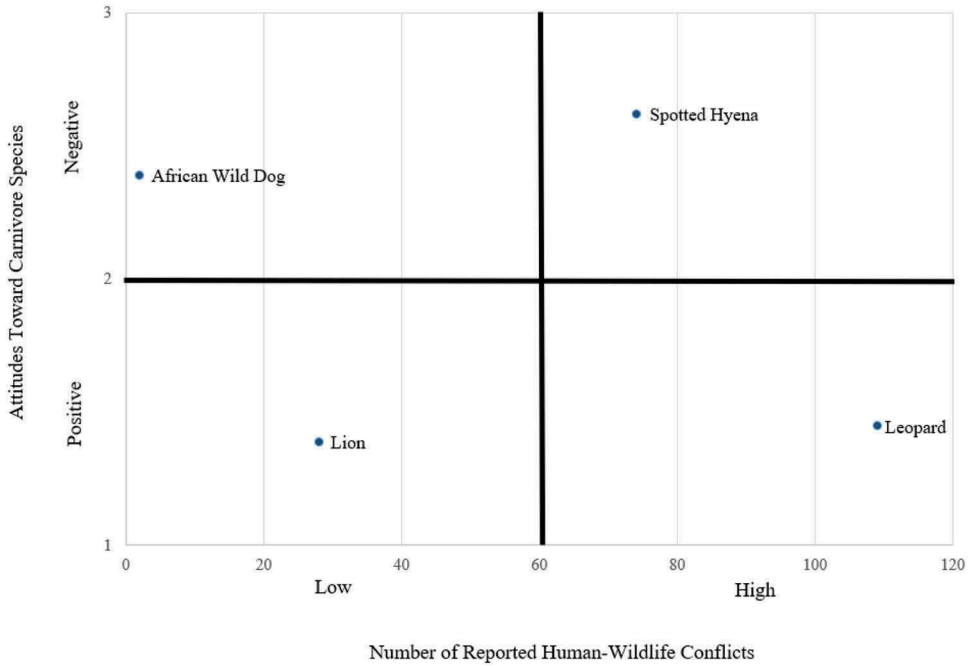


Figure 3. Comparison between the number of livestock depredation events (low or high) in Westgate Community Conservancy and the attitudes (positive or negative) Westgate residents hold toward each carnivore species.

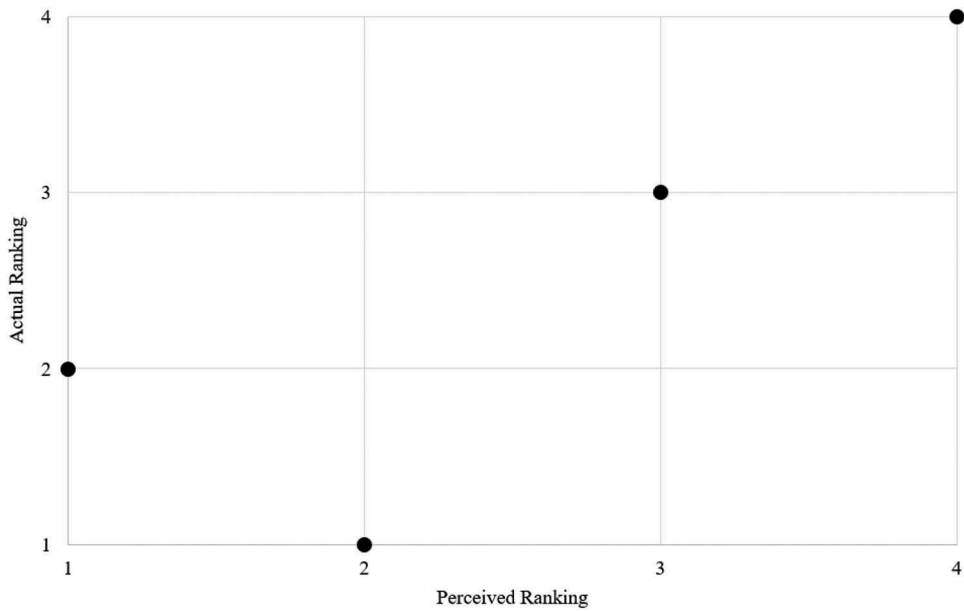


Figure 4. Actual versus perceived rankings of carnivore involvement in livestock predation.

Discussion

The results revealed that the attitudes of Westgate residents toward carnivores varied based on which species was involved in the conflict events, rather than the actual predation frequency. For example, leopards were the most frequent predator involved in conflict incidents but were positively regarded by the Westgate community overall. Conversely, African wild dogs were the least involved in actual conflict events, but regarded negatively by the community. The relationship between conflict incidents and community attitudes was more predictable for the other two species: hyenas were often involved in conflict and regarded negatively, and lions were unfrequently involved in conflict and regarded positively. These results follow Dickman's (2010) argument that social and cultural factors can influence attitudes, arguably more than actual conflict occurrences (like the common assumption). For example, although they are often involved in livestock predation, leopards have a storied place in Samburu folklore and are heralded as one of the "big five" species that tourists allegedly come to Kenya to see, bringing economic spending with them. Leopards are also responsive to deterrents, giving pastoralists a sense of control in preventing leopard attacks. They commonly attack small stock and will kill only what they can consume (Hayward, Henschel, O'Brien, & Kerely, 2006).

African wild dogs, on the other hand, are feared by many people throughout the region; the salience of this sentiment can be heard consistently among people who live in the region. Fear of an attack, stemming from direct or indirect prior experiences, is a strong emotion and can foster animosity toward carnivore species (Kozziarski, Kissui, & Kiffner, 2016; Legendijk & Gusset, 2008). The severity of an attack can also influence attitudes and at least partially explain the disproportionate relationships found in this study as well. Despite the extremely low depredation levels during this study—an average of one attack occurring every two years—African wild dogs often kill multiple animals during a single attack, causing more destruction and a higher economic cost in a single event (Woodroffe, Lindsey, Romanach, Stein, & Ole Ranah, 2005). An average attack by African wild dogs can cost the equivalent of two to three months of income (Woodroffe et al., 2005). These losses greatly affect the economic livelihoods of Westgate community members living near the conservancy (Muriuki, Ipara, & Kiringe, 2017). Enduring cultural beliefs can also harbor resentment toward the species, and Samburu folklore postulates that killing an African wild dog (i.e., following an attack on livestock) will prevent a family from bearing a son. As a result, the Samburu are forced to live with African wild dogs and endure the costs of any depredation events, so they can bear a son (Tobias Otieno, personal communication, 2016).

Wildlife managers must understand that economic loss endured from livestock depredation events can pull attitudes in a negative direction, ultimately hindering conservation efforts (Legendijk & Gusset, 2008). If fear of a devastating, economically-costly attack is a primary explanation as to why Westgate community members view African wild dogs with intense negativity, management strategies should focus on addressing this attitude, such as compensation after an attack or educating residents about deterrents that can help protect them from attacks. Attitudes and perceptions of conflict events cannot be ignored even when the frequency of attacks is low.

Lions preyed more on cattle—the most coveted livestock species because of their economic value and status it brings a family—more than any other carnivore species in

Westgate, but the results demonstrated that Westgate residents held positive attitudes toward lions. Further, lions are also known to kill the healthiest and largest livestock, resulting in greater economic loss (Funston, Mills, & Biggs, 2001; Hemson, 2003; Muriuki et al., 2017). It would seem that carnivores who attack more valuable livestock would be disliked more than carnivores who attack less costly animals. Past research, however, demonstrates that lions are thought of with admiration and pride despite livestock losses, as demonstrated by de Pinho et al. (2014) study showing that aesthetic value can influence people's perception of certain species. Although lions are resented when they kill livestock, communities often accept these lion predation events because it is viewed as a natural behavior and the lion is valued for killing only what it can eat (Goldman, de Pinho, & Perry, 2010). Education can also influence and change attitudes in favor of wildlife conservation (van Dalum, 2013). For example, Ewaso Lions have worked extensively to empower Westgate community members to protect and understand the value of lions. After 10 years of extensive work to promote the coexistence between lions and people, many members of Westgate community view lions favorably, as "their lions," as opposed to the "government's lions" (Shivani Bhala, personal communication, 2016). This community sentiment is likely a product of the extensive community outreach of Ewaso Lions and a key lesson from which other conservation organizations can learn: the involvement of local people who coexist with carnivores is critical. This coincides with academic findings that the degree to which residents support lion conservation will ultimately depend on the value they place on lions (Sillero-Zubiri & Laurenson, 2001).

Samburu often perceive hyenas as ugly, unclean, and greedy animals (Goldman et al., 2010), and as noted earlier, perceived aesthetics can influence community support for the conservation or protection of a species. As depicted in this study and others, hyenas are also opportunistic carnivores who commonly kill prey based on vulnerability rather than abundance (Ogara et al., 2010). It is not surprising that hyenas will exploit opportunities for easy attacks on livestock (Kozierski et al., 2016), sometimes killing an animal and not eating it (Goldman et al., 2010). It is the way in which hyenas hunt that evokes animosity among the community, because they take more than they can consume. While carnivore management must explore ways to reduce livestock depredation events, the levels of livestock depredation must be culturally, economically, and socially accepted by the local community to protect the carnivore species they dislike (Muriuki et al., 2017).

Study Limitations

Although the findings provide important insight into how different carnivore species influence community attitudes, it is important to note several caveats. First, the conflict data were based on events reported to Ewaso Lions. Relying mostly on pastoralists to contact Ewaso Lions regarding a conflict incident might have influenced the number of livestock depredation events recorded and the accuracy of data (e.g., some reports were filed up to one month after the event).

Second, the social data were not a random sample because participants were selected based on convenience during the sampling period. Scouts who conducted the interviews were limited in their sampling options due to the practical constraints of the region, including

the rugged terrain, nomadic orientation of tribes, and viable sample of residents; therefore, a convenience sample represented the most practical way for the scouts to conduct interviews.

Finally, Ewaso Lions employs local community members who do have an influence in their communities, something that increases the support for lion conservation. Although Ewaso Lions scouts completed the interviews and may have biased a positive affinity for lions, the positive attitudes are seen as a result of successful conservation efforts, rather than a potential social desirability bias. Despite these limitations, other studies conclude that pastoralists do provide a reliable interpretation of livestock depredation events, ultimately providing a dependable account of conflict events (Woodroffe et al., 2005).

Conservation Implications

Uncertainty about wildlife conflict always exists in Samburu, because no one can predict when, where, or how an attack will occur. This uncertainty influences social aspects because conservation strategies to protect carnivore species must be flexible to account for these uncertainties. Conflict is rarely a single-species, individual-issue problem. Only multi-faceted solutions that incorporate social and cultural factors, as well as ecological issues, are likely to be effective. Wildlife conservation will only be successful if community members are empowered to manage wildlife in ways in which the benefits outweigh the costs (Kinnaird & O'Brien, 2012). Research shows that certain mitigation methods, such as improving boma quality or changing herding practices, can be successful in reducing human-wildlife conflicts, but the motivation to want to protect wildlife must be there. When wildlife negatively impacts peoples' livelihoods, support for conservation of that species is at risk to decline. Conservation efforts must continue to incorporate the needs and attitudes of community members in their work and allow the communities to feel empowered.

If a certain species is involved in high levels of livestock depredation, negative attitudes toward the species by community members do not automatically ensue. This study indicates that frequency of conflict does not always elicit a proportional response in attitudes. Wildlife management and conservationists must look at multi-faceted approaches that not only focus on targeting ways to reduce conflict events (such as herding at different times or adding deterrents to bomas), but also address the social factors that contribute to these events (i.e., Kenyans are pastoralists living in wildlife hotspots who are traditional livestock owners) and the ramifications of conflict incidents (e.g., economic impacts).

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