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## Pastoralists' Perceptions of the Endangered Grevy's Zebra in Kenya

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*The Grevy's zebra (Equus grevyi) is an endangered equid found in northern Kenya and Ethiopia on rangelands often shared by pastoral populations. The Grevy's zebra population has experienced a significant decline in the past 40 years from approximately 15,000 individuals to around 2,000–5,000. For this trend to be reversed, local people that share the pasture-land with Grevy's zebra must be involved. This study sought to identify the beliefs and levels of importance ascribed to Grevy's zebra by local people. In-depth surveys conducted in the region indicated that males and those with fewer numbers of livestock viewed the Grevy's more favorably. In addition, most respondents identified few direct benefits of the zebra, but individuals from areas with minimal tourism perceived the Grevy's zebra as providing financial benefits (e.g., via safaris). Findings suggest that outreach to local communities is needed about the benefits of the species as well as its population decline.*

**Keywords** Grevy's zebra, pastoralism, Kenya, perceptions

### Introduction

The Grevy's zebra (*Equus grevyi*) is an endangered equid found in the arid rangelands of northern Kenya and Ethiopia. They are the largest of the three zebra species, the others being the plains zebra (*equus quagga*) and the mountain zebra (*equus zebra*). The species is uniquely adapted to its arid environment. They can survive on low quality grass forage and go for several days without drinking, although females with young foals must visit water daily.

In recent years, the Grevy's zebra population has undergone a dramatic reduction in range and numbers. Populations have declined from approximately 15,000 in the 1970s to around 2,500 today. Once the species ranged widely across northern Kenya, Ethiopia, Somalia, and Djibouti. Today, Grevy's zebra are restricted to parts of northern Kenya and Ethiopia. The last stronghold of the species is the bushed grasslands of the Ewaso ecosystem in the districts of Laikipia and Samburu in northern Kenya, where Grevy's zebra

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co-occur with the closely related and more abundant plains zebra (*Equus quagga*, formerly *E. burchelli*). Within the Ewaso ecosystem, the population of Grevy's zebra within Laikipia has actually increased during approximately the last 10 years, although an estimate or the exact reasons for this increase (i.e., better survival or increased immigration from other less-safe areas) are not known.

This article examined the perceptions of Grevy's zebra held by local pastoralists who share an ecosystem with the zebra. This is important, as the activities of these individuals can greatly affect a significant portion of the world's remaining population of the species. People in this region may presume that the Grevy's zebra population overall is healthy given their local observations of the species. Specifically, we examined how importance ascribed toward Grevy's zebra and perceived benefits of Grevy's zebra differed by various demographics (e.g., sex, number of livestock) within Laikipia. This study also served as a pilot for a similar survey carried out in the far north of Kenya. The results of this work will enable conservation practitioners in the area to build on these perceptions and knowledge levels to enlist the support of local people in the protection of Grevy's Zebra habitat.

## Background

In this article we focused on the six group ranches in Laikipia district of the Greater Ewaso ecosystem. The Ewaso ecosystem is a typical arid savannah. Lying just north of the equator in the rain-shadow of Mt. Kenya, the ecosystem can be broadly defined by the watershed of the Ewaso Ngiro River covering over 25,000 km<sup>2</sup>. The dominant land use in the ecosystem is livestock ranching. Land tenure, however, is variable and correlates with other ecological features. The different land tenures form a mosaic of habitats for wildlife, with most of the ecosystem owned privately and only 2% in formally protected areas (e.g., Samburu National Reserve; Buffalo Springs National Reserve; Shaba National Reserve). Across most of the district, wildlife like Grevy's zebra coexist uneasily with livestock, including cattle, sheep, goats, and camels.

Livestock ranches can be classified into commercial and pastoral holdings. Land holdings are extensive and ranches are typically around 100 km<sup>2</sup> or more in area. These ranches often supplement their income from livestock with wildlife tourism. Commercial ranches are typically owned by wealthy individuals or corporations. Some of these private ranches have also formed conservancies where wildlife conservation is an explicit goal. By contrast, pastoralist areas, also known as group ranches, are communally owned and managed. Each ranch is held privately by a defined group of families belonging to the local community. These areas are characterized by relatively high livestock and human densities and low densities of wildlife. Habitat deterioration and degradation also are more apparent in pastoral or communal areas. Several group ranches in the region have recently formed conservancies on their land to support wildlife conservation.

## Threats to Grevy's Zebra

Grevy's zebra were hunted (legally, as a sport) for their skins. Since 1977, however, a hunting ban prohibits any killing of Grevy's zebra in Kenya. Today, the main factors underlying current population declines of the species are habitat degradation, reduced access to waterholes, and illegal killing in some parts of their range (Williams, 2002).

As human population densities and livestock grazing regimes change, habitat for wild ungulates is often adversely altered. For example, a transition to sedentary livestock grazing practices from a more nomadic approach harms regeneration in grasslands and, may lead to

loss of vegetative cover and soil erosion. Consequently, land is less hospitable for Grevy's zebra and other ungulates (Williams, 1998). In arid areas where water is scarce, people fence off waterholes to prevent wildlife from soiling the water or occupying the waterholes for most of the day. Species such as Grevy's zebras thus have fewer opportunities to drink or are forced to drink at unsafe times, such as evening or night, when predators are most active.

### **Why do Grevy's Zebras Matter to People?**

Across Laikipia and Samburu, the majority of Grevy's zebra habitat is owned by local pastoral communities comprised of Samburu and Maasai people. Historically there has been little direct conflict between humans and zebras compared to human-wildlife conflict with other wildlife such as lions or elephants. Nevertheless, zebras share many of the same food and water resource needs as livestock, so the species is of interest to local people. Conversely, because of their shared resource needs, efforts to protect Grevy's zebra habitat in Laikipia and Samburu would also benefit livestock. With improved range conditions for Grevy's zebra, this could result in enhancing livelihoods as well.

### **Literature Review**

Understanding local perspectives of wildlife plays a critical role in the management and conservation of a large array of different species. Studies have sought to understand how local perspectives and attitudes shape individual behavior as related to specific wildlife species as well as biological conservation. Most studies show an overall positive view of different wildlife species and their conservation (Gusset et al., 2008; Hu et al., 2010; Scanlon & Kull, 2009; Tessema, Liliehom, Ashenafi, & Leader-Williams, 2004) although some studies found opposite results, usually in the case of predators (Gusset et al., 2008; Leroy, de Visscher, Halidou, & Boureima, 2009; Románach, Lindsey, & Woodroffe, 2010).

A number of factors influence both local attitudes toward wildlife, and how that wildlife is conserved. These factors include sex, education, wealth or number of livestock owned, benefits received, livelihoods, and conflicts with wildlife.

#### ***Sex***

Results vary regarding the degree to which sex influences perceptions of wildlife. Males appear to be more positive toward wildlife than females. For example, in a study of attitudes of local people in Laikipia, Kenya, men had a more positive view of elephants than women (Gadd, 2005). Similarly, Tomičević, Shannon, and Milovanović (2010) found that women had a negative attitude toward conservation in general in Ethiopia while men held a positive view. Other studies in Africa, however, show no connection between sex and attitude (De Boer & Baquete, 1998; Parry & Campbell, 1992).

#### ***Education***

In a number of studies that employed a variety of quantitative and qualitative approaches for measuring attitudes toward specific species, conservation education was linked to positive attitudes toward species by local people for a number of species including African elephants (Kuriyan, 2002), endangered African wild dogs (Gusset et al. 2008), and

endangered Przewalski's gazelle in China (Hu et al., 2010). Education also correlated with positive attitudes toward general conservation (Tomićević et al., 2010; Vodouhê, Coulibaly, Adégbidi, & Sinsin, 2010). However, some studies show no correlation between education and attitude (Gadd, 2005; Parry & Campbell, 1992). Researchers suggest the use of conservation education programs as a means of increasing positive attitudes toward wildlife among local people (Gillingham & Lee, 1999; Gusset et al., 2008; Tessema et al., 2010; Vodouhê et al., 2010).

### ***Wealth or Number of Livestock***

In many parts of rural Kenya livestock is viewed as indicative of wealth and social status (Bruyere, Beh, & Lelengula, 2009; Hazzah, Mulder, & Frank, 2009). Previous studies have addressed how the number of livestock owned influences individuals' feelings toward specific wildlife species. In most cases, those who owned more livestock held a more positive attitude toward wildlife (Hazzah et al., 2009; Parry & Campbell, 1992; Romañach et al., 2010). Leroy et al. (2009) found that owning livestock was the only predictor of a positive attitude toward white giraffes in Niger. In contrast, Tessema et al. (2010) found that positive views of wildlife were correlated with owners of smaller herds in Ethiopia. In addition, no correlation was found in Mozambique (De Boer & Baquete, 1998).

### ***Benefits***

The most often cited reason for supporting the conservation of wildlife is the obtainment of tangible benefits, including tourism, hunting, jobs, revenue, meat, and infrastructure by local people (Bruyere et al., 2009; Leroy et al., 2009; Romañach et al., 2010; Scanlon & Kull, 2009; Tessema et al., 2010; Tomićević et al., 2010; Vodouhê et al., 2010). A few studies mentioned that locals perceive intangible benefits from wildlife and conservation, such as pride and connection to culture (Kuriyan, 2002; Tomićević et al., 2010; Tessema et al., 2010; Vodouhê et al., 2010), but these were the minority. Recognizing the importance of perceived tangible benefits related to wildlife is crucial in future conservation planning.

Tourism-based revenue may be one of the most important perceived benefits of wildlife. This is of particular note as the Grevy's zebra is considered one attraction for tourists in the area under study and could be used to facilitate a sense of ambassadorship among local people (Low, Sundaresan, Fischhoff, & Rubenstein, 2009). The Grevy's zebra could easily become a flagship species for this area should tourists' perceptions prove positive (Jones & Entwistle, 2002).

### ***Local Livelihoods***

Life in rural Kenya is subject to many hardships that are only further exacerbated by disruption of livestock practices by wildlife (Bruyere et al., 2009). Local people whose livelihoods are threatened by wildlife are more likely to negatively view and behave toward wildlife (Leroy et al., 2009; Gillingham & Lee, 1999). This may be due to local people being dependent in part on bush meat for protein but unable to hunt due to strict prohibitions for doing so (Parry & Campbell, 1992). Complaints about problem species may be exaggerated in instances of impoverished populations (Dublin & Hoare, 2004). Although threatened livelihoods can cause a somewhat negative view of wildlife, conflicts with wildlife may further intensify these feelings.

### *Conflicts With Wildlife*

In a recent study of threats to protected areas in Kenya, human–wildlife conflicts ranked third in severity for all threats mentioned (Kiringe, Okello, & Ekajul, 2007). The risk of zebras and elephants foraging on agricultural plots, and thus reducing yields, was mentioned as an important park-related risk in Tanzania (Baird, Leslie & McCabe, 2009). Although human–wildlife conflicts differ by situation, land use type, and whether the species in question is a predator, results mainly show that human–wildlife conflict is correlated with negative perceptions of wildlife and conservation.

Local perceptions of wildlife and conservation were negatively influenced by general conflict (Mugisha & Jacobson, 2004; Tessema et al., 2010), crop raiding and damage (De Boer & Baquete, 1998; Gillingham & Lee, 1999; Parry & Campbell, 1992), and loss of livestock through predation or competition (Gusset et al., 2008; Hazzah et al., 2009; Kuriyan, 2002; Lindsey, du Toit & Mills, 2005). In some cases with predators, compensation for losses positively changed the perceptions of conflict (e.g., Hazzah et al., 2009) but did not in others (e.g., Gusset et al., 2008). It is important to realize that pastoralists may not always view competition from other herbivores as a major concern (Gadd, 2005; Leroy et al., 2009). Even when local pastoralists perceived competition from the endangered Przewalski's gazelle, those who demonstrated greater knowledge about the species and its needs continued to be in favor of conservation (Hu et al., 2010).

In the case of the Grevy's zebra, the possibility for human–wildlife conflict exists. Low et al. (2009) found that there was extensive overlap with zebra and livestock in grazing and watering areas, although they may not be in competition. The Grevy's zebra avoided areas close to livestock corals in a study by Sundaresan, Fishhoff, Hartung, Akilong, and Rubenstein (2007), showing the potential influence livestock rearing practices may have on zebra. It is therefore crucial to understand local perceptions of the Grevy's zebra to uncover possible conflicts, perceived benefits, and how factors such as wealth, education, and sex influence these perceptions.

### *Hypotheses*

Based on the goals for this study and the review of literature, the following hypotheses were determined:

- H<sub>1</sub>: Male respondents will place greater importance on Grevy's zebra than females.
- H<sub>2</sub>: Respondents with more livestock (cows and goats) will place less importance on Grevy's zebra than those with fewer livestock.
- H<sub>3</sub>: Respondents will identify economic benefits as the primary incentive for Grevy's zebra on their group ranches.
- H<sub>4</sub>: Respondents from group ranches with tourism enterprises will identify more benefits of Grevy's zebra than respondents from other group ranches.

### **Methods**

#### *Sample*

We questioned 15 to 30 members from each of six different pastoral areas or group ranches in the Laikipia District of Kenya. This range was the result of different sizes of group ranches and also based on minimum numbers anticipated to detect differences between group ranches as well as by practicalities (there is often large distances between households

and road infrastructure is typically rugged). When possible, randomized sampling was used. For example, in Il Polei, we obtained a list of households and randomly selected a set of households to visit. For other group ranches, we attempted to choose respondents randomly through various techniques such as walking in a random direction from a village center and questioning people in households encountered along that path. Purposive sampling was also integrated to insure a mix of age and sexes.

The six group ranches are broadly similar in terms of culture, but vary in their exposure to wildlife conservation endeavors. For example, the Koiya and Kijabe group ranches have well-developed eco-tourism initiatives on their properties, while the Mosul and Tiamamut group ranches have none. All ranches are of similar area (20–80 km<sup>2</sup>), contain similar ecological habitats, and experience the same general rainfall and climate conditions. The people of these ranches are all Maasai or Samburu with a broadly similar pastoralist culture. Their main source of livelihood is livestock rearing. Cattle are the most prized livestock, although small stock (sheep and goats) are the most common. Donkeys and camels also are held less frequently.

The questionnaire was administered by a local person who was first trained in the method. A preliminary questionnaire was drawn up in English, translated to the local language (Maa), and then back translated to ensure integrity. The preliminary questionnaire was administered to 30 individuals (these individuals were not subsequently questioned and this preliminary data was not used in the analyses). Based on the experience of the questionnaire administrator, the wordings of the questions and protocol then were modified so that maximum information could be gathered and respondents were placed at ease in answering questions. Subsequently, we administered the questions to randomly chosen recipients.

The questionnaire was conducted in Maa. The administrator recorded the answers on a sheet of paper after translating them into English.

### ***Survey Instrument***

The survey included 34 questions and took on average about 40 minutes to administer. Most questions were open-ended and allowed for a discussion between the questioner and respondent. Some questions asked about specific local information (e.g., “*Do you know where Grevy's zebra drink in your group ranch?*”), the trends of the Grevy's zebra population in the area over time and finally questions about the importance they place on Grevy's zebra (e.g., “*How are important are Grevy's zebras?*” and “*How important is having Grevy's zebra on your ranch? Why?*”). We also asked basic demographic information and number of livestock.

### ***Data Analysis***

Discrete sets of attributes were created for replies to the open-ended questions (e.g., “*What are the benefits you receive by having Grevy's zebra in your group ranch?*”). Descriptive statistics were run and hypotheses were tested by administering chi-square, independent sample *t*-tests, and one-way Analysis of Variances (ANOVA) to compare groups. Statistical significance was set at the  $p < .05$  level and eta values were used to determine the strength of the relationships. Effect size measures for ANOVA (Eta) and the cross-tabulations (Phi or Cramer's V, depending on number of categories) provided an indication of the strength of any differences. An effect size of .1 suggests that the relationship between two variables is minimal; .3 indicates a typical relationship and .5 suggests a strong relationship (Vaske, Gliner, & Morgan, 2002).



## Results

### *Perceptions of the Importance of the Grevy's Zebra*

*Perceptions of Importance by Sex.* Respondents were asked to indicate how important they thought the Grevy's zebras were to their respective group ranches. All respondents generally perceived the presence of the Grevy's zebra as important ( $M = 4.17$ ). Male and female respondents, however, statistically differed in their perceptions of the importance (Table 1). Male respondents reported a higher level of importance than female respondents ( $M$  for males = 4.32 and  $M$  for females = 3.81,  $t = 2.60$ ,  $p < .01$ ). This relationship had an eta value ( $\eta$ ) of .232 suggesting the strength of the difference can be characterized as minimal to typical (see Vaske et al., 2002). Based on this result, we accept the first hypothesis (see Table 1).

*Perceptions of Importance by Livestock Ownership.* Respondents were asked to report the number of cows they owned, and responses were grouped into four categories. Regardless of the number of cows owned, respondents generally perceived the presence of the Grevy's zebra on their group ranches as important (see Table 2;  $M$ 's ranging from 4.44 to 3.52). One-way ANOVA indicated that the four ownership groups differed statistically with regards to their perceptions of the importance of the Grevy's zebra ( $F = 2.79$ ,  $p = .05$ ). Post hoc analyses (Scheffe) indicated that respondents with zero to three cows perceived the Grevy's zebra as more important than those with more than 25 cows. The Eta e ( $\eta$ ) of .263 suggests a typical difference between groups. No other group differences were found.

**Table 1**  
Differences among sex on importance of Grevy's zebra in group ranches

	Sex <sup>1</sup>		<i>t</i> -value	<i>p</i> -value	H
	Male	Female			
Importance <sup>2,3</sup>	4.32	3.81	2.60	<.01	.232

<sup>1</sup>Cell entries are means.

<sup>2</sup>Variables coded on a 5-point scale: (1) very unimportant, (2) unimportant, (3) indifferent, (4) important, (5) very important.

<sup>3</sup>a and b superscripts indicate differences between groups.

**Table 2**  
Differences among cow ownership groups on importance of Grevy's zebra in group ranches

Item	Ownership groups <sup>1</sup>				<i>F</i>	<i>p</i> -value	H
	0–3 cows	4–9 cows	10–25 cows	>25 cows			
Importance <sup>2,3</sup>	4.44 <sup>a</sup>	4.16 <sup>ab</sup>	4.31 <sup>ab</sup>	3.52 <sup>b</sup>	2.79	.050	.263

<sup>1</sup>Cell entries are means.

<sup>2</sup>Variable coded on a 5-point scale: (1) very unimportant, (2) unimportant, (3) indifferent, (4) important, (5) very important.

<sup>3</sup>a and b superscripts indicate differences between groups.



**Table 3**  
Differences among goat ownership groups on importance of Grevy's zebra in group ranches

Item	Ownership groups <sup>1</sup>					F	p-value	H
	0-5 goats	6-19 goats	20-40 goats	41-75 goats	>75 goats			
Importance <sup>2</sup>	3.43	4.87	4.32	4.11	3.92	2.40	.050	.274

<sup>1</sup>Cell entries are means.

<sup>2</sup>Variable coded on a 5-point scale: (1) very unimportant, (2) unimportant, (3) indifferent, (4) important, (5) very important.

Similar results were found when comparing perceptions of importance by the number of goats owned by respondents (Table 3). Respondents generally felt that having the Grevy's zebra on their respective ranches was important (*M*s ranging from 4.87 to 3.43). The five goat ownership groups, however, did differ statistically in their perceptions of importance ( $F = 2.40, p = .05$ ). Post hoc analyses (Scheffe) indicated that respondents with the most goats (>75) perceived the presence of the Grevy's zebra as less important than respondents with fewer goats. An exception to this finding was found with the 0-5 goats group, but, with only seven respondents, this group was too small to compare. The Eta value ( $\eta$ ) for this relationship was .274, indicating a typical difference among goat ownership groups. We accept  $H_2$ .

**Perceptions of the Benefits of the Grevy's Zebra**

*Perception of Benefits by All.* Respondents were asked to report the benefits of the Grevy's zebra (Table 4). Almost two-thirds of respondents (62%) reported that the Grevy's zebra had no benefits, which was different than our anticipated finding ( $H_3$ ) in which we predicted most respondents would identify economic benefits. Approximately one-third (34%) indicated that the Grevy's zebra had economic benefits (e.g., tourism, money). Another 4% of respondents identified benefits related to subsistence (e.g., food, material). We rejected  $H_3$ .

**Table 4**  
Perceptions of benefits of the Grevy's zebra

	Recipient of benefits <sup>1</sup>	
	You	Others
Economic	34	37
Subsistence	4	5
No benefits	62	56

<sup>1</sup>Cell entries are percents.

<sup>2</sup>Open-ended question asked was "What are the benefits you/others receive from having Grevy's zebra on your group ranch?" Question was recoded to dichotomous yes/no variable.

**Table 5**

Differences among group ranches on economic benefits and no benefits of Grevy's zebra

Item	Group ranch <sup>1</sup>						$\chi^2$	V	p-value
	Kijabe	Mosul	Tiamumut	Koiija	Ilmotiok	Il Polei			
Economic benefits	20	53	75	35	55	37	16.38	.19	<.01
No benefits	80	40	25	53	40	40	14.85	.25	.01

<sup>1</sup>Cell entries are percents of respondents who positively identified economic benefits and who identified no benefits.

*Perception of Benefits by Group Ranch.* Reported benefits of the Grevy's zebra were compared by group ranches (Table 5). Of the six group ranches represented in this study, respondents from the two ranches with tourism enterprises, Kijabe and Koiija, identified economic benefits of the Grevy's zebra less often (20% and 35%, respectively), and more often stated that there are no benefits to the Grevy's zebra (80% and 53%). In contrast, respondents from the ranches without tourism ventures (i.e., Mosul, Tiamamut, Ilmotiok, and Il Polei) more often mentioned economic benefits. Chi square analyses indicated that responses did differ statistically by group ranch for the *economic benefit* ( $\chi^2 = 16.38$ ,  $p < .01$ ) and *no benefit* items ( $\chi^2 = 14.85$ ,  $p = .01$ ). This finding is in contrast to our fourth hypothesis, and we therefore reject H<sub>4</sub>.

## Discussion

This article revealed a number of differences in how pastoralists assess the importance and favorability of Grevy's zebra and the perceived benefits of Grevy's zebra to their communities. First, while both males and females generally felt Grevy's zebra are important to their group ranch, the sentiment was more strongly expressed by males. Males have traditionally been more responsible for tending livestock in the bush where they must co-exist with wildlife. As a result they have possibly developed a stronger respect and/or affinity for Grevy's zebra; this explanation is postulated in prior research as well (see Gadd, 2005; Tomićević et al., 2010). Other researchers only speculate on the causes. This is an issue we recommend be investigated further to better understand why this difference between sexes exists.

This article also indicated that individuals with more livestock felt less favorably toward Grevy's zebra. As reported earlier, previous studies have been inconsistent on this finding. Our explanation for this is that those with large numbers of cows and goats perceive Grevy's zebra as competitors for the same rangeland resources needed by their livestock. Ecological studies of cattle-zebra (using Plains zebra not Grevy's zebra, but a good surrogate for our discussion purposes) suggest that cattle and zebra do compete for forage in the dry season but facilitate each other in the wet season (Young, 2005). Generally, zebras can subsist on lower quality forage than cattle but require a higher biomass to extract sufficient nutrients. The fact of competition, however, is very different from people's perception of competition. It is not surprising that people believe the Grevy's zebra compete with

livestock—they eat grass in a broadly similar way. They need water to drink and use many of the same waterholes as livestock.

The perceived benefits of Grevy's zebra are consistent with previous research about how pastoralists view the advantages of wildlife (Bruyere et al., 2009; Gadd, 2005; Gillingham & Lee, 1999; Leroy et al., 2009; Lindsey et al., 2005; Newmark, Leonard, Sariko, & Gamassa, 1993; Tessema et al., 2010; Tomićević et al., 2010). In this study, approximately two-thirds of respondents expressed that Grevy's zebra provide no benefits to either the respondents or to others. Of the respondents that did express a benefit, that benefit was most often a financial benefit derived from tourism. Wildlife-based tourism provided a tremendous economic impact in Kenya—upward of USD \$700 million annually—although the amount attributable to Grevy's zebra is not known, but is likely to be less substantial compared to more widely recognized mega-fauna such as lions, elephants, and cheetahs. Counter to expectations, however, respondents from the two group ranches in this study that have tourism enterprises within their ranch (e.g., tourist lodges) were less likely to perceive Grevy's zebra as having any benefit to themselves or their community. One explanation here is that their exposure to tourists and tourist behavior might paint a more realistic picture of the minimal economic impact of Grevy's zebra for those individuals, whereas those without much exposure to tourism might tend to over-estimate the economic benefits of Grevy's zebra since they know that wildlife in general generate tourist revenue. Alternatively, those two ranches also tend to be wealthier, and their greater likelihood to report no benefits of Grevy's zebra could also be due to having more livestock (and thus, perceived competition).

The view by a majority of respondents of Grevy's zebra having either no benefits or only economic benefits is fairly consistent with prior research about how pastoralists in this same region view protected areas; they are good for generating money, though few people report receiving a direct financial benefit to themselves or to their families. We echo a similar issue here raised in the studies by Bruyere et al. (2009) and Bruyere, Beh, and Foster (2011) that a tenuous situation potentially exists if the only perceived benefit by local people is financial, yet few people actually realize that benefit themselves. At some point we wonder if local people's favorability toward Grevy's zebra, other wildlife species, and protected areas will wane if benefits fail to be extended to them more directly.

This has implications for nongovernmental organizations (NGOs), universities, and government agencies managing wildlife resources in lands that are shared by pastoral people. If there are known benefits—financial or otherwise—of protection of a species directly to people, those benefits should be explicitly articulated and apparent to local people. We can more realistically expect people whose livelihood is dependent largely on land resources to be good partners for wildlife conservation if they receive benefits as well, and are fully aware of those benefits. This study helps make the argument for greater efforts to raise awareness and education about Grevy's zebra.

A final important finding of this article is also one that raises additional questions for future investigation. Given the number of open-ended questions and the interview format of this data collection that allowed for the respondent to share other thoughts and comments, there was very little mention of the endangerment of Grevy's zebra by any of our 160 respondents despite its population declines over the past 40 years and the presence of a number of NGOs and others studying Grevy's zebra. We feel this finding is a topic that needs further research: is the concept of “endangered” understood, and if the comprehension exists that a species is in peril of survival, how do pastoralists in this region react to such a scenario?

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