

Conservation outside of parks: attitudes of local people in Laikipia, Kenya

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SUMMARY

Conflict between wildlife and people can erode local support for conservation. Wildlife-based benefits are intended to offset costs and encourage tolerance or stewardship, but where the linkage between benefits and wildlife is not understood, benefits may be ineffective at bolstering conservation. In Laikipia, Kenya, wildlife and areas devoted to wildlife are on the increase, but most residents still suffer losses to wildlife and derive minimal benefits. The elephant situation is particularly problematic because elephants may compete with livestock for resources, raid people's crops, and chase and kill livestock and people. Although most unprotected elephant range in East Africa is in semi-arid rangelands occupied by pastoralists, previous research has emphasized agricultural, not pastoral or agri-pastoral conflicts. Between 1999 and 2002, interviews were conducted in Laikipia District to examine whether pastoralists also experience conflict, and to determine whether wildlife conservation provided appreciable benefits to residents, or fostered pro-conservation attitudes among residents. Three properties, Endana, Koija and Mpala, were selected to include the two primary land uses in Laikipia (livestock and agriculture) and two levels of wildlife-based benefits (indirect benefits and direct benefits from a locally-owned tourism operation). People were negative about many aspects of local wildlife conservation, especially animals that raided crops or were dangerous. Fundamental differences in attitudes were attributable to primary land use; within ethnic groups, people practising agriculture were less tolerant of elephants than people practising pastoralism. Despite evidence that elephants may compete with livestock for forage, ecological competition was not a primary concern among cattle-keeping people. In communities that received indirect benefits from tourism or wildlife, the connection between wildlife and employment or aid in kind was usually overlooked. Unlike elsewhere in Africa, education and wealth did not correlate with positive attitudes towards wildlife because the tourism programme was improving the situation and the outlook of people lacking education and material

wealth. Pastoral people with indirect financial benefits expressed positive attitudes towards elephants for aesthetic reasons, while pastoral people with direct benefits cited financial rewards derived from tourism but attributed aesthetic values to living with elephants. The programme in the pastoral community receiving benefits was exemplary in that benefits were tangible, and the participants appreciated the linkage between benefits and active conservation. Land conversion from pastoralism to agriculture threatens elephant survival, not only in terms of habitat loss, but also in terms of lost tolerance among people who have shifted to farming.

Keywords: attitudes, benefits, conservation, elephants, sustainable land use, tourism, wildlife conflict

INTRODUCTION

Conservation outside parks is lauded to benefit wildlife and people by expanding habitat and extending wildlife-derived economic development (Western & Wright 1994), but living with wildlife can have costly, even deadly, drawbacks. Compensation schemes and wildlife-based benefit programmes are intended to offset the financial cost of wildlife and to encourage people to protect wildlife, but benefits can also have unintended effects. Commodification of a natural resource ties a financial value to that resource (King & Stewart 1996). Financial values can alter people's behaviour towards the resource adversely if, for example, it is so desirable that it is exploited unsustainably (as with rhino horn and ivory) or if the resource suddenly loses value. People may fail to acknowledge or may undervalue benefits (Parry & Campbell 1992; Gillingham & Lee 1999). If the linkage between the benefits and the health of the resource is underemphasized, beneficiaries may fail to recognize or take steps to protect the source (Parry & Campbell 1992; Gibson & Marks 1995; Infield & Namara 2001). Unrealistic expectations may result in hostility towards the park or body that failed to deliver the anticipated goods (Boonzaier 1996). People may come to expect financial proceeds or services, and resent species that do not provide them with a direct profit (Gadd 2001, 2003). The commercialization of wildlife may displace or override existing cultural values (Infield 2001; Gadd 2003).

Tourism can bring benefits to wildlife-rich areas (Western & Wright 1994; Agrawal & Gibson 1999; Honey 1999; Newmark & Hough 2000; Adams & Hulme 2001), particularly areas with charismatic species like elephants and the great apes

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(Walpole & Leader-Williams 2002; Adams & Infield 2003). But even where tourism succeeds in bringing revenue, it often fails to provide long-term support for conservation. Participants may be positive about tourism but negative about wildlife conservation (Mehta & Kellert 1998; Walpole & Goodwin 2001). Alternatively, people may receive and appreciate benefits, but may not be aware of the source (Archabald & Naughton-Treves 2001).

If financial incentives fall short, the resource itself may be jeopardized. This is a particular concern with an industry as capricious as tourism. Domestic and international events can drastically disrupt tourism (Walpole & Leader-Williams 2002). Following the kidnapping of tourists at Bwindi Impenetrable National Park in Uganda in 1999, monthly tourist numbers dropped as much as 85% throughout Ugandan parks (Archabald & Naughton-Treves 2001). At the onset of the Gulf War, the number of tourists travelling to game parks in Kenya dropped by 21% (Norton-Griffiths & Southey 1995) and UK and USA government warnings in 2003 of security risks in Kenya caused a substantial decrease in visitor volume (Mureithi 2003).

In Africa, conflict with wildlife is increasing. The elephant, *Loxodonta africana* Blumenbach, is one of the most financially valuable species in terms of attracting tourists and trophy hunters, but it is also one of the most problematic to local human populations. With 84% of African elephant habitat outside of protected areas (Blanc *et al.* 2003), elephants are particularly likely to come into contact with people. In much of the continent, the local cost of tolerating elephants exceeds the benefits. Agriculturists lose crops to various wildlife species (Hill 1997; Naughton-Treves 1998), and although elephant damage is infrequent compared to other pests, it is often the most severe (Tchamba 1996; Naughton-Treves 1998; Sutton 1998) or comes just before harvest when effort and resources have already been invested (M.E. Gadd, personal observation 1997–2004). Elephants are also dreaded crop-raiders because they are difficult to chase away and may kill people (Thouless 1994; Tchamba 1996; De Boer & Baquete 1998; Hill 1998). To farmers, the cost of elephant damage is not only the direct loss of a source of nutrition and income, but also indirect losses of education for children who have to stay home to guard the crops (Naughton-Treves 1998) or alter their schedules to avoid elephants (Kuriyan 2002), and psychological stress from anticipating nocturnal raiders (Sutton 1998).

To conservation, the cost of elephant damage is also tremendous. Hostility towards nearby national parks arises when people feel they have not been adequately compensated for damage (Hill 1998; Naughton-Treves 1998). People may take matters into their own hands, eliminating unwelcome animals (Nyhus *et al.* 2000). Not surprisingly, Mozambican farmers who lost crops to elephants had a more negative attitude towards the Maputo Elephant Reserve than people who had not suffered elephant raiding. In fact, the single most common reason for disliking the reserve was the invasion of crop-raiding animals (De Boer & Baquete 1998). Similarly,

when local people were polled about abolishing a neighbouring park in Tanzania, respondents were more likely to desire abolition if they had grievances with the park or park officials (Newmark *et al.* 1993), crop damage by wild animals often being the predominant complaint (Gillingham & Lee 1999). Conflicts with wildlife can threaten the survival of animals and erode support for conservation areas.

While a lot is known about the relationship between elephants and farmers throughout Africa (Hill 1997, 1998; De Boer & Baquete 1998; Naughton-Treves 1998; Hoare & DuToit 1999; Low 2000; O'Connell-Rodwell *et al.* 2000; De Boer & Ntumi 2001; Osborn & Parker 2002; Smith & Kasiki 2002), pastoralists also share the land with wildlife outside of parks, and their views have been much less studied. Many of Africa's parks and its largest elephant populations are in areas too arid for agriculture, or surrounded by land predominantly used for cattle production. Historically, these lands have been home to pastoral people and their livestock. It has been asserted that traditional pastoralists live in harmony with wildlife and are inherently conservation-minded (Parkipuny 1989), although sceptics argue that pastoralist presence is directly linked to wildlife absence (Mordi 1991; Prins 1992). As development proceeds around parks, pastoral rangelands are sometimes the only suitable habitat remaining and therefore accommodate more dispersing and migrating animals than ever (Parkipuny 1989). This habitat is crucial, sometimes providing an area equal in size and wildlife numbers to the adjacent protected area (for example Masai Mara National Reserve, Norton-Griffiths 1996), or providing the only remaining habitat for wildlife in areas where there are no national parks (for example Laikipia District, Kenya). In some cases, pastoral people are denied access to protected areas but are expected to tolerate grazing, browsing and predation by animals wandering out of the parks. Weighing the costs of tolerating wildlife against the profits to be made from selling the land or converting it to more profitable use (Norton-Griffiths & Southey 1995), it is not surprising that many pastoralists convert to mixed agri-pastoralism or lease the land to intensive irrigation agriculture (Thompson & Homewood 2002). If elephants are to persist on pastoral rangeland, the costs and benefits incurred by pastoral people with livestock need to be assessed.

Whether people dependent on livestock were resentful or antagonistic towards elephants because of potential competition was unknown. Elephants eat both woody plants and grass (Laws *et al.* 1975; McKnight 1995; Gadd 1997) and may compete with livestock directly (Young *et al.* 2005). Despite extensive overlap in distribution, elephants and livestock have rarely been studied together. Cattle may alter elephant feeding, either by changing the quantity and quality of grass elephants eat or by pushing them to shift to browsing. Whether elephants have a reciprocal effect on grass availability for cattle is as yet uncertain, though preliminary evidence indicates that they do reduce overall grass cover (Young *et al.* 2005) and may reduce cattle foraging efficiency (Odadi 2002).

Browsing livestock may also compete with elephants, foraging on the same woody plant species (Gadd 2003).

By interviewing residents of cattle rangeland in central Kenya about elephant ecology, conflict, and the value of elephants, I sought to identify perceived problems with elephants and to solicit suggestions for how these could be alleviated. Varying levels of participation in tourism and different land uses provided the opportunity to measure the success of wildlife-based tourism in terms of local people's attitudes or behaviour toward wildlife. The interview format was designed to elucidate whether knowledge of elephant behaviour, local views on elephant problems, willingness to tolerate wildlife, and opinions and suggestions on wildlife management were related to the benefit system, ethnic or cultural traditions, or underlying socioeconomic conditions. This information has relevance throughout rural areas where people struggle to survive alongside wildlife.

This project investigated attitudes towards elephants, the severity of wildlife-related problems, and the influence of aid or wildlife-based schemes on attitudes. In particular, I sought to test the following hypotheses:

- Cattle production is more compatible with wildlife than agriculture. Pastoralists will be more tolerant and more positive than farmers.
- People from pastoralist cultures will be more tolerant than people who have traditionally practiced agriculture, regardless of current land use.
- Alternatively, ecological competition between elephants and livestock may be a reason for intolerance among pastoralists.
- People who receive tourism benefits or wildlife-based aid will be more positive towards wildlife.
- Factors found to influence attitude elsewhere in Africa (education, wealth and gender) also influence conservation attitudes in Laikipia.

METHODS

Study area

The research was conducted in Laikipia District in central Kenya (Fig. 1). The district is typical of many parts of Africa where elephants persist outside national parks: wooded savannah, suboptimal for agriculture but suitable for livestock. A substantial amount of Kenya's wildlife persists outside of protected areas (Ottichilo *et al.* 2000). Approximately 73% of current elephant range in Kenya is outside protected areas (Blanc *et al.* 2003). Kenya's rural residents often complain about having to suffer the presence of wildlife without reaping any benefits (Kiiru 1995; Ngure 1995; Kangwana 1996; Waithaka 1996, 1997, 1999; Elliott & Mwangi 1998; Low 2000; Emerton 2001; Sitati *et al.* 2003). Tourism accounts for 12% of Kenya's gross domestic product (Mureithi 2003), but very little of the money reaches the residents of wildlife areas.

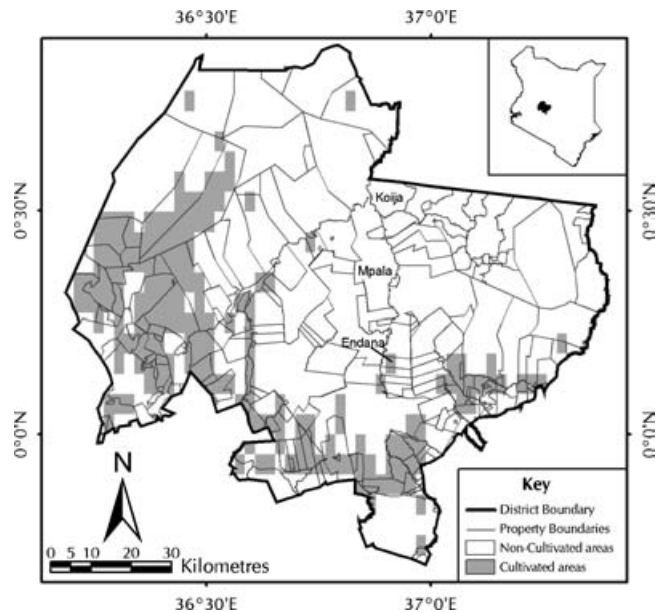


Figure 1 Map of Laikipia District, Kenya showing location of the district within Kenya (inset) and land uses. The three properties included in the attitude surveys are labelled. Unshaded areas are non-cultivated land, predominantly used for livestock (commercial, government-owned and pastoralist group ranches). Shaded areas are cultivated lands used for subsistence and/or commercial agriculture.

Map provided by N. Olwero and N. Georgiadis, Mpala Research Centre, including data from Kenya's Department of Resource Surveys and Remote Sensing and Laikipia Research Programme/Natural Resource Management, Mapping and Modelling.

The districts of Laikipia, Samburu and Isiolo host Kenya's largest population of elephants outside of protected areas (Thouless & Sakwa 1995). In 1999, the population was estimated at 3400 individuals (Kahumbu *et al.* 1999), and is believed to have increased since (Moss 2002). Only a small fraction of the population, estimated at 250 individuals, is inside the refuges of Samburu-Buffalo Springs and Shaba Game Reserves at any given time (Wittemyer 1998, 2001). In the 1970s and 1980s, elephants moved south into Laikipia District in large numbers, probably as a response to illegal ivory poaching and increasing human and livestock presence in the north (Thouless 1994).

Within Laikipia District, some elephant range is privately owned by people who are pleased to host wildlife, but much of it belongs to people who struggle to maintain their own families. Laikipiak Maasai, Pokot, Samburu and Turkana tribes and white settlers are currently the main inhabitants of the district (Herren 1987), all predominantly dependent upon cattle. Some large properties have been subdivided and sold to individual owners. These subdivided ranches are often surrounded by ranches with wildlife and suffer frequent wildlife incursions. The new settlers include farming people (especially Kikuyu, Meru and Embu) from wetter, more densely settled parts of the country, and many are unfamiliar

Table 1 Demographics of the respondents interviewed at three sites in Laikipia, Kenya. The first interview format did not include questions about household livestock holdings or education, so this information is unknown for the Mpala sample (n/a = not available).

Site	Land use	n	Respondents' sex ratio (F:M)	Ethnic origin of respondents	Households with		Mean household number				Respondents with any schooling
					Livestock	Crops	Cows	Shoats	Any stock	Wealth index	
Endana	Small holdings, mixed agriculture	20	9:11	Kikuyu 70% Turkana 20% Maasai 10%	14 (70%)	20 (100%)	1	30	31	3.5	14 (70%)
Koiya	Group ranch, livestock and tourism	20	8:12	Maasai 100%	18 (90%)	0	7	38	46	2.4	8 (40%)
Mpala	Commercial cattle ranch, research centre	34	0:34	Turkana 62% Maasai 38%	n/a	0	n/a	n/a	n/a	2.0	n/a

with either wildlife or dryland farming. Farmers are rarely satisfied with their yields on these semi-arid lands and are distressed by their losses to crop-raiding wildlife (Wambuguh 1998).

Laikipia is gaining prominence as a wildlife destination and economic resource for Kenya. Many people are counting on tourism to support or subsidize the local economy, but the district has become a complex mosaic of wildlife-friendly and wildlife-intolerant places. Elephants moving long distances have little alternative but to traverse cattle grazing areas and agricultural crops. The elephants come into conflict with humans by raiding crops, and by threatening, and occasionally killing, people and livestock (M.E. Gadd, personal observation 1997–2004; Thouless & Sakwa 1995). As many as 13 people were killed by elephants in one year in Laikipia District (Thouless 1994).

To determine whether land use, culture, or benefit systems were influential in compatibility with elephants, I selected three communities that represented the different land use types and ownership situations in Laikipia, namely Mpala, Koiya and Endana (Fig. 1).

Mpala Ranch is a private wildlife area and cattle ranch administered by a consortium of academic and wildlife institutions. The people interviewed on Mpala Ranch were all herders employed by the wildlife trust. Most were lifetime residents of the Laikipia Plateau or came from more arid pastoral areas to the north. All described themselves as Turkana or Maasai (Table 1). Only men were employed as herders at the ranch, and women were not permanently resident.

Koiya is a community-owned group ranch with a newly established tourist lodge. The profits from the lodge are deposited into a community bank account, and the residents decide together how the money will be used. With the help of a neighbouring game reserve (Loisaba), a school has been built, a teacher hired, and a scholarship fund established for successful students to continue their studies elsewhere. The people interviewed at Koiya Group Ranch all described themselves as Maasai (Table 1), and all were lifetime residents of Koiya, except one who grew up in another Maasai settlement less than 20 km away.

Endana is an agricultural settlement scheme consisting of individual landowners who purchased smallholdings from the Kenya government in the late 1980s and early 1990s. Formerly a single property, the settlement is adjacent to properties with high wildlife densities. People from various parts of Kenya have settled in Endana. All of the Turkana and Maasai people interviewed came from Laikipia District or the Northern District, like the herders at Mpala, but most Kikuyu settlers came from wetter parts of Kenya to the south and west. There is no tourism venture at Endana, although the residents receive assistance from neighbours who host tourists and they often request help from Kenya Wildlife Services (KWS) when wild animals enter Endana.

All three properties were within 40 km of one another on the Laikipia Plateau, 1500–1800 m above sea level (Fig. 1). Annual rainfall is highly variable, averaging 300 mm per year in the more arid northern sections of the district (Heath 2000) to 700 mm per annum in southern parts of the district. Elephants and northern plains game inhabit the Laikipia Plateau (see Young *et al.* 1998 for complete species list). Resident predators include lions (*Panthera leo* Linnaeus), leopards (*Panthera pardus* Linnaeus), cheetahs (*Acinonyx jubatus* Schreber), wild dogs (*Lycaon pictus* Temminck), jackals (*Canis mesomelas* Schreber) and caracals (*Felis caracal* Schreber). Koiya, the furthest north, has the lowest rainfall of the three, and is characterized by *Euphorbia* and *Acacia* woodland on red soil. Endana, the furthest south, is dominated by *Acacia drepanolobium* and *Euclea divinorum* woodlands on black cotton soil. Mpala is between Endana and Koiya and has both vegetation types.

Interview methods

Between June and July 1999, 34 cattle herders were interviewed at Mpala Ranch. In July and August 2002, 20 people were interviewed at Koiya Group Ranch, and 20 people at Endana Settlement. The original interview format containing the broadest questions was used at Mpala, and narrower sub-questions were added later for ease of tabulating data. Reliable census figures were not available, so at Mpala, all herders on the property during the survey period were interviewed, and

at Koiija and Endana interviews were conducted at every tenth household. If no adults were present at the selected household, it was skipped and replaced by the next household with a suitable respondent.

The target population was adults over the age of 15 who permanently resided at the location. At each site, an effort was made to obtain relatively equal proportions of gender, education level and age group, so some potential respondents were dismissed if they were from a demographic subset that was already represented. Only one person per household was permitted to participate. The purpose of the interview was explained (a study of the problems of living in rural Africa where wildlife is present) and if the adult was willing to participate, the interview proceeded. Two people declined to be interviewed at Mpala because they needed to search for lost cattle, and two people declined at Endana because they did not live there.

The interview included questions (details in Results section) regarding natural history of elephants in the area, attitudes towards elephants, traditional and contemporary uses of elephants, and topics including other wildlife, especially crop raiding and predation on livestock. People were willing to talk about their household livestock holdings, so numbers of cows, camels, goats and sheep were recorded, in addition to the types of crops cultivated. An index of material wealth was scored for each household, in terms of store-bought goods (on a scale of 1 to 5, with 1 being minimal possessions and 5 maximum, similar to methods described in Infield 1988). After completing all other questions, the respondent was asked if he or she had attended any schooling.

Each interview lasted 30–75 minutes and was conducted by the researcher and a locally hired translator. Interviews were conducted in Turkana, Maa, Swahili, Kikuyu and English, depending upon the respondent's preference. The translator asked all questions, and then translated the respondent's answer into English. Clarification was sought immediately if there was any ambiguity.

Each interview took the form of a conversation, structured around a written questionnaire consisting of general and specific questions. Most questions were open ended, but a few were multiple choice. For analysis, the responses were entered verbatim into Microsoft Excel spreadsheets. When many people repeated answers, they were categorized and tallied. To identify correlations, common responses were analysed with Pearson chi-squared (χ^2) and analysis of variance (ANOVA) tests using JMP 4.0.4.

Interview-based approaches have been criticized for several reasons, including the researcher leading the respondent, variation in the delivery of the questionnaire, respondent anticipation or desire to please the researcher, pushing for concise answers to soft-edged concepts (Mitchell & Slim 1991), or discrepancies between what people report and what they actually feel or do (Borgerhoff-Mulder & Caro 1985; L.P. Boggs, personal communication 2003). Nonetheless, quantifying attitudes is necessary to compare attitudes towards conservation across regions, or within the same region over

time or in response to changed policy, which can then contribute to planning or improving relations between parks and people (Harcourt *et al.* 1986; Infield 1988; Parry & Campbell 1992). Interviews were the most effective way to obtain detailed individual opinions and explanations from a representative sample of residents. Pilot surveys were tested with translators and test respondents beforehand, and advice was taken to modify the survey to make it more compatible with the local language and culture. Every effort was made to keep the interview uniform so that whatever bias was present would be consistent throughout all interviews. Initially, it was feared that the presence of a foreigner would encourage people to be positive about wildlife, since foreigners are presumed to be pro-wildlife. However, the respondents voiced many negative opinions about wildlife.

RESULTS

Demographics

The three sites differed in ethnic composition, household economy, and education (Table 1). While Mpala and Koiija had the lowest mean household material-wealth indices, residents of Koiija had the greatest livestock wealth. All residents of Endana were subsistence farmers, and only one reported a harvest surplus that could be sold. Most farmers at Endana also kept some livestock (14, 70%). Most people at Endana were educated (70%), whereas education was rare at Koiija and at Mpala, except among people under age 30. Only one adult female in Koiija had ever attended school.

Fewer people at Koiija (8, 40%) than at Endana (14, 70%) had been to a nationally protected area (Pearson $\chi^2 = 3.64$, $df = 1$, $p < 0.056$). However, private wildlife areas surrounded Koiija and most people regularly encountered wildlife. Visits to parks were independent of ethnicity (Pearson $\chi^2 = 1.9$, $df = 2$, $p < 0.38$), and of gender (Pearson $\chi^2 = 0.05$, $df = 1$, $p < 0.82$).

Problem animals

Respondents who practised agriculture reported that elephants were the species causing the most problems (Table 2), followed by eight other species of herbivores and omnivores that entered people's fields and ate or destroyed crops. Pastoralists named elephants as a problem (75%), but more pastoralists were concerned with predators, especially hyenas (90%) and leopards (50%). Pastoralists did not mention grievances with any other herbivores.

Experiences with elephants

All survey respondents had seen elephants. People at Mpala (97%) and Endana (85%) were more likely to believe they were dangerous than people at Koiija (70%) (Pearson $\chi^2 = 7.9$, $df = 2$, $p < 0.02$); the difference was not explained by

Table 2 Respondents' answers to the question 'Are any animals causing problems in your area?' This question was not asked at Mpala, but asked in all subsequent interviews (20 from Endana and 20 from Koiya). Cumulative total exceeds 40 because some respondents listed numerous animals.

<i>Animal</i>	<i>Scientific name</i>	<i>Endana</i>	<i>Koiya</i>	<i>Total</i>
<i>Herbivores</i>				
Elephant	<i>Loxodonta africana</i>	20 (100%)	15 (75%)	35 (88%)
Zebra	<i>Equus burchelli</i>	8 (40%)		8 (20%)
Eland	<i>Taurotragus oryx</i>	4 (20%)		4 (10%)
Porcupine	<i>Hystrix africaeaustralis</i>	4 (20%)		4 (10%)
Antelope	<i>Aepyceros melampus</i> or <i>Gazella</i> spp.	1 (5%)		1 (3%)
Buffalo	<i>Syncerus caffer</i>	1 (5%)		1 (3%)
Primate	Baboon (<i>Papio ursinus</i>) or vervet monkey (<i>Cercopithecus pygerythrus</i>)	5 (25%)		5 (13%)
<i>Carnivores</i>				
Hyena	<i>Crocuta crocuta</i>	1 (5%)	18 (90%)	19 (48%)
Leopard	<i>Panthera pardus</i>	1 (5%)	10 (50%)	11 (28%)
Wild dog	<i>Lycan pictus</i>		5 (25%)	5 (13%)
Lion	<i>Panthera leo</i>	1 (5%)	3 (15%)	4 (10%)
Cheetah	<i>Acinonyx jubatus</i>		3 (15%)	3 (8%)
Jackal	<i>Canis</i> spp.		2 (10%)	2 (5%)
Caracal	<i>Felis caracal</i>		1 (5%)	1 (3%)

Table 3 Respondents' answers to the question 'What is the biggest problem caused by elephants?' Total number of responses is greater than 74 because some respondents gave multiple answers.

<i>Problems</i>	<i>Endana</i>	<i>Koiya</i>	<i>Mpala</i>	<i>Total</i>
<i>General</i>				
Chasing and killing people	5 (25%)	8 (40%)	29 (85%)	42 (57%)
Damage natural bushes and trees	2 (10%)	9 (45%)	0	11 (15%)
Blocking passage	2 (10%)	2 (10%)	4 (12%)	8 (11%)
Foul water	0	3 (15%)	0	3 (4%)
Interfere with fetching water	0	2 (10%)	0	2 (3%)
Damage garden trees	0	1 (5%)	0	1 (1%)
<i>Livestock-related</i>				
Disturb cattle, split herd	0	5 (25%)	8 (24%)	13 (18%)
Kill livestock	0	9 (45%)	1 (3%)	10 (14%)
Disturb herdsman	0	4 (20%)	2 (6%)	6 (8%)
<i>Agri- and api-cultural</i>				
Crop raiding	20 (100%)	0	1 (3%)	21 (28%)
Prevent planting	2 (10%)	4 (20%)	0	6 (8%)
Destroy manmade beehives	0	4 (20%)	0	4 (5%)
Damage agricultural fences	2 (10%)	0	0	2 (3%)

ethnicity (Pearson $\chi^2 = 3.2$, $df=2$, $p < 0.20$). Most respondents (53 people, 72%) knew of one or more incidents of elephants killing people nearby. Several people had lost family members to elephants (seven people at Koiya and three people at Mpala).

The threat of elephants chasing and killing people was the only elephant problem voiced by the majority (57%, Table 3). Crop raiding was the second most common problem, but was voiced almost exclusively by agriculturists. Pastoralists in the two cattle areas were concerned with elephants disturbing cattle herds and disturbing herdsman.

Elephant/cattle relationship

Half of pastoralists believed that elephants created problems for livestock (Table 4). The most commonly reported problem was chasing cattle and separating them from the rest of the herd (52%), followed by killing livestock (32%). One quarter

of respondents said that elephants had killed one of their livestock animals in the past (Table 4).

Although Mpala herders were herding the livestock of an absentee owner, not their own cattle, they were more likely than the herder-owners of Koiya to complain about elephants chasing and losing cows (Pearson $\chi^2 = 9.2$, $df=1$, $p < 0.003$).

Do elephants and cattle compete?

Only 22% felt that cattle and elephants competed for water (Table 4). In fact, herders from Mpala were significantly more likely than those from Koiya to say water competition was occurring (Pearson $\chi^2 = 5.0$, $df=1$, $p < 0.026$) even though Mpala had several dams. Most respondents suggested that competition did not occur at the river because the water was flowing and relatively unlimited, therefore this discrepancy may be because Mpala herders were referring to elephant use of man-made dams.

Table 4 Responses to questions concerning elephant ecology, feeding habits and conflict with cattle. These questions were not all asked at Endana because people who owned livestock said that they kept the livestock confined to Endana during the day, then in corrals or pens at night, and that the livestock did not encounter nor share habitat with elephants. Total number of respondents = 54.

*Questions about elephant diet were added to better understand why people did not perceive competition. The question 'What do elephants eat?' was not asked of the first nine people at Mpala, but was asked of all subsequent respondents (total survey = 63). The direct question 'Do elephants eat grass?' was not asked of the first four people at Mpala (total survey = 68).

<i>Problem</i>	<i>Endana</i>	<i>Koiya</i>	<i>Mpala</i>	<i>Total</i>
Elephants cause problems for cattle	–	10 (50%)	23 (68%)	33 (61%)
Elephants chase cattle and separate them from herd	–	5 (25%)	23 (68%)	28 (52%)
Elephants kill livestock	–	7 (35%)	10 (29%)	17 (32%)
Elephants interfere with livestock trying to get water	–	1 (5%)	2 (6%)	3 (6%)
Elephants bring ticks to cows	–	1 (5%)	0	1 (<2%)
Elephants compete with cattle for water	–	1 (5%)	11 (32%)	12 (22%)
Elephants compete with cattle for grass	–	2 (10%)	5 (15%)	7 (13%)
What do elephants eat?*				
Trees	19 (95%)	20 (100%)	23 (100%)	62 (98%)
Cultivated crops	18 (90%)	0	0	0
Do elephants eat grass?*				
Yes	9 (45%)	13 (65%)	11 (39%)	33 (49%)
Unknown	1 (5%)	3 (15%)	0	4 (6%)

Table 5 Responses to the question 'Are there any good things about or benefits that you personally receive from elephants?'

<i>Benefits</i>	<i>Endana</i>	<i>Koiya</i>	<i>Mpala</i>	<i>Total</i>
Personal (all types)	5 (25%)	19 (95%)	16 (47%)	40 (54%)
Aesthetic: pleasure to see		9 (45%)	10 (29%)	19 (26%)
Tourism		11 (55%)		11 (15%)
Security	1 (5%)	2 (10%)	8 (24%)	11 (15%)
Provide ecological service	1 (5%)	2 (10%)		3 (4%)
Bring compensation money	3 (15%)			3 (4%)
To others				
Tourism benefits white people, government, or people in tourism	8 (40%)	3 (15%)	11 (32%)	23 (31%)
Ivory benefits the government	1 (5%)		2 (6%)	3 (4%)
Unspecified benefits go to the government	1 (5%)			2 (3%)
Unspecified benefits go to unknown others	1 (5%)			1 (5%)

Only 13% of respondents believed that elephants and cattle compete for grass (Table 4). The percentage of people who thought there was competition was not significantly different across sites or tribes (Site: $\chi^2 = 0.25$, $df = 1$, $p < 0.62$; Tribe: $\chi^2 = 0.053$, $df = 1$, $p < 0.82$).

Although grazing competition did not elicit much concern, some respondents suspected competition between elephants and browsing livestock. At Koiya, eight of 20 (40%) said that elephants and goats eat leaves of the same species of trees, and eight of 20 said elephants and camels feed on the same species. However, five of these clarified that elephants feed at different heights and on different plant parts than livestock species.

To clarify whether or not elephants were perceived as a competitor due to niche overlap, all pastoralist respondents were asked if there were enough plants available for both elephants and livestock. Only eight people perceived a limitation (15%), while 46 said there was enough vegetation available for both (85%).

What do elephants eat?

Cattle-herding people offered more detailed insights on elephant diet. Every respondent who listed natural foods correctly identified that elephants eat trees and/or shrubs (Table 4), but only half said that elephants also ate grass. At Koiya, several respondents pointed out that there is very little grass available on Koiya, but many of them reasoned that there must be grass in the diet since they had noticed it in elephant dung. Nine people (12% of the sample, 27% of respondents who said elephants ate grass) from Koiya and Mpala described specific types of grass that elephants eat. Four of them said that elephants eat grass on old boma (corral) sites.

Redeeming features of elephants

People at Koiya were more likely (95%) to say that they personally benefited from the presence of elephants than at Mpala (47%) or at Endana (25%) (Table 5, Pearson $\chi^2 = 20.9$, $df = 2$, $p < 0.0001$). This perception was also strongly

Table 6 Potential advantages and disadvantages if there were more wild animals in the area.

	<i>Endana</i>	<i>Koiya</i>	<i>Total</i>
<i>Advantages or benefits of more wild animals</i>			
Good for tourism	2 (10%)	14 (70%)	16 (40%)
Could have consumptive use	2 (10%)	0	2 (5%)
Nonspecific	5 (20%)	3 (15%)	8 (20%)
<i>Disadvantages of more wild animals</i>			
Increased danger and inconveniences to people	11 (55%)	9 (45%)	20 (50%)
Increased crop raiding by small wild animals	13 (65%)	0	13 (32.5%)
Competition with livestock	2 (10%)	7 (35%)	9 (22.5%)
If predators increase, predation on livestock will increase	0	8 (40%)	8 (20%)

linked to ethnicity, with 77% of Maasai perceiving a benefit, 44% of Turkana and only 14% of Kikuyu. This could have been a confounding effect between site and tribe, but within Endana itself, the proportion of people who believed they benefited from elephants was not significantly different across the three tribes (Pearson $\chi^2 = 2.9$, $df = 2$, $p < 0.24$).

Twenty-eight people (38%) volunteered that benefits do come from elephants, but that the respondents themselves do not receive these benefits (Table 5). Twenty-three (31%) reported that tourism was beneficial, but that the benefits did not reach their villages. Paid herders at Mpala felt that financial benefits accrued to someone else (government or the landowner). People at the agricultural settlement were least likely to say they personally benefited or that anyone benefited.

Feelings about non-elephant wildlife

Most respondents from Endana were unable to describe any advantage of non-elephant wildlife (55%, Table 6). By contrast, most people (70%) at Koiya saw an increase in wild animals as an advantage, especially for tourism.

As with elephants, the costs of wild animals were related to agriculture at Endana and to livestock at Koiya. Residents of Endana were not in favour of an increased number of wild animals because they were perceived as a threat to crops (65% of respondents) and to humans (55%). Respondents at Koiya were more concerned with increased danger to humans (45%), threat of predation on livestock if predators increase (40%), and direct competition between non-elephant herbivores and livestock (35%).

Tolerance of elephants

When asked hypothetical questions, the majority of people recommended killing the elephant if a person was killed (79%; Table 7), 18% thought an elephant should be killed for chasing a livestock animal, and 41% thought it should be killed for killing a livestock animal. Opinions differed by site on what should be done in each case ($p < 0.07$ in each case). People at Endana favoured harsher punishments for lesser offences like chasing people or livestock, but the people at Koiya and Mpala were more prone to suggest killing the elephant when loss of life occurred.

Table 7 Responses to question 'If an elephant does the following things should it be killed?' Total sample = 72, because two respondents at Mpala were undecided.

<i>Action</i>	<i>Endana</i>	<i>Koiya</i>	<i>Mpala</i>	<i>Total</i>
<i>Chases a person</i>				
Always	6 (30%)	3 (16%)	6 (19%)	15 (21%)
Conditional	2 (10%)	2 (10%)	3 (9%)	7 (10%)
Never	5 (25%)	14 (74%)	23 (72%)	42 (58%)
Relocate	7 (35%)	1 (5%)	0	8 (11%)
<i>Kills a person</i>				
Always	13 (65%)	16 (80%)	27 (87%)	56 (79%)
Conditional	1 (5%)	1 (5%)	3 (10%)	5 (7%)
Never	2 (10%)	0	1 (3%)	3 (4%)
Relocate	3 (15%)	0	0	3 (4%)
Compensate	1 (5%)	3 (15%)	0	4 (6%)
<i>Chases livestock</i>				
Always	6 (30%)	3 (15%)	4 (13%)	13 (18%)
KWS action	6 (30%)	1 (5%)	0	7 (10%)
Never	8 (40%)	16 (80%)	28 (88%)	52 (72%)
<i>Kills a livestock animal</i>				
Always	7 (35%)	7 (35%)	15 (48%)	15 (48%)
Conditional	3 (15%)	1 (5%)	2 (6%)	6 (9%)
Never	3 (15%)	3 (15%)	11 (36%)	17 (24%)
Compensate	7 (35%)	9 (45%)	3 (10%)	19 (27%)

Uses of elephants

To understand whether people had any desire to use elephants consumptively, respondents were asked if they would eat meat if it were legally given to them, or whether they had traditional or other uses of elephant bodies. Sites and ethnicities were significantly different in their willingness to eat elephant meat. None of the Maasai people interviewed would eat elephant meat, but 36% of Kikuyu and 35% of Turkana would eat it (Pearson $\chi^2 = 13.5$, $df = 2$, $p < 0.0012$). Neither age group nor gender was influential in whether or not the person would eat meat (age group: Pearson $\chi^2 = 2.6$, $df = 4$, $p < 0.63$; gender: Pearson $\chi^2 = 0.032$, $df = 1$, $p < 0.86$).

Only 21% of Maasai could suggest any contemporary uses from an elephant body, whereas 86% of Kikuyu and 87% of Turkana were able to suggest consumptive or medicinal uses of elephants (Pearson $\chi^2 = 31.1$, $df = 2$, $p < 0.0001$). Even when ivory was excluded as a use (which could be biased because educated people or people with more access to outside information would be more likely to have heard of its value),

Table 8 Tangible benefits perceived by local people and attributed to the national wildlife authority, neighbouring ranches with tourism and tourists directly.

<i>Benefactor</i>	<i>Endana</i>		<i>Koija</i>	
	<i>n (%) reporting benefit</i>	<i>Benefit</i>	<i>n (%) reporting benefit</i>	<i>Benefit</i>
Kenya Wildlife Services	15 (75%)	Chasing problem elephants, built school, donated pump	4 (20%)	Helps with tourist development, helped once with a problem animal
Neighbouring ranches with wildlife tourism	13 (65%)	Calls or radios KWS when Endana needs help, provides jobs, donates milk, helped secure funding to build elephant-resistant fence	13 (65%)	Attracts tourists, arranges reservations, delivers tourists to community's lodge, provides jobs
Tourists	0		17 (85%)	Jobs at the lodge, provides a market for women's crafts, tourists pay for traditional dancing

the difference between ethnicities was still significant ($p < 0.0002$).

Of the 33 respondents who would not eat elephant meat, roughly half offered the explanation that elephants should not be eaten because they resembled human beings in their social behaviour, their intelligence or their external anatomy (16, 48%). Members of Kikuyu, Maasai and Turkana tribes gave analogy to humans as a reason. Other reasons were that elephant meat was not suitable for people (6, 18%), elephant meat was unclean or smelled bad (5, 15%), people should not eat animals that kill people (2, 6%) and elephants are not designated as food in the Bible (1, 3%). Contrary to the stereotype that Maasai do not eat wild game, four respondents at Koija indicated that previous generations of their clan ate elephant meat before they had livestock of their own, but that it was not a favoured food.

Tangible and potential benefits

Respondents were asked whether they received any benefit or service from the national government's wildlife authority (KWS), neighbouring ranches (each survey site had neighbours that were engaged in wildlife tourism) and any tourist development on the site itself (only Koija) (Table 8). At both Endana and Koija, 65% of respondents credited neighbouring ranches with helping: at Endana help mostly took the form of donated food or services, or help in deterring elephants, whereas at Koija the help was related to fortifying the new tourist industry.

When asked what kind of assistance would help alleviate or ameliorate the wildlife situation, 100% of respondents at Endana suggested an electric, elephant-proof fence (Table 9), which the community had sought for a long time and has since been initiated (Guy Grant, personal communication 2001). Secondary requests were for general development

Table 9 Assistance desired by community.

<i>Assistance desired</i>	<i>Endana</i>	<i>Koija</i>
Game-proof fence	20 (100%)	0
Money or food aid	2 (10%)	0
Guns to deter elephants	1 (5%)	0
Water access in the village	1 (5%)	0
Designate and protect bigger wildlife area	0	8 (40%)
Help promote and expand tourism	0	7 (35%)
Compensation if predation	0	2 (10%)

(money, food and water) or weapons to use against elephants. By contrast, residents at Koija wanted help attracting or improving their area for tourists (14 people, 70%).

Socioeconomic correlations

In addition to site and ethnicity (see above), gender and childhood education were tested for correlations with several of the aforementioned questions. Women and men did not significantly differ in the likelihood of having been to a park ($p < 0.82$), acknowledging any personal benefit of elephants ($p < 0.89$), expressing aesthetic benefit of elephants ($p < 0.53$) or other wildlife ($p < 0.58$), the importance of tourism ($p < 0.25$), believing cattle and elephant feeding overlapped ($p < 0.24$), that there was enough food for livestock and elephants ($p < 0.84$), or that elephants were dangerous ($p < 0.53$). However, women were more likely than men to say that an increase in non-elephant wildlife would be bad (53% of women, 22% of men, $df = 1$, Pearson $\chi^2 = 4.18$, $p < 0.04$) and women were more likely than men to believe that elephants should be killed for non-lethal offences like chasing livestock (43% of women vs. 16% of men, $df = 1$, Pearson $\chi^2 = 2.98$, $p < 0.08$) or people (50% of women, 14% of men, $df = 1$, Pearson $\chi^2 = 4.1$, $p < 0.04$).

Educated people overall were not more likely to recognize benefits (to self or to others) from elephants or from tourism, even within sites. In fact, more uneducated people saw personal benefits (60%) than educated people (41%), but the difference was not significant ($p < 0.14$) except at Endana (7% of educated people vs. 33% of uneducated people, $df = 1$, Pearson $\chi^2 = 7.94$, $p < 0.005$). Less educated people expressed gratitude for compensation and development benefits that were linked to KWS or elephants, for ecological services (elephants were credited with breaking up trees which made firewood gathering easier) and for providing security. Educated people were not more likely than uneducated people to express pleasure in seeing elephants.

DISCUSSION

Pastoralists tolerated herbivores

Pastoralists were more tolerant of elephants than agriculturists. Pastoralists found elephants to be problematic but were willing to tolerate the inconveniences. Agriculturists had more animosity towards elephants than towards any other species. This is in agreement with research where elephants and farmers overlap throughout Africa, including Uganda (Naughton-Treves 1997, 1998; Hill 1997, 1998), Cameroon (Tchamba 1996), Zimbabwe (Hoare & DuToit 1999; Osborn & Parker 2002), and Mozambique (De Boer & Baquete 1998). Although elephants may not cause as much damage as smaller, more ubiquitous and more persistent animals, such as rodents, suids (Naughton-Treves 1998), small ungulates (Western & Waithaka 2005) or primates, they are often singled out as the most problematic animals and, in this district, the most deadly. When people attempt to cultivate adjacent to or in the midst of elephant populations, conflict with elephants is inevitable. Attempts to mitigate conflict by allowing villagers to harvest problem elephants occasionally or to keep elephants at bay with affordable technology have had very limited success (O'Connell-Rodwell *et al.* 2000; Osborn 2002; Osborn & Parker 2002). It is unfortunate that agriculturists are encouraged to settle in high-risk areas like Endana where they will suffer crop raiding in the short term. In the long term, elephants are usually eliminated from agricultural areas (Hoare & DuToit 1999). Agricultural land has little tourism potential, and it is unlikely that agriculturists surrounded by wildlife areas, like those at Endana, could ever gain enough from tourism to mitigate ongoing problems with elephants. Local exclusion or extermination of elephants is a more probable outcome.

Land use outweighed cultural heritage

Primary land use was the most powerful predictor of attitude. In a few analyses, ethnicity explained differences in attitudes, but farming vs. herding was a stronger delineation. The Maasai and Turkana people who were farming in Endana had attitudes more similar to their Kikuyu neighbours than

to other Maasai and Turkana, indicating that an agricultural lifestyle and livelihood influence attitudes more than heritage or ancestry. These results indicate that conversion from pastoralism to agriculture is a severe threat to elephants both in terms of habitat lost and loss of tolerance.

Ecological competition not perceived to be important

In spite of ecological overlap, cattle producers were far more tolerant of elephants than agriculturists. Direct competition between elephants and livestock was not regarded as a problem. Although many respondents suspected that elephants ate grass, fewer than one in five believed that elephants compete with cattle for grass. In fact, respondents expressed more concern that smaller wild ungulates compete with their grazing stock. Overlap between elephants and browsing livestock was reported more, but was still not a substantial concern. Lack of concern about grazing competition is surprising because elephants do eat grass in this area (M.E. Gadd, personal observation 1997–2005) and substantially reduce grass cover in this ecosystem (Young *et al.* 2005). However, people with cattle in Botswana also did not perceive competition (Gadd 2003). Perhaps it is not interpreted as competition for a finite resource because elephants graze more after the rainy season (Laws 1970; Barnes 1979), when grass is plentiful and elephants are dispersed throughout the district. Livestock herders also displayed more detailed knowledge of elephant habits than agriculturists, and many explained that elephants eat at different heights, seasons or on different species than domestic stock, suggesting niche separation.

Benefits recognized and strongly linked to wildlife

For programmes to be successful both in providing benefits to communities and protecting wildlife, not only must the benefit be received and valued by the local people, but the linkage between the benefit and the wildlife resource must be made clear. Although respondents at Mpala and Endana received services or indirect benefits from commercial ranches and tourism-related industries, they did not perceive a direct benefit from wildlife. Although Mpala hosts wildlife researchers and visitors from overseas, few of the property's local residents made the linkage between wildlife and their jobs. They were aware that wildlife provides benefits, but they felt they were not the beneficiaries. Farmers at Endana often mentioned that the neighbouring ranches which host tourists were helpful to them, but were even less likely to link tourism to any benefit. By contrast, people at Koiya were aware of the importance of tourism to their community, and most people stated a direct linkage between increased wildlife and tourists and increased local benefits. The new venture at Koiya has been successful in distributing benefits equitably and gaining the support of most residents thus far. Unlike ecotourism projects elsewhere, this project also succeeded in making residents aware of the linkage between healthy wildlife numbers and successful tourism.

The type of assistance desired and potential advantages of increased wildlife numbers in the area proved to be good indicators of whether benefits exceeded costs. Among pastoralists who perceived a net benefit to keeping wildlife, requests for help focused on boosting tourism. Among agriculturists who suffered a net loss to wildlife, people preferred help offsetting or preventing these costs.

Consumptive use would not be a viable alternative in the pastoralist communities; most Maasai and two-thirds of Turkana respondents were unwilling to eat elephant meat and the former had few traditional or contemporary uses of elephants. Like elsewhere in Kenya (Kuriyan 2002), and Botswana (Gadd 2003), people cited cultural taboos against eating elephants. Some members of all three tribes retained taboos about elephants because of their similarities to people, indicating that they adhere to these traditions to some extent, and that they regard some elephant features and behaviours to be similar to our own.

Aesthetic and moral regard for wildlife was prevalent in pastoralist communities with and without benefits. At Mpala, in the absence of benefits, the majority of respondents reported non-financial personal benefit from the presence of elephants; 29% said they enjoyed watching elephants, and 24% said elephants provided security against cattle raiders or predators. The majority of respondents (55%) at Koiya stated that the single most important aspect of tolerating elephants and other wildlife was tourism and the benefits derived therefrom, but almost as many people also reported an aesthetic benefit (45%). Traditional values are an underemphasized conservation tool in developing countries (Infield 2001). A substantial portion of people sharing elephant range in Laikipia retained traditional beliefs about wildlife. Promoting and preserving these traditions may fortify non-financial respect for elephants.

Traditional values and profit from wildlife strengthened positive attitudes

Unlike elsewhere in Africa, education and material wealth did not correlate with positive attitudes towards elephants nor other wildlife in Laikipia. People who perceived benefits from tourism were positive about wildlife that attracts tourists, elephants in particular, irrespective of education or material wealth. In Tanzania, students who knew more about wildlife were less likely to say national parks should be discontinued if tourists ceased to visit them than students who scored lower on factual questions (Harcourt *et al.* 1986). In eastern Botswana, educated people were more likely to see the benefit of keeping elephants locally and nationally, possibly due to being taught about wildlife conservation, or to being more cosmopolitan and becoming aware of benefits to the nation (through the central government) or to tourist and hunting regions within the country (Gadd 2003). Evidence that wealthier people perceived more benefits from wildlife use has been found in northern Botswana (Parry & Campbell 1992), but not in eastern Botswana (Gadd 2003) nor in South

Africa (Infield 1988). Women were among the beneficiaries in Koiya, especially by directly selling handmade items to tourists, and thus they were equally positive. However, women were slightly less tolerant of problem elephants than men. Elsewhere in Africa, women were more negative about elephants possibly because they were more dependent upon agricultural production for sustenance and livelihood (Hill 1998), or because their daily routines (for example collecting firewood and water) brought them into contact with elephants more. Within the settlement that suffered the most crop raiding and gained the fewest benefits from wildlife (Endana), few people acknowledged any benefit of elephants, but those who did so were among the least educated and least wealthy. This provides support for the argument that sometimes the poorest members of society most dependent on 'free' environmental services are more positive about the source of those services (Infield 1988).

CONSERVATION IMPLICATIONS

The success of the tourism-based project at Koiya deserves praise for delivering tangible benefits and creating a positive feedback loop that reinforces and encourages wildlife custodianship. However, the project is in its early phases and the initial enthusiasm could decline. If the motivation to conserve wildlife becomes purely financial and aesthetic benefits are lost or forgotten, the effects could be disastrous when financial incentives are interrupted or discontinued (if tourism declines or if donors withdraw). Acknowledging and building upon local aesthetic values and traditional beliefs would be advantageous to future conservation efforts. Bearing in mind the volatility of the world tourism industry and the number of similar community-based wildlife tourism destinations arising throughout Africa, preserving or encouraging non-financial conservation motives among local people is essential.

In marginal lands with viable elephant populations, investing in compatible land-use planning could yield more success in protecting elephants and people and meet with less resistance than trying to placate or compensate farmers. Where agriculture is unsustainable in the long-term, encouraging pastoralism or investing in more compatible land uses is likely to be more fruitful than attempting to persuade farmers to be tolerant after land conversion has occurred. Cohesive and holistic land-use planning and financial incentives that encourage compatible production systems, but discourage short-lived agricultural conversion adjacent to elephant range would avert short-term conflict and protect wildlife and livelihoods in the long term.

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References

- Adams, W.M. & Hulme, D. (2001) If community conservation is the answer in Africa, what is the question? *Oryx* 35: 193–200.
- Adams, W.M. & Infield, M. (2003) Who is on the gorilla's payroll? Claims on tourist revenue from a Ugandan National Park. *World Development* 31: 177–190.
- Agrawal, A. & Gibson, C.C. (1999) Enchantment and disenchantment: the role of community in natural resource conservation. *World Development* 27: 629–649.
- Archabald, K. & Naughton-Treves, L. (2001) Tourism revenue-sharing around national parks in Western Uganda: early efforts to identify and reward local communities. *Environmental Conservation* 28: 135–149.
- Barnes, R.F.W. (1979) Elephant feeding behaviour in Ruaha National Park, Tanzania. Ph.D. dissertation, University of Cambridge, Cambridge, UK.
- Blanc, J., Thouless, C.R., Hart, J.A., Dublin, H.T., Douglas-Hamilton, I., Craig, C.G. & Barnes, R.F.W. (2003) African Elephant Status Report 2002: an update from the African Elephant Database 304. IUCN/SSC African Elephant Specialist Group, Gland, Switzerland and Cambridge, UK.
- Boonzaier, E. (1996) Local responses to conservation in the Richtersveld National Park, South Africa. *Biodiversity and Conservation* 5: 307–314.
- Borgerhoff-Mulder, M. & Caro, T.M. (1985) The use of quantitative observational techniques in anthropology. *Current Anthropology* 26: 323–336.
- De Boer, W.F. & Baquete, D.S. (1998) Natural resource use, crop damage and attitudes of rural people in the vicinity of the Maputo Elephant Reserve, Mozambique. *Environmental Conservation* 25: 208–218.
- De Boer, F. & Ntumi, C. (2001) Elephant crop damage and electric fence construction in the Maputo Elephant Reserve, Mozambique. *Pachyderm* 30: 57–64.
- Elliott, J. & Mwangi, M.M. (1998) Developing wildlife tourism in Laikipia, Kenya - who benefits? *Laikipia Wildlife Economics Study Discussion Paper CEC-DP-3*: 1–13.
- Emerton, L. (2001) The nature of benefits and the benefits of nature: why wildlife conservation has not economically benefited communities in Africa. In: *African Wildlife and Livelihoods: The Promise and Performance of Community Conservation*, ed. D. Hulme & M. Murphree, pp. 208–226. Oxford, UK: James Currey Ltd.
- Gadd, M.E. (1997) Factors influencing the effects of elephants on woody vegetation in private protected areas in South Africa's lowveld. M.Sc. thesis, University of the Witwatersrand, Johannesburg, South Africa: 106 pp.
- Gadd, M.E. (2001) Final report to Botswana Department of Wildlife and National Parks: 2000–2001. Eastern Botswana Elephant Project, Botswana.
- Gadd, M.E. (2003) Elephant ecology and conservation in African rangelands. Ph.D. dissertation, University of California at Davis, CA, USA: 166 pp.
- Gibson, C.C. & Marks, S.A. (1995) Transforming rural hunters into conservationists: an assessment of community-based wildlife management programs in Africa. *World Development* 23: 941–957.
- Gillingham, S. & Lee, P.C. (1999) The impact of wildlife-related benefits on the conservation attitudes of local people around the Selous Game Reserve, Tanzania. *Environmental Conservation* 26: 218–228.
- Harcourt, A.H., Pennington, H. & Weber, A.W. (1986) Public attitudes to wildlife and conservation in the Third World. *Oryx* 20: 152–154.
- Heath, B. (2000) Ranching: an economic yardstick. In: *Wildlife Conservation by Sustainable Use*, ed. H.H.T. Prins, pp. 21–33. Boston, USA: Kluwer Academic Publishing.
- Herren, U., ed. (1987) The people of Mukogodo Division, Laikipia District. Laikipia Rural Development Program, Institute of Geography, University of Berne, Berne, Germany: 44 pp.
- Hill, C.M. (1997) Crop-raiding by wild vertebrates: The farmer's perspective in an agricultural community in western Uganda. *International Journal of Pest Management* 43: 77–84.
- Hill, C.M. (1998) Conflicting attitudes towards elephants around the Budongo Forest Reserve, Uganda. *Environmental Conservation* 25: 244–250.
- Hoare, R.E. & DuToit, J.T. (1999) Coexistence between people and elephants in African savannas. *Conservation Biology* 13: 633–639.
- Honey, M. (1999) Kenya, the Mzee of ecotourism in Africa: early experiments, foreign aid, and private reserves. In: *Ecotourism and Sustainable Development: Who Owns Paradise?*, ed. M. Honey, pp. 293–338. Washington, DC, USA: Island Press.
- Infield, M. (1988) Attitudes of a rural community towards conservation and a local conservation area in Natal, South Africa. *Biological Conservation* 45: 21–46.
- Infield, M. (2001) Cultural values: a forgotten strategy for building community support for protected areas in Africa. *Conservation Biology* 15: 800–802.
- Infield, M. & Namara, A. (2001) Community attitudes and behaviour towards conservation: an assessment of a community conservation programme around Lake Mburo National Park, Uganda. *Oryx* 35: 48–60.
- Kahumbu, P., Omondi, P., Muriuki, G., Geddes, C. & Higginbottom, J. (1999) Total aerial count of elephants in Samburu/Laikipia. Kenya Wildlife Service Research Department and Save the Elephants sponsored by International Fund for Animal Welfare, Nairobi, Kenya: 24 pp.
- Kangwana, K. (1996) Assessing the impact of human–elephant interactions. In: *Studying Elephants, AWF Technical Handbook Series*, ed. K. Kangwana, pp. 138–147. Nairobi, Kenya: African Wildlife Foundation.

- Kiiru, W. (1995) The current status of human–elephant conflict in Kenya. *Pachyderm* 19: 15–19.
- King, D.A. & Stewart, W.P. (1996) Ecotourism and commodification: protecting people and places. *Biodiversity and Conservation* 5: 293–305.
- Kuriyan, R. (2002) Linking local perceptions of elephants and conservation: Samburu pastoralists in Northern Kenya. *Society and Natural Resources* 15: 949–957.
- Laws, R.M. (1970) Elephants as agents of habitat and landscape change in East Africa. *Oikos* 21: 1–15.
- Laws, R.M., Parker, I.S.C. & Johnstone, R.C.B. (1975) *Elephants and Their Habitats*. Oxford, UK: Clarendon Press.
- Low, B. (2000) Investigating the role of elephant migration routes in determining human–elephant conflict spatial patterns in Taita Taveta District, Kenya. M.Sc. thesis, University of Kent at Canterbury, Canterbury, UK: 70 pp.
- McKnight, B.L. (1995) Behavioural ecology of ‘hand-reared’ African elephants (*Loxodonta africana* (Blumenbach)) in Tsavo East National Park, Kenya. *African Journal of Ecology* 33: 242–256.
- Mehta, J.N. & Kellert, S.R. (1998) Local attitudes toward community-based conservation policy and programmes in Nepal: a case study in the Makalu-Barun Conservation Area. *Environmental Conservation* 25: 320–333.
- Mitchell, J. & Slim, H. (1991) Listening to rural people in Africa: the semi-structured interview in rapid rural appraisal. *Disasters* 15: 68–72.
- Mordi, A.R. (1991) *Attitudes Toward Wildlife in Botswana*. New York, USA: Garland Publishing, Inc.: 217 pp.
- Moss, J. (2002) Laikipia Wildlife Forum Ltd: achievements in 2002. Laikipia Wildlife Forum Ltd, Kenya.
- Mureithi, K.W. (2003) Kenya tourism workers fear for jobs. BBC News Online [www.document]. URL <http://news.bbc.co.uk/1/hi/world/africa/3034201.stm>
- Naughton-Treves, L. (1997) Farming the forest edge: vulnerable places and people around Kibale National Park, Uganda. *The Geographical Review* 87: 27–47.
- Naughton-Treves, L. (1998) Predicting patterns of crop damage by wildlife around Kibale National Park, Uganda. *Conservation Biology* 12: 156–168.
- Newmark, W.D. & Hough, J.L. (2000) Conserving wildlife in Africa: integrated conservation and development projects and beyond. *Bioscience* 50: 585–592.
- Newmark, W.D., Leonard, N.L., Sariko, H.I. & Gamassa, D.-G.M. (1993) Conservation attitudes of local people living adjacent to five protected areas in Tanzania. *Biological Conservation* 63: 177–183.
- Ngure, N. (1995) People–elephant conflict management in Tsavo, Kenya. *Pachyderm* 19: 20–25.
- Norton-Griffiths, M. (1996) Property rights and the marginal wildebeest: an economic analysis of wildlife conservation options in Kenya. *Biodiversity and Conservation* 5: 1557–1577.
- Norton-Griffiths, M. & Southey, C. (1995) The opportunity costs of biodiversity conservation in Kenya. *Ecological Economics* 12: 125–139.
- Nyhus, P.J., Tilson, R. & Sumianto (2000) Crop-raiding elephants and conservation implications at Way Kambas National Park, Sumatra, Indonesia. *Oryx* 34: 262–274.
- O’Connell-Rodwell, C., Rodwell, T., Rice, M. & Hart, L.A. (2000) Living with the modern conservation paradigm: can agricultural communities co-exist with elephants? A five-year case study in East Caprivi, Namibia. *Biological Conservation* 93: 381–391.
- Odadi, W. (2002) Cattle foraging behavior in a multi-species enclosure system. M.Sc. thesis, Moi University, Eldoret, Kenya: 160 pp.
- Osborn, F.V. (2002) Capsicum oleoresin as an elephant repellent: Field trials in the communal lands of Zimbabwe. *Journal of Wildlife Management* 66: 674–677.
- Osborn, F. & Parker, G.E. (2002) Community-based methods to reduce crop loss to elephants: experiments in the communal lands of Zimbabwe. *Pachyderm* 33: 32–38.
- Ottichilo, W.K., Grunblatt, J., Said, M.Y. & Wargute, P.W. (2000) Wildlife and livestock population trends in the Kenya rangeland. In: *Wildlife Conservation by Sustainable Use*, ed. T.T. Dolan, pp. 203–219. Boston, USA: Kluwer Academic Publishing.
- Parkipuny, M.S.O. (1989) So that Serengeti shall never die. In: *Nature Management and Sustainable Development*, ed. W.D. Verwey, pp. 256–263. Amsterdam, the Netherlands: IOS.
- Parry, D. & Campbell, B. (1992) Attitudes of rural communities to animal wildlife and its utilization in Chobe Enclave and Mababe Depression, Botswana. *Environmental Conservation* 19: 245–252.
- Prins, H.H.T. (1992) The pastoral road to extinction: competition between wildlife and traditional pastoralism in East Africa. *Environmental Conservation* 19: 117–123.
- Sitati, N.W., Walpole, M.J., Smith, R.J. & Leader-Williams, N. (2003) Predicting spatial aspects of human–elephant conflict. *Journal of Applied Ecology* 40: 667–677.
- Smith, R.J. & Kasiki, S.M. (2002) African Elephant Specialist Group Report: A spatial analysis of human–elephant conflict in the Tsavo ecosystem. African Elephant Specialist Group, Species Survival Commission, IUCN (The World Conservation Union), World Wide Fund for Nature, Nairobi, Kenya.
- Sutton, W. (1998) The costs of living with elephants in Namibia. In: *Proceedings from the Workshop on Cooperative Regional Wildlife Management in Southern Africa*, pp. 57–71. Davis, CA, USA: University of California.
- Tchamba, M.N. (1996) History and present status of the human/elephant conflict in the Waza-Logone region, Cameroon, West Africa. *Biological Conservation* 75: 35–41.
- Thompson, M. & Homewood, K. (2002) Entrepreneurs, elites, and exclusion in Maasailand: trends in wildlife conservation and pastoralist development. *Human Ecology* 30: 107–138.
- Thouless, C.R. (1994) Conflict between humans and elephants on private land in northern Kenya. *Oryx* 28: 119–127.
- Thouless, C.R. & Sakwa, J. (1995) Shocking elephants: Fences and crop raiders in Laikipia District, Kenya. *Biological Conservation* 72: 99–107.
- Waithaka, J. (1996) Problems and solutions outside protected areas. *Pachyderm* 22: 91–92.
- Waithaka, J. (1997) Management of elephant populations in Kenya – what have we learnt so far? *Pachyderm* 24: 33–35.
- Waithaka, J. (1999) Monitoring human–elephant conflict through remotely located stations. *Pachyderm* 27: 66–68.
- Walpole, M.J. & Goodwin, H.J. (2001) Local attitudes towards conservation and tourism around Komodo National Park, Indonesia. *Environmental Conservation* 28: 160–166.
- Walpole, M.J. & Leader-Williams, N. (2002) Tourism and flagship species in conservation. *Biodiversity and Conservation* 11: 543–547.

- Wambuguh, O. (1998) Local communities and wildlife: a spatial analysis of human-wildlife interactions in Laikipia District, Kenya. Doctoral thesis, University of California, Berkeley, Berkeley, CA, USA: 391 pp.
- Western, D. & Waithaka, J. (2005) Policies for reducing human-wildlife conflict: a Kenya case study. In: *People and Wildlife: Coexistence or Conflict*, ed. R. Woodroffe, S.J. Thirgood & A. Rabinowitz (in press). Cambridge, UK: Cambridge University Press.
- Western, D. & Wright, R.M. (1994) The background to community-based conservation. In: *Natural Connections: Perspectives in Community-based Conservation*, ed. D. Western & R.M. Wright, pp. 1–14. Washington, DC, USA: Island Press.
- Wittemyer, G. (1998) Annual Report to Kenya Wildlife Services: Samburu, Buffalo Springs, and Shaba Elephant Project. Save the Elephants, Nairobi, Kenya.
- Wittemyer, G. (2001) The elephant population of Samburu and Buffalo Springs National Reserves. *African Journal of Ecology* **39**: 357–365.
- Young, T.P., Okello, B.D., Kinyua, D. & Palmer, T.M. (1998) KLEE: a long-term multi-species herbivore exclusion experiment in Laikipia, Kenya. *African Journal of Range and Forage Science* **14**: 94–102.
- Young, T.P., Palmer, T.M. & Gadd, M.E. (2005) Competition and compensation among cattle, zebras, and elephants in a semi-arid savanna in Laikipia, Kenya. *Biological Conservation* **122**: 251–259.