Animal preferences and acceptability of wildlife management actions around Serengeti National Park, Tanzania

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Abstract. Wildlife management policies are often based on expert perceptions of the ecological importance of certain species and poorly informed perceptions of how public attitudes toward management are formed. Little is known about why preferences vary greatly and how this affects support for management actions. This paper explores preferences for a range of wildlife species among a sample of the rural population adjacent to Serengeti National Park in Tanzania. We also examine the degree of acceptance for alternative management interventions when potentially dangerous animals pose different levels of problems to human beings, and the extent to which these attitudes are related to species preferences. Gender has a significant effect on species preferences. Men like most species better than women. Age has no significant effect, but level of education affects preference level for some species. Species preferences have a positive effect on support for management intervention when dangerous animals cause small or moderate problems to humans, i.e. there is a higher degree of acceptance of problems caused by animals that are well liked. In situations where human life is threatened, species preferences have no effect on preferred management actions. Appreciation of animals is a combination of functional, consumptive and cultural dimensions, and there is no simple link between species preferences and attitudes toward management actions. The local context and concrete experience with wildlife encounters is more important for shaping normative beliefs like attitudes towards management actions than global wildlife attitudes.

Introduction

Wildlife management often faces unanticipated public resistance or simply fails in attracting public support for goals and strategies, due to inadequate understanding of the public's attitudes and preferences. One of the key questions in wildlife management is the acceptability of various regulatory actions. These can be considered normative beliefs about what is ethical, appropriate and effective measures when, for instance, animals start causing problems for people or even endangering human life. Following this we also need to know more about what influences these normative beliefs. Are they shaped by global attitudes like general preferences for certain flagship species (i.e. campaigns to

save rainforest habitat via focus on the endangered orangutang), or are the specific experiences with animals and the problems they cause more decisive for the specific views and acceptance people hold of appropriate management actions?

In East Africa, any form of wildlife management these days increasingly needs to take account of community needs, perceptions and capacities. Hence, information about local knowledge, tradition, and perceptions of wild game are needed in the development of management strategies. In this paper we explore the species preferences of a population of agro-pastoralists living along the borders of Serengeti National Park in Tanzania, and how species preferences relate to the acceptability of certain management actions to deal with animals causing problems for humans.

We assume that people hold a range of preferences for the various species in the East African fauna, and we assume that the level of liking people associate with a species influences their attitudes toward the management of these animals. However, little is known about why preferences evidently vary a lot across species, and little is also known about how species preferences affect preferences for management actions. It seems reasonable that well-liked but feared species should be more tolerated when showing provoking behaviour, compared to disliked and feared species. Yet, the degree of tolerance may well be too low for such species to function as 'flagships'. Species that are well-liked and not feared may be better candidates. The goal of the study was to gain some understanding of how species preferences influence attitudes toward management of wildlife. In order to do so we posed four research questions:

- How are the species preferences distributed among the people in the study area?
- How do sociodemographic variables effect species preferences?
- What are the preferred management actions when potentially dangerous animals interact in different ways with humans?
- What are the relationships between species preferences and preferred management actions?

Animal preferences in relation to global and specific attitudes

All animal species have valuable ecological functions. However, the effectiveness of species conservation efforts depends upon the degree to which various species are liked or disliked. The reasons why preferences vary dramatically across species or taxa are largely unknown, but they most likely involve a multitude of evolutionary/genetic, psychosocial, and cultural factors (Kellert and Wilson 1993).

In order to gain support for conservation efforts charismatic and popular animal species are sometimes singled out as 'flagship species'. This strategy has been effective in stimulating conservation awareness among the general

public and environmental organisations in developed countries. Examples are campaigns to protect species like the giant panda *Aluropoda melanoleuca*, the tiger *Panthera tigris*, and whales. If broad conservation efforts are more effective by targeting well-liked species, we might profit from better knowledge about how much species are liked, both among international supporters and donors, and among local residents that live close to the animals in question. Particular attention should be given to diverging or contrasting preferences in the attitudes of local residents compared to the attitudes of more distant actors. The contributions and support of conservation groups may become less effective if the local public does not share similar species-specific attitudes. However, if the species selected as the 'flagship' is highly regarded among local populations where wildlife management actions are likely to be focused, then the strategy will be more successful.

Some animal species cause rather severe problems for rural villagers in Africa, nevertheless people generally value these animals, as measured by questionnaires and interviews. For example, conflicts between elephants and local people are widespread across the continent, mainly because of crop damage by this species (O'Connell-Rodwell et al. 2000; Osborn and Parker 2003). On a general level, the majority of people asked support the protection of wildlife. But when the situation is specified, as when attitudes toward wildlife that create damage or threaten people are measured, the willingness to protect the animals is reduced.

The change from a general or abstract regard for wildlife to one of marked scepticism as a species exhibits problematic behaviour has been shown in several studies. Covering such different species and regions as mountain lions, beavers, and coyotes in North America (Zinn et al. 1998), and wolves, bears, lynx (*Lynx lynx*), and wolverines (*Gulo gulo*). In Norway (Kleiven et al. in press). Acceptability of these species were high in the general public as long as they did not show up in the proximity of humans and settlements. (Bjerke et al. 2002). In Tanzania, Gillingham and Lee (1999) documented widespread support for the protection of wildlife, while many also favoured stringent control of wildlife causing crop damage. In Botswana attitudes toward wildlife were more positive in those villages that were least affected by agricultural losses (Parry and Campbell 1992). Many similar findings indicate that humans in most cultures are positive toward wildlife in the context of abstract existence values, but easily turn more negative when they incur economic costs associated with the presence of the animal in their immediate surroundings (see also Heinen and Low 1992).

The change from positive and global valuation to scepticism or active persecution as an animal species starts to inflict damage to crops and people could mean that global measures of attitudes toward animals are of limited practical significance. However, it can be argued that inter-species differences regarding people's attitudes correlate with differences in acceptance of management actions regarding various species. People are expected to accept the presence of a well-liked but problematic species (even though it is feared) better than a species that is both feared and disliked.

Methods

Study area

The Western Corridor of the Serengeti National Park in north-central Tanzania and adjacent communities was selected as the field area for this study. Serengeti National Park, which covers 14,763 km^2, is the centrepiece of the greater Serengeti ecosystem which amounts to approximately 27,000 km^2. Serengeti lies between the Great Rift Valley to the east and Lake Victoria to the west. As a highland savannah with a variety of open grasslands and mixed forests it comprises one of the largest and most important ecosystems in East Africa in terms of protecting large populations of herbivores and carnivores. Serengeti is home to one of the last large scale herbivore migrations in the World. Most East African savannah species are found here such as lion, leopard, cheetah, hyena, buffalo, giraffe, Grant gazelle, Thompson gazelle, impala, topi, eland, kongoni, bushbuck, waterbuck, warthog and others (Sinclair and Arcese 1995).

Serengeti became a national park in 1951 with a previous history as a popular hunting area, and a Game Reserve from 1929. In 1981 the park became a World Heritage site along with the adjoining Ngorongoro Conservation Area. The areas outside the national park are mostly populated with agro-pastoralists to the north and west and pastoralists to the east. The east side of the park is sparsely populated mostly by Masaai, who are cattle people. In contrast, the ethnic diversity and population densities are much higher in other areas surrounding the park. To the north and the west the population densities are on the order of fifteen times that of the Masaai areas (Bureau of Statistics 1992). Furthermore, the area around the Western Corridor is populated by a number of ethnic groups and tribes, especially the Ikizu, Sukuma, Taturu, Ikoma, Kuryia, Natta and Issenye. The population growth varies across this area, but is believed to be approximately 3 percent annually. Rough extrapolations of earlier censuses would indicate that around 2 million people now reside along the borders of Serengeti National Park.

Sample

We did not have access to information about the exact size or structure of the population around the Western Corridor when the present study was conducted. Therefore we chose to design the data collection so that we were able to capture a sufficient number of cases on selected variables to make it as close as possible to a representative sample. Key concerns included geographical coverage, basic socio-demographic structure, tribal status, and distance to protected area. Six villages were selected to achieve this, two each in the districts of Serengeti, Bunda, and Magu. In each of the districts, one village was located close to the protected area (i.e. 1–2 km) from the border, and the other further away

(10–15 km). However, for the research questions in this paper we did not test for the effects of distance to the national park border. The sample was stratified with an even distribution across gender, age groups, household size, and a minimum of 80 persons in each village. The final net sample size was 590 informants.

Data collection

Data were collected through personal interviews using a structured questionnaire. The questionnaire was developed from a combination of experiences with previous studies on human-wildlife interactions, informal meetings and unstructured interviews, as well as observations in a series of the villages in the study area. Furthermore, a draft questionnaire was pre-tested on a sample of 50 informants in three different villages before final modifications for the main study. The questionnaire was developed by the lead author in close cooperation with two Tanzanian scientists. Each interview was conducted in Kiswahili by a native speaker trained in interview techniques and took on the average 50 min to complete. In most cases this took place in the informant's home. Efforts were made to keep the interview situation undisturbed so as to avoid the influence of other family or village members. The questionnaire included questions about land use practices, people–park interactions, wildlife encounters and benefits, perceptions of livestock–wildlife interactions, hunting, fear of animals, environmental beliefs, and background characteristics in addition to two topics that were used in the present analyses. First, respondents were asked to indicate the degree to which they liked 21 animal species on a five-point Likert-like scale from 'do not like at all' to 'like very much' (see Table 1). Second, they were asked the question "which measures do you think are appropriate when large animals do the following: (1)The animal is often seen close to village, (2) the animal kills domestic animals, and (3) the animal threatens humans." In each of these situations respondents were asked to choose between four management actions; (a) Do nothing, (b) Scare off animal, (c) Report to game officer, and (d) Kill animal. Eight species commonly known to cause problems to humans and livestock were the objects in these ratings (see Table 3). Our proposed selection of problem species were confirmed by the pre-testing of the pilot questionnaire and meetings in the villages.

Results

Species preferences

Not all animals are equally well liked. We found a great range in preferences from the most liked to the least liked animals included in this study, with responses spanning almost the entire scale from do not like at all to like very much (Figure 1). The species preferences can be divided roughly into three

Table 1. Effects of sociodemographics on species preferences (OLS regressions).

Species	Age	Education	Gender	R^2	N
Goat	0.020 (0.012)	0.024 (0.012)	−0.129 (0.032)*	0.040	578
Thompson gazelle	0.004 (0.021)	−0.001 (0.032)	−0.190 (0.054)*	0.022	578
Giraffe	0.016 (0.021)	0.022 (0.033)	−0.179 (0.056)*	0.022	575
Zebra	0.017 (0.019)	−0.002 (0.030)	−0.182 (0.051)**	0.026	579
Wildebeest	0.016 (0.018)	−0.014 (0.028)	−0.172 (0.048)**	0.028	569
Grant gazelle	0.016 (0.017)	0.032 (0.026)	−0.163 (0.044)**	0.030	579
Impala	0.021 (0.017)	0.037 (0.026)	−0.162 (0.045)**	0.031	579
Topi	0.036 (0.019)	0.065 (0.030)*	−0.265 (−0.050)**	0.066	576
Eland	0.008 (0.021)	−0.033 (0.032)	−0.143 (0.055)*	0.015	578
Birds	0.007 (0.027)	0.002 (0.042)	−0.178 (0.071)*	0.012	577
Domestic dog	−0.080 (0.036)*	−0.080 (0.056)	−0.530 (0.095)**	0.054	568
Buffalo	−0.066 (0.041)	−0.205 (0.064)**	−0.705 (0.108)**	0.079	574
Elephant	0.016 (0.047)	0.031 (0.073)	−0.241 (0.124)	0.008	578
Hippo	0.011 (0.052)	−0.071 (0.082)	−0.384 (0.141)**	0.016	551
Lion	−0.036 (0.054)	−0.050 (0.084)	−0.198 (0.144)	0.004	574
Leopard	−0.055 (0.048)	0.154 (0.074)	−0.201 (0.125)	0.021	552
Cheetah	0.002 (0.042)	0.230 (0.066)**	−0.139 (0.112)	0.029	578
Crocodile	−0.030 (0.038)	0.157 (0.060)*	−0.139 (0.102)	0.023	577
Hyena	−0.019 (0.038)	0.121 (0.059)*	−0.252 (0.100)*	0.024	571
Snakes	−0.026 (0.034)	0.030 (0.054)	−0.240 (0.092)*	0.015	551
Mouse	−0.066 (0.053)	0.109 (0.081)	−0.158 (0.128)	0.036	234

Unstandardised regression coefficients. Standard errors in parenthesis.
*$p < 0.05$; **$p < 0.01$.

categories; those animals which are highly liked, those which receive a moderately high ranking, and those which are more or less disliked by most people. In the first category are the Thompson gazelle (*Gazella thomsonii*), giraffe, zebra, wildebeest (*Connochaetes taurinus*), Grant gazelle (*Gazella granti*), impala (*Aepyceros melampus*), topi (*Alcelaphus buselaphus*), and eland (*Tragelaphus oryx*). Birds as a general category are also ranked high by this sample of villagers. Species in the middle category, which are still ranked on the positive side of the scale, include the domestic dog, buffalo, elephant, and hippo. The lion is also on the positive side, but relatively close to a neutral position. Finally, in the lowest category are the leopard, cheetah (*Acinonyx jubatus*), crocodile, hyena (*Crocuta crocuta*), snakes and mice.

Socio-demographic effects on species preferences

Stepwise regression analysis was used to examine the influence of three demographic variables (age, education, and gender) on species preferences. This analysis enters the independent variables in a stepwise manner in order to identify the effects of each variable independently as well as the cumulative effect of the independent variables on the independent variable. The dominant demographic variable in explaining species preferences is gender (Table 1). For 15 of 21 species gender has a significant effect on how well people like the various species, and
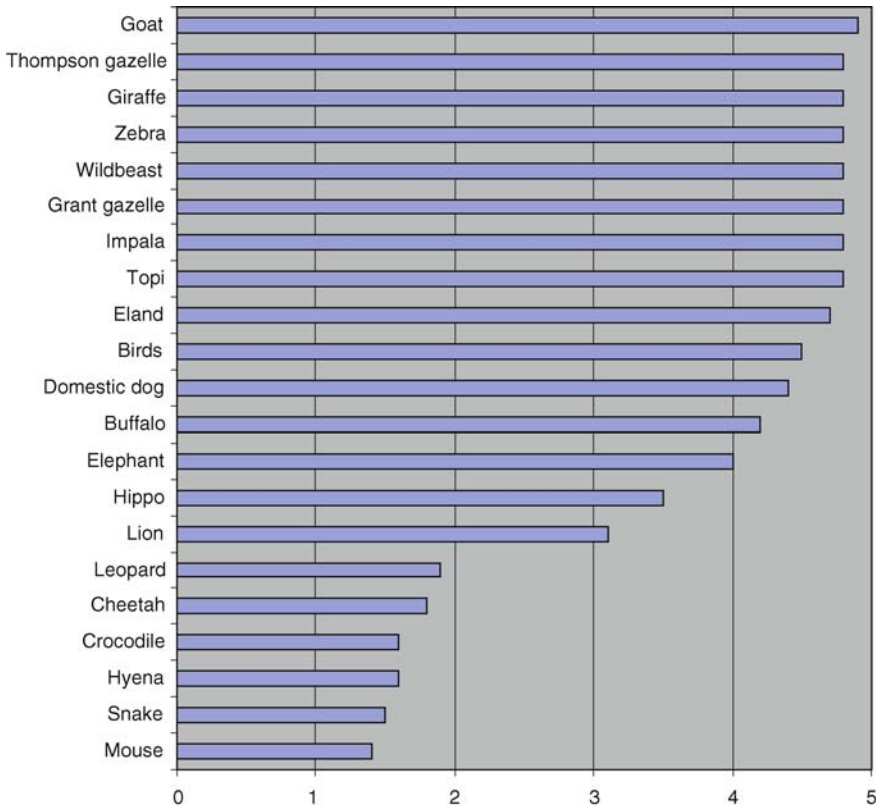
Figure 1. Species preferences (Mean scores) Response format: 1: Do not like at all – 5: Like very much.

consistently men like these animals more than do women. Age does not have any significant effect on species preferences (except for domestic dog), while the level of education has an effect on how well people like topi, buffalo, cheetah, crocodile, and hyena. Except for buffalo, more education is associated with a better liking of the species. While it is evident that gender has a fairly consistent effect on species preferences in terms of statistical significance, it should be duly noted that the conceptual differences are small. In most cases the difference in responses by men and women are less than one-half unit on the scale.

Preferences for management actions

Table 2 shows the distribution of responses to the management preference questions. The non-applicable category has been omitted, i.e. situations that seldom or never occur, like non-carnivores killing domestic animals. Three types of situations were conceptualised; the animal is seen close to the village,

Table 2. Preferences for management actions (in percent).

	Do nothing	Scare off the animal	Report to game officer	Kill animal
Animal is often seen close to the village				
Lion	29.1	8.2	52.4	10.4
Cheetah	29.4	8.4	52.1	10.1
Leopard	29.5	8.4	51.4	10.8
Hyena	24.7	12.4	41.7	21.3
Elephant	25.5	4.8	61.0	8.8
Buffalo	25.5	4.8	59.4	10.4
Hippo	24.2	5.7	58.7	11.4
Crocodile	25.7	4.8	59.2	10.2
The animal kills domestic animals				
Lion	0.3	2.2	52.0	45.5
Cheetah	0.5	2.6	52.2	44.7
Leopard	0.3	2.7	51.5	45.5
Hyena	0.5	6.0	38.5	55.0
Elephant	1.2	2.4	84.9	11.2
Buffalo	0.8	2.0	84.1	13.1
Hippo	0.4	2.0	82.3	15.3
Crocodile	1.1	2.1	77.2	19.6
The animal threatens humans				
Lion	0.5	0.3	43.4	55.8
Cheetah	0.5	0.3	43.5	55.7
Leopard	0.5	0.3	43.2	55.9
Hyena	0.5	2.7	36.0	60.8
Elephant	0.5	0.7	59.7	39.1
Buffalo	0.5	0.7	58.4	40.4
Hippo	0.3	0.3	59.1	40.2
Crocodile	0.4	0.2	60.9	38.5

the animal kills domestic animals, and the animal threatens humans. There are two main messages in this part of the data. First, there is a relationship between the perceived seriousness of the situation and the severity of the preferred reaction. In the case where the animal in question is observed close to the village, few people think that the animal should be killed. About one-half of the sample would prefer to report this to the district game officer. Game officers can then assist in relocating the animal or attempt to abate the problem in other ways. This could reflect trust and a good relationship with officials, but it could also indicate powerlessness. Our more informal conversations with villagers suggest that many feel that they either would not dare to chase away problem animals, and/or have the skill to achieve it.

Quite a few informants (approx. 25–30%) feel that it is not necessary to do anything in this case, while a small percentage (5–12%) thinks that one should try to scare off the animal. However, if the animal kills domestic animals, the preferred management action shifts towards killing the animal or reporting to a game officer. Very few think that one should not do anything or try to scare away the animal themselves. In the most serious situation of animals

threatening humans, the sample is roughly divided between reporting to a game officer and killing the animal (Table 2).

The second general trait in the results is that this pattern is relatively uniform across species examined in this study. With some variation, people on the average think that the type of human-wildlife interaction is more decisive for their preferred reaction than the species involved. However, there are some differences worth noting. Reactions are most severe towards the hyena. More people are willing to kill this animal than any of the other species. It has been documented that hyenas suffer a high degree of mortality due to snares set by poachers (East and Hofer 2000), but this could be partly unintended since snares are unselective and primarily intended for herbivores. Furthermore, people are more inclined to use lethal methods to deal with other large carnivores (i.e. lions, cheetahs, and leopards) compared to elephants, buffalo, crocodiles, and hippos when they cause serious problems. However, it should be noted that these are verbal statements (behavioural intentions), and there is a need to examine the link to actual behaviour.

Relationships between species preferences and preferred management actions

Table 3 shows that in 11 out of 24 possible interactions we found that species preferences have a significant effect on preferred management actions. For the lion, the degree of preference is decisive for reactions to seeing the animal close to the village or if it kills domestic animals, but not if it threatens humans. The same is the case for the cheetah. With one exception, the more one likes these two animals, the less tolerant one is of management actions that aim at relocating or killing the animals if they present a small or moderate problem. However, if they actually threaten humans, this is sufficiently serious to override any effect of preference for the species. The only exception is the situation where a cheetah is seen close to the village, in which case increased liking of the animal is associated with being more supportive for strict management interventions.

Species preference has an effect on preferred management actions toward the leopard if it kills domestic animals or is a danger to humans, but not if it is merely observed close to the village. The direction of the effect is the same way here (negative coefficients), i.e. increasing preference is associated with lower tolerance for strict management actions.

Species preferences have no effect on preferred management actions toward the hyena or elephant regardless of situation. Species preferences do affect preferred actions toward the hippo and buffalo if they are seen close to the village, or if they threaten humans, but not if they kill domestic animals (which is unlikely and perhaps seen as irrelevant). There is a peculiar twist to the pattern of effects here. In the least serious situation of observing the animals close to the village, preference is related to tolerance as originally postulated, i.e. liking the animal is associated with less tolerance for strict management

Table 3. Relationships between species preferences and preferred management actions (OLS regressions).

Animal	B (St. Error)	R^2	Pearson's correlation	N
The animal is seen close to the village				
Lion	−0.070 (0.025)**	0.013	−0.113*	581
Cheetah	0.067 (0.032)*	0.008	0.087*	582
Leopard	−0.008 (0.030)	0.000	−0.011	557
Hyena	−0.025 (0.038)	0.001	−0.028	577
Elephant	0.038 (0.028)	0.003	0.056	586
Buffalo	−0.223 (0.030)**	0.087	−0.295**	581
Hippo	−0.093 (0.026)**	0.023	−0.152**	549
Crocodile	−0.020 (0.035)	0.001	−0.024	553
The animal kills domestic animals				
Lion	0.030 (0.089)**	0.008	0.089*	578
Cheetah	−0.051 (0.0180)**	0.014	−0.118**	576
Leopard	−0.058 (0.016)**	0.022	−0.147**	556
Hyena	−0.008 (0.022)	0.000	−0.015	576
Elephant	0.041 (0.102)	0.001	0.025	248
Buffalo	0.005 (0.019)	0.000	0.016	240
Hippo	−0.028 (0.019)	0.009	−0.093	241
Crocodile	−0.033 (0.021)	0.006	−0.075	436
The animal threatens humans				
Lion	0.017 (0.013)	0.003	0.052	578
Cheetah	−0.027 (0.017)	0.005	−0.067	579
Leopard	−0.044 (0.015)**	0.015	−0.121**	556
Hyena	0.016 (0.021)	0.001	0.032	578
Elephant	−0.003 (0.015)	0.000	−0.009	582
Buffalo	0.037 (0.017)**	0.008	0.091*	579
Hippo	0.031 (0.014)*	0.009	0.095*	545
Crocodile	−0.043 (0.018)**	0.010	−0.100*	436

Unstandardised regression coefficients. Standard errors in parenthesis.
*$p < 0.05$; **$p < 001$.

actions toward the animal. However, in the event that these animals threaten humans the reverse is the case; liking the animals correlate with being more tolerant of strict management actions. For the crocodile species preferences have an effect on preferred reactions only in the most serious situation of humans being threatened, and then as expected, higher preference correlates with less tolerance for strict management intervention.

The postulated relationship between species preferences and preferred management actions appears to be complex and without strong effects. Furthermore, gender has a significant, albeit modest influence on species preferences. Thus the effects of species preferences partly or largely may be an effect of gender. We tested this through a stepwise regression analysis where species preferences and gender were entered as predictors, and preferred management actions as dependent variables. The analysis then excludes the variables (predictors) that lack a significant contribution to the relationship.

In the 24 possible interactions (8 species of animals in three types of situations), gender is the most important of the two predictors in 19 of the interactions. This pertains to all the situations with significant interactions involving the lion, cheetah, hyena and elephant. For the leopard, gender is the dominant predictor in the case where the animal is seen close to the village, or threatens the humans, but not in the case where the leopard kills domestic animals. For the buffalo, species preferences is still the dominant predictor in instances where the animals are either seen close to the village or threaten humans. Thus, to some extent, the effect of species preferences on preferred management actions is an effect of gender. Species preferences are not unimportant in terms of how people feel about the acceptability of management actions, but this pattern is heavily influenced by gender.

Discussion

The results show that residents in the area like most of the animals listed in the questionnaire. Only six of the 21 animal species or groups are disliked.

The pattern of animal species preferences expressed by the inhabitants around the Serengeti region probably reflects functional and consumptive motives as well as more cultural dimensions. The most liked animals are generally useful and non-threatening to most people. The domestic goat is kept by a large part of the population for meat and milk and is a salient part of the agro-pastoral economy. Gazelles and other herbivores seldom present any danger to humans, although wildebeest and others cause some crop damage and contamination of drinking water during the migrations. On the other hand, they also provide a very significant food supply through poaching as well as legal hunting. For instance, wildebeest is an extravagant food source at certain times of year, and meat is harvested by many, but topi and gazelles, while more difficult to harvest, are preferred for their taste. The giraffe is a national symbol, and to many the large herds of ungulates on the savannah symbolise the African environment and its history.

Animals like buffalo, elephant, hippo, and lion are reasonably well liked in terms of average scores, but they are not as highly endorsed as the other herbivores. The lion, however, scores one scale unit lower than the buffalo and the elephant, and is close to a neutral position. People in this region have an ambivalent attitude toward these potentially dangerous species. It has been shown elsewhere that villagers in the Western Corridor have a high level of fear of animals like buffalo, hippo, lion, and elephant (Kaltenborn and Bjerke Submitted). These species are unquestionably dangerous to humans in certain situations. Buffalo and hippo are known throughout parts of Africa for causing injury and death to several people every year (Parry and Campbell 1992; Durrheim and Leggat 1999), and elephants are notorious for crop damage if they do not find sufficient feed in the wild. Furthermore, difficulties poachers experience when attempting to kill the elephant for meat using traditional

weapons might also have affected their preference. Other tribes hold the elephant very highly as a symbol of the African environment (Kuriyan 2002). Lions can also kill people, but they are nevertheless admired for their strength and they are part of rituals in certain tribes like the Masaii (Galaty 1998). Moreover, most local people in villages have never seen the live lions but have heard stories about the animals from hunters who have encountered the animals. Lions tend to stay far from villages. For instance, the known pride of lions in the western corridor that is closest to human inhabitants is 15 km away right in the park (Nyahongo 2003). This is too great a distance for villagers to go to collect firewood. Only poachers venture this far into the park.

Carnivores like crocodiles, leopards, cheetahs and hyenas are generally disliked by this population of respondents. All of these animals, perhaps with the exception of the cheetah, often create problems for human livelihoods. Impressions from the data collection suggest that many people have problems differentiating between leopards and cheetahs, which may explain why these are grouped together. In certain locations along rivers or lakes, crocodiles take a toll on human lives, and certainly affect the way of life. The mouse is an animal without any noteworthy use or importance, and snakes which are found all over the country present a real danger that everyone in rural areas is aware of. The dislike of mice and snakes seems to be close to a cross-cultural universal, since they rank lowest on preference scales in many previous studies (Kellert and Westerveld 1983; Bjerke et al. 1998; Arrindel 2000). Probing this issue after the interviews were completed, some villagers commented that mice cause damage to crops in the stores for untreated harvest. Farmers cannot afford the cost of chemicals and also they are worried about food poisoning. Moreover, mice are responsible for diseases like plague, a deadly disease that have claimed a great number of people in villages. In addition, snakes eat mice. Most people in the villages correlate the two; snake and mice. The houses with mice are potential habitat to snakes as well. Thus, villagers tend to hate the mice because they bring snakes to the people.

Socio-demographic variables and species preferences

The pattern of associations between demographic variables and animal preference scores deviates strongly from findings obtained in Western cultures. Previous research has shown that age of the respondents has a marked effect on both preferences and fears of animals. Generally, older U.S. citizens express less interest and affection, and more dominionistic and utilitarian attitudes toward animals, compared with young adults (Kellert 1996, Ch. 3). Similarly, a Norwegian study showed positive associations between preference scores and age for some animal groups (i.e. birds, insects), and negative associations for others (i.e. dogs, cats, birds of prey, mice, rats) (Bjerke and Østdahl, submitted). Self-reported fear of wolves, bears and wolverines has been found to increase with increasing age (Bjerke et al. 2002), and for spiders, to decrease

with increasing age (Bjerke and Thrane, submitted) and for the adder (*Vipera berus*) to decrease with age (Bjerke and Bevanger 2002). In the present material from Tanzania, age is associated (negatively) with animal preferences for only one animal (the domestic dog). Part of the explanation for this cross-cultural difference may be that in many Western countries, strong negative attitudes toward large carnivores (and other 'problem species') were widespread among the general public until a few decades ago. In these countries younger age groups, being less dependent upon agriculture, are more influenced by modern conservationist attitudes. A similar cohort effect, and the relatively abrupt change in attitudes toward animals that may create problems, may not have taken place in Tanzania, where the agro-pastoralist way of living has remained relatively unchanged to the present day.

Previous surveys have also shown the existence of positive correlations between educational level and preference for various animal species or groups (Kellert 1996; Bjerke and Østdahl submitted). The five significant correlations (of 21 possible) found in the present study indicate a weak effect of education on animal preferences among Tanzanians. In contrast, gender is strongly associated with animal preferences with a negative correlation observed for 15 of 21 animal species or groups. Consistently males more than females express a higher degree of preference for all 15 animals. This may reflect the central role of hunting in for males in these cultures.

Surveys in other cultures have also shown that gender is the perhaps most important demographic variable affecting attitudes toward animals (Kellert and Berry 1987), but higher preference scores among females for some animal species have been shown (Bjerke et al. 1998; Bjerke and Østdahl, submitted). In addition, females more than males have been found to express a negative attitude toward large carnivores (Bjerke et al. 2002). However, in the Tanzanian sample gender differences are lacking for lion, leopard, cheetah, and crocodile. It may be that the danger posed by these species is so unquestionable, partly based on what poachers report to other villagers, as to prevent gender differences to appear, while opinions on the danger posed by wolves and brown bears in Scandinavia are highly divergent.

The debate about large carnivores in Scandinavia reflects contrasting animal preferences, embedded in wider social and economic conflicts between active local groups and central political authorities (Bjerke et al. 2002). Contrasting attitudes across social groups develop in childhood. Bjerke et al. (1998) showed that children living in areas where wolves (*Canis lupus*) exist, express more negative attitudes toward these animals, compared with children living in wolf-free (i.e. urban) areas. British children like tigers (*Panthera tigris*) and lions (*Panthera leo*), and similar preferences apply to Italian urban children (Rusca and Tonucci 1992). But children in Tanzania express fear of these carnivores and consider them a nuisance (Entwistle and Stephenson 2000). The favourite animals of Tanzanian children are the zebra (*Equus zebra*), giraffe (*Giraffa cameloparadalis*), and buffalo (*Syncerus caffer*). They also like the elephant (*Loxodonta Africana*), even though they fear this animal (Bowen-Jones and

Entwistle 2002). Factors like meat quality, appearance, and importance for tourism may contribute to these preferences (Entwistle and Stephenson 2000).

Species preferences and management actions

Among the species included here, the buffalo, lion, elephant, and hippo are animals that people like for various reasons including food supply, culture and tradition. The remaining carnivores are generally disliked and all of these species are, as discussed earlier, associated with a high level of fear. For the species people like, we would expect this to affect views towards management, but this is only partly the case. Species preference does not affect views toward management of elephants. It has an affect on lions, but only if they do not pose any real danger to humans. For buffalo and hippo, increased preference has the expected influence in a non-threatening situation, but in a threatening situation, liking the animals is associated with support for strong management intervention.

An alternative to changing people's attitudes toward potentially dangerous species is to select 'flagship species' that – although feared – are valued for their position in cultural and religious traditions (Bowen-Jones and Entwistle 2002).The elephant may illustrate this argument. In the Serengeti region, people have been shown to express strong fear of lions (*Panthera leo*) and leopards (*Panthera pardus*), and almost as many fear elephants, crocodiles (*Crocodylus niloticus*), buffalo and hippos (*Hippopotamus amphibius*) (Kaltenborn and Bjerke Submitted). Is this uniform strong fear of several animal species reflected in equally strong defensive behaviours if the animals show problematic behaviours (i.e. approach the village, kill livestock, threaten humans)? There are reasons to believe that one species, the elephant, is valued higher, and that elephants are more accepted when exhibiting problematic behaviours compared to other species listed in the study.

Even though the history of human-elephant interactions is a long tale of conflicts, elephants are associated with many material benefits. They produce paths, create open clearings in the forest, break branches that can be used for firewood, bring income to the tourist industry, and are killed for meat (Barnes 1996; Hill 1998; Kuriyan 2002). Their faeces are used as a medicine, and burned to repel mosquitoes (DeBoer and Baquette 1998). In Kenya, Samburu respondents emphasise similarities between humans and elephants: The latter species has a trunk acting like a human arm, breasts similar to women, and skin resembling human skin. Some consider elephants as ancient relatives of humans, deserving respect (Kuriyan 2002). However, a concern exists that these traditions are changing. Poverty, youths killing elephants for profit, and concern about children's safety on their way to school are among the factors that could reduce the traditional respect for elephants.

The usefulness for management purposes of broad and general attitudes, i.e. attitudes not directed at local objects or conditions is debatable. An important

assumption underlying this study is that even though people may like certain species quite well, and therefore support broad campaigns of habitat preservation or fund raising for conservation, this is likely to be of limited value for guiding decisions for how to deal with concrete, local problems associated with protecting these species. On the village level, where people frequently encounter problematic animals engaged their normal activities, the specific situation is more determining for attitudes toward acceptable management actions than higher order global attitudes.

In order to use attitudes toward wildlife as predictors of how people might react to management interventions we need to distinguish between cognitive aspects (belief, meaning about the animal) and affective aspect (fear, like, dislike). It is unlikely that the attitudes of people towards species which are both feared and disliked can easily be turned from negative to positive. Attitudes may operate differently, however, when species are feared but liked. Such species may be identified by use of the traditional preference tests, where respondents indicate their degree of both preference and fear. But such measures most often have been of a global and abstract character disconnected from real-life, concrete situations. It is when global attitudes are translated into behaviour – i.e. what people do locally when confronted with the species – that they become most clearly relevant to wildlife management. The essence from the local perspective is that wildlife must be managed in ways that help people who must live in that place.

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