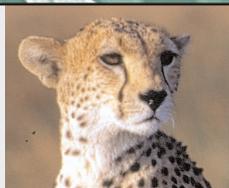


# People and Wildlife Interactions around Serengeti National Park, Tanzania

Bjørn P. Kaltenborn  
Julius W. Nyahongo  
Michael Mayengo

## Biodiversity and the Human-wildlife Interface in Serengeti, Tanzania



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## Referat

Kaltenborn, B.P., Nyahongo, J.W. & Mayengo, M.  
People and Wildlife Interactions around Serengeti National Park, Tanzania.

Denne rapporten presenterer resultatene fra en survey undersøkelse i landsbyer i randsonen til Serengeti nasjonalpark i Tanzania. Studien er del av prosjektet: Biodiversity and the Human-Wildlife Interface in the Serengeti. Dette er et tverrfaglig prosjekt som har som formål å studere interaksjonene mellom mennesker og økosystemer i en av verdens største nasjonalparker. Denne undersøkelsen fokuserer på kulturelle og sosiale sider ved menneske-dyr interaksjoner blant informanter fra seks landsbyer i Western Corridor av Serengeti. Konkret omfatter studien problemstillinger knyttet til arealbruk, kontakten mellom lokalbefolkningen og nasjonalparken, jakt, kontakt med vilt, godefordeling og problemer, holdninger til dyreliv og miljø, interaksjonen mellom vilt og husdyr og holdninger til forvaltning.

**Nøkkelord:** nasjonalparker, konflikter, menneske-dyr interaksjoner

## Abstract

Kaltenborn, B.P., Nyahongo, J.W. & Mayengo, M.  
People and Wildlife Interactions around Serengeti National Park, Tanzania.

This report covers the results from a survey study in communities adjacent to Serengeti National Park in Tanzania. This study is part of the project: Biodiversity and the Human-Wildlife Interface in the Serengeti, which is a multidisciplinary effort to analyse interactions between human populations and ecosystems in one of the World's largest protected areas. The current study focuses on cultural and social aspects of human-wildlife interactions among people from six villages in the Western Corridor of the Serengeti. Specifically we have analysed questions related to land use, people-park relationships, hunting, wildlife encounters, benefits and problems, environmental perceptions, livestock-wildlife interactions, and attitudes toward management.

**Keywords:** national parks, conflicts, human-wildlife interactions

## Foreword

This publication is part of the reporting from the project: "Biodiversity and the Human-Wildlife Interface in the Serengeti, Tanzania". The purpose of this report is to provide a broad description of some of the human dimensions in the human-wildlife interactions around the proximity of the Serengeti National Park. The report is based on a survey conducted in different villages in the Western Corridor over a period of six months from October 2001 to March 2002. While this report is largely descriptive in nature, most of the data has also been subject to more complex analyses, and the results of these are currently being prepared and reported in scientific journals.

This study is a part of the collaboration between NINA and the Tanzania Wildlife Research Institute (TAWIRI). The two institutes co-operate on several fronts ranging from field research to institutional capacity building. TAWIRI is the central wildlife research agency in Tanzania, and as such mandated to co-ordinate and carry out research within and outside the protected areas. Besides being actively involved in the data collection and analysis, TAWIRI has been instrumental in providing logistics support, communication with Tanzania National Parks (TANAPA) and chairmen in the villages where we have been conducting the interviews.

Funding for this work has been provided by The Norwegian Research Council's programme: 'Biological diversity – dynamics, threats, and management', and by NORAD. We thank all the institutions and persons who supported this study, especially all the people in the Western Corridor who generously gave of their time when we conducted the numerous interviews and conversations. We also cherish all the good times and good help from our colleagues in TAWIRI and NINA who make this work possible. Not the least we extend our thanks to all the good staff at the Serengeti Wildlife Research Centre who make every field period in Serengeti a treat, and the drivers who take us where we need to go, and make sure we always return safely to base.

It is our hope that this work will be useful both for the further development of TAWIRI, the people residing around Serengeti National Park, and the management of Tanzania's natural resources.

Lillehammer, Norway, 10.09.03

Bjørn P. Kaltenborn

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## Executive summary

### The study

Conservation in East Africa faces tremendous challenges in its efforts to develop strategies for sustainable use and management. The dual task of preserving natural and cultural heritage while providing extended and more equitable distribution of benefits requires integrated knowledge about the social, economic and ecological dynamics of wildlife management. This study addresses the area human – wildlife interactions around the Western Corridor of Serengeti National Park with an analysis of the human dimensions of this interaction.

### People park relationships

There is much awareness about the interaction between the communities and the park. Most people are concerned about this relationship, but the majority has never been in direct contact with people from management institutions. SRCP is more visible and present in the communities than SENAPA. Overall there is a positive attitude towards developing these relationships, and most people would like to see more private and public benefits flow to the communities. There is an expressed interest in increased dialogue, and more emphasis on proactive educational and information type activities. At the same time, there is a general feeling of alienation and lack of understanding of needs on issues on behalf of staff in SRCP and particularly SENAPA. Communication can clearly be improved.

### Hunting

Hunting is a sensitive issue. It is also a highly prevalent activity in most communities. Hunting is historically important and currently presents a significant economic activity. The supply of legal game meat is far from sufficient to offset illegal hunting. Most people will when asked deny personal involvement in hunting, but almost everyone know hunters among friends, family or others in the community.

Hunting is a complex and salient activity motivated by a range of needs and reasons. Economic and subsistence needs dominate, but socio-cultural motives are also important. For many, hunting is an inseparable part of other life activities and culture, and even if all basic needs were satisfied, there will remain reasons to engage in hunting (legal or illegal). The villagers are somewhat divided in their views on how hunting affects wildlife populations. Half of the population in the study area thinks that hunting can have a detrimental effect on wildlife, and two-thirds expect hunting to have some kind of negative effect on wildlife. The issue of hunting is on most people's mind, and almost everyone has opinions about ways to abate problems with illegal hunting one way or another. Key words are increased law enforcement, significantly improved legal game meat supply, improvement in employment opportuniti-

es and income generating activities, and more information and communication about wildlife issues between communities and management authorities.

### Wildlife encounters and safety

Animal encounters is part of the daily routine for many in the districts bordering the Western Corridor. However, few people have carnivores in the close proximity to the place they live, with the exception of the ubiquitous hyena. Other herbivores are more or less common, with distinct seasonal variations. Wild game provides a range of important benefits as a commodity for food and cash as well for cultural and spiritual purposes. Many people experience problems with crop damage and killing of livestock, and take various precautions to deal with this including guarding the animals at night, reporting to game officers, use of poison baits, fencing livestock and chasing away problem animals. Likewise people apply various strategies to avoid dangerous confrontations, mostly defensively by avoiding problem animals one way another.

Overall, most people are quite concerned about the safety of themselves and their families in relation to potentially dangerous animals. There is a high level of fear of the typical "problem" species such as the large carnivores, elephant, buffalo and hippo. Age, gender and education has an effect on levels of self-reported fear for some species, but not all. Women are more afraid than men, older people are generally more afraid than younger age groups, and those with education beyond standard 7 are more afraid than those with little or no school background. The effect of education found here is contrary to most earlier studies in Western countries, where higher levels of education is associated with lower degrees of fear of dangerous animals.

### Attitudes toward wildlife and the environment

The people in this study express a range of views in terms of how well they like the different species of animals. Roughly this can be divided into three categories of species preferences. Most of the large and medium size herbivores are very well liked by most people. These animals comprise a salient food source (legally or illegally), present few problems and little danger, with the exception of some crop and drinking water damage especially during migrations, and they contribute to a sense of well being by their presence on the savannah. They are symbols of the history and the environment and people's attachment to land and resources. A second group of moderately well liked animals include buffalo, elephant, hippo, and lion. Multiple attributes are associated with these animals, and they represent positive as well as negative aspects such as strength, endurance, food supply (buffalo), but also danger to human lives and crop damage. A third category of animals are viewed rather negatively. Leopard,

cheetah, crocodile, hyena, snake, and mouse are dominantly associated with problems, danger, and very little in terms of aesthetic/spiritual enjoyment or links to cultural practices. Species preferences vary significantly with gender. Most animals are better liked by men than women.

Analysis of wildlife value orientations show that most people in this area have a positive attitude towards wildlife in general, but that this broad attitude contains “contradictions” and complexity. There is a strong feeling that wildlife should be wisely managed, but that village committees are not capable of doing this. Likewise, wildlife must be conserved, but it should benefit communities much more than it does today. The link between a distinct use orientation and inclination to think that wildlife is an integral part of life and culture that must be preserved, is evident. This may not necessarily denote a conflict in views, but simply indicate a value perspective that does not contradict use and protection, but rather sees these as two sides of the same coin.

The perspective that emerges from the analysis of wildlife value orientations is also mirrored in the examination of broad environmental beliefs. As “worldviews” of the environment they tap more universal attitude structures of how people look at the utilisation and preservation of natural resources. The villagers around the Western Corridor express attitudes reflecting both human dominance over nature and utilitarian uses of resources as well as conservation concerns. The typical dichotomy found between these dimensions in populations in industrialised nations was not identified here. Rather than seeing these aspects of the environment as opposing or independent factors, here they are closely correlated, which suggests that also in the realm of more general, higher order attitudes, conservation and use elements are more integrated.

## **Attitudes toward wildlife management**

People express a range of preferred management actions toward depending on the situation and the problems animal cause to people. All in all, preferred management actions do not vary that much across species of animals, but is more dependent upon the type of situation and potentially negative effects on people. If the situation is not especially serious as in instances where typical problem animals like large carnivores, buffalos or elephants are simply observed at some distance, very few people would opt to kill the animal if they had the skill and/or opportunity. The majority would then either refrain from any action or report to a district game officer to get help. In more serious situations such as when an animal threatens human life, a far greater proportion would like to have the animals killed or at least relocated.

Regarding livestock – wildlife interactions, the general perception is that domestic animals and wild game do have effects on each other. By most people the opinion is that wild animals have more negative effects on livestock than the other

way around. There is a steadfast notion that wildlife transmits diseases to domestic animals.

# 1. Background: Conservation and human – wildlife interactions

Wildlife conservation has been the most demanding and important environmental management issue in East Africa for several decades. Countries like Tanzania and Kenya receive a large portion of their GNP through wildlife-based tourism and the protected areas are the prime refuges of large populations of wild animals that sustain this tourism. Traditionally, wildlife management and conservation has depended strongly on protected areas. Tanzania has devoted about 28 percent of its land surface to wildlife conservation one way or another, of which about 15 percent is comprised by the 12 national parks. Human settlement is prohibited in the national parks and game reserves, but to some extent allowed within the Game Controlled Areas and Ngorongoro Conservation Area. Government policies contain an ambition to include more areas with special or unique biological values into Tanzania's system of protected areas (IUCN 1987, MLHUD 1995).

The wildlife sector provides a sizeable contribution to Tanzania's economy, and the value of the wildlife resource is estimated at US\$ 120 million annually (Leader-Williams et al. 1996). However, this potential is only partly realised. Between 1987 and 1996, the wildlife sector earned the country US\$ 73.3 million through consumptive and non-consumptive uses (Gamassa 1998). Non-consumptive use fees from the national parks amounts to approximately one-half of this, while the rest came from consumptive fees from game reserves and game controlled areas.

Tanzania's biological diversity, particularly that associated with wildlife resources has a tremendous potential as a driving force and contributor to development processes. However, there is increasing concern that one needs to develop wildlife management and harvesting models that are not only ecologically, but also socially and culturally sustainable. For the past decade or so major efforts have been put into developing more community based approaches in all colours and shapes throughout Africa and other parts of the world. To some extent this is a facet of larger, global forces pushing for democratisation and local governance, but also a result of post-colonial politics in general and policies of influential international environmental NGOs (Neumann 1995). From the realisations that the "fences and fines" approaches of strict preservation can lead to even more conflicts, unacceptable social inequity and ultimately to destruction of the resources, sustainable use including more local participation is sometimes called a "use it or lose it" philosophy (Swanson 1992). The various community based resource management (CBNRM) models, experiences and results have been diverse (see for example Songorwa et al. 2000, Agrawal & Gibson 1999 for reviews).

However, it is generally recognised now that long range management of wildlife resources will have dire chances of

much success unless the needs of communities are taken into consideration. Likewise, the poverty issues are so extensive and pressing that some level of wildlife utilisation for subsistence and cash-economy is required to gain any support at all (Newmark et al 1994, Murphree & Hulme 2001). The current thinking around these issues now emphasises that co-operation between protected area managers and villagers is essential, and that some form or level of community based management is required in order to achieve a more equitable distribution of benefits, greater legitimacy, social and economic development and conservation of biodiversity.

This poses a range of knowledge needs about the interaction of social, political, economic and ecological dynamics. We are currently witnessing a slow but steady change in focus from framing these questions as biological management challenges to seeing the issues as social conflicts and contested development goals. While we have considerable knowledge about wildlife populations and ecological dynamics, we are still severely lacking knowledge about the social human dimensions of people-wildlife interactions. Also as a research agenda we need to strengthen the social science part of wildlife conservation and development agenda. A more dynamic perspective on people as agents who seek to improve their livelihoods through adaptive- as well as coping strategies, rather than seeing people as static problems to conservation, will provide much more useful information on how to regulate human exploitation of resources and how to contribute to human welfare and development goals. In this study we examine human behaviours, attitudes, and beliefs around wildlife and livelihoods along the borders of Serengeti National Park.

## 2 Scope and objectives



**Figure 1.**  
*The human dimensions of Serengeti's resources are still poorly understood. Photo: B.P. Kaltenborn*

This report is part of a larger interdisciplinary effort to examine issues related to biodiversity and human-wildlife interactions in the Serengeti. The particular part of the project that is reported here deals with the social and cultural aspects of the project. Other NINA-TAWIRI collaborative teams examine resource economy related to hunting, plant-herbivore interactions, wildebeest population structure, trends of migratory and non-migratory herds, and parasitology related to large herbivores. In the Serengeti history and context this is a rather novel approach in that the project carries an overall goal of integrating plant and animal ecology and biology with social sciences and economy, and secondly by assessing direct and indirect effects of human settlements on herbivore migration. The study combines several approaches and methodologies like quantitative ground and aerial transects and surveys, behavioural studies, biomass analysis, quantitative and qualitative interviews, public meetings, focus groups, participant observation, and economic modelling.

### The specific objectives of the collective study include:

- To identify cultural, social and economic values of wildlife harvest in the Western Corridor Area.
- To assess the importance of wildlife for the local economic systems in Serengeti.
- To provide accurate estimations of wildebeest population structure and trends including the quantification of mortality factors (including harvest).
- To accurately establish migration patterns (in protected and settled areas) and to link these patterns with population trends.
- To establish the correlation between natural and human-modified landscape features, forage availability and quality on one hand and the spatio-temporal patterns of migration on the other

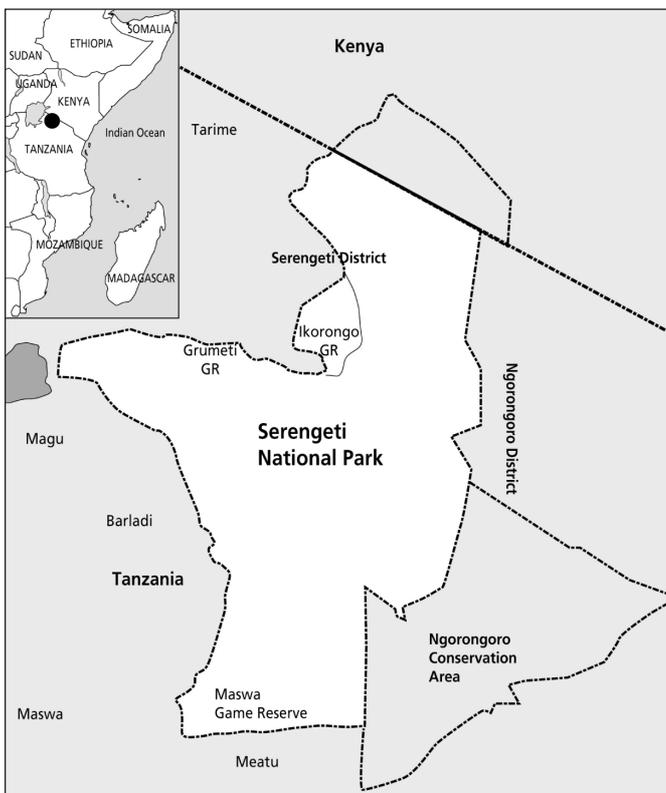
This report deals with the human dimensions of the human-wildlife interactions. Here we report on a survey carried out in the districts and villages surrounding the Western Corridor. The objective of this report is a broad, descriptive reporting of all the issues covered in the survey. Different parts of this is covered in more detail as regards theoretical background and more complex analysis in a series of journal publications under work. The specific objectives are:

- Identify key characteristics of land use in a representative sample of informants in three districts of the Western Corridor.
- Identify characteristics and issues associated with people-park relationship
- Identify attitudes toward wildlife, natural resource management, as well as environmental beliefs in the population in the Western Corridor.
- Assess the role of hunting and critical factors regulating hunting in the communities in the Western Corridor.

### 3. Research design and methodology

#### Study area

The project is located in the surroundings of the Western Corridor of the Serengeti National Park (Figure 2). Serengeti National Park lies west of the Rift Valley and the western border is close to Lake Victoria while the northern edge borders Kenya. Even in a global context, Serengeti National Park has a long history as a protected area. The central part of the current park was designated a Game Reserve in 1929. In 1940 hunting was banned, and in 1951 it was declared a national park. In the time following, the borders have been modified as the park has expanded. In 1981 Serengeti was inscribed as a World Heritage Site. Simultaneously the adjacent Ngorongoro Conservation Area to the south was declared a Biosphere Reserve. Serengeti National Park covers 14 763 km<sup>2</sup> and is the central element in the larger Serengeti ecosystem which encompasses around 27 000 km<sup>2</sup>. The entire ecosystem is managed through a mosaic of protected areas contiguous with the national park, the Ngorongoro Conservation Area, Maswa Game Reserve, Ikorongo Game Reserve, Grumeti Game Reserve, and Loliondo Game Controlled Area, all in Tanzania, as well as the Masaai Mara Game Reserve to the north in Kenya (Figure 2).



**Figure 2.**  
Serengeti National Park

The Serengeti National Park protects some of the last remaining pieces of the East African highland savannah. The altitude ranges from 920 to 1850 metres above sea level, and the mean annual precipitation is 1210 mm, with considerable local variations. The undulating open grassland plains is the major type of vegetation. Dominant vegetation species are couch grass (*Digitaria macroblephara* and *Sporobolus marginatus*) Sedges (*Kylinga* sp.) take over in wetter areas. In central parts of the park the acacia woodland savannah dominates. The north is typified by more dense and hilly woodland. Lowland woodlands comprise *Commiphora*, *Acacia drepanolobium* and *A. gerrardi*. Upland woodlands comprise *Acacia lahai* and *A. seyal*.

The Serengeti ecosystem contains some of the largest herbivore and carnivore populations in the World. The ecology of the wildlife has been described in a numerous publications and extensive summaries exist including Sinclair and Arcese (1995). Most of the species of the East African savannah are found here, and the area is famous both for the large-scale herbivore migrations such as wildebeest (*Connochaetes taurinus*), zebra (*Equus burchellii*), Thomson's gazelle (*Gazella thomsoni*), eland (*Taurotragus oryx*) and for the large populations of resident herbivores like African buffalo (*Syncerus caffer*), giraffe (*Giraffa camelopardalis*), Grant's gazelle (*Gazella granti*), impala (*Aepyceros melampus*), kongoni (*Alcelaphus buselaphus*), topi (*Damaliscus korrigum*), warthog (*Phacochoerus aethiopicus*), and waterbuck. The ecosystem is also the home of large populations of large carnivores like lion (*Panthera leo*), leopard (*Panthera pardus*), cheetah (*Acinonyx jubatus*) and hyenas (*Crocuta crocuta*).

During the 19<sup>th</sup> century the Serengeti and Masai Mara were mostly open grasslands free from tsetse flies and it was extensively grazed by pastoralists. During the 1880s a rinderpest epidemic led to massive livestock and wildlife losses, and much of the human population left the area (SRCS 1992). Currently the people of this region are mostly agro-pastoralists to the north and west of the national park and pastoralists to the east of the park. The latter are primarily Masaai who are cattle people. For cultural reasons they do not consume meat (Leader-Williams et. al. 1996, Homewood & Rodgers 1991). Their land use and resource needs require them to range over large areas. Subsequently the pressure on their traditional way of life was one of the key reasons for establishing the Ngorongoro Conservation Area, where pastoralism is combined with wildlife conservation. Higher population densities and a greater diversity of ethnic groups and tribes are typical of the western and north-western side of the park. The importance of hunting varies among these tribes, but for instance the Ikoma and Kuryia tribes have long traditions of hunting, and the wildebeest migrations are a salient part of their annual life cycle. Here people engage in subsistence and cash crop farming, as well as mixed farming and animal husbandry. The population pressure in the western and north-western areas is high with an estimated population in 1988 in six districts adjacent to the park of 1,49 million (64,5/km<sup>2</sup>). In contrast the population in the eastern (Masaai) areas were 69,100 (4,92/km<sup>2</sup>) at the same time (Bureau of Statistics,

1988). In the most heavily populated areas, the population growth rate is thought to be around 3 per cent annually, so the current population around the park is now probably approaching 2 million people.

## Sample

The exact size or structure of the population in the areas surrounding the national park is not known. Due to this we decided to design a sample that was intended to capture sufficient size and diversity on selected variables in order to be as close to a representative sample as possible. In the three districts covered in this study around 30 tribes live in multiethnic communities. The main tribes are Ikizu, Sukuma, Tatuturu, Ikoma, Kuryia, Natta and Issenye. We selected six villages, two each in the districts of Magu, Bunda and Serengeti (Figure 1). In each district one village was close to the protected area, and the other located further away from the protected area. Then the sample was stratified with an even distribution across gender and age groups and a minimum of 80 persons in each village. The net sample contained 590 persons, which we believe represents sufficient diversity in terms of geographical/environmental variation, tribes and ethnic groups as well as demographic structure.

## Data collection and analysis

The data was conducted by using a structured questionnaire with interviews in Kiswahili by a native speaker. After a pre-test on a pilot sample of 50 cases in 3 different villages final adjustments were made. In each village the interviewers approached the village chairman to give an orientation about the study, request permission to conduct the work and have the village chairman or village secretary help select the appropriate households according to the structure of the sample. In most cases we conducted the interviews in people's homes. On the average it would take 50 minutes to complete an interview, but they could range from 30 to 90 minutes. In all of the six villages, the interview team also had more informal conversations with village leaders and community members about the contents of the questionnaire to gain additional qualitative information that could support the questionnaire data. Thematically the interviews covered land use practices, people-park relationships, wildlife encounters and benefits, attitudes and preferences associated with wildlife, attitudes toward management and the environment, perceptions of livestock – wildlife interactions, and various background characteristics of the people included in the study.

## 4. Results

### 4.1 The people in the study

Among the people living in the Western Corridor of Serengeti a diversity of ethnic groups and tribes were included in this study. The interviews were carried out in the three districts of Serengeti, Bunda and Magu. A little more than one-half (58,6%) of the sample were men and 41,4 % were women (Table 1). In terms of age more than one-half of the people in the study are in the 25-45 age group. There are relatively few persons who are older than 55 years of age (Table 2).



**Figure 3.**

*Increasing numbers of people are trying to make a living in the lands adjacent to the Western Corridor. Photo: B.P. Kaltenborn*

The households also range in size, but the majority are small to medium sized with more than three quarters of the sample living in households of 1 – 5 or 6 – 10 people. Slightly less than 20 per cent live in households comprise more than 10 people (Table 3). Most of the people included in this study have lived in the villages they were interviewed for quite some time (Table 4). Almost everyone (88,8%) have lived there more than 5 years, and one-half (49,9%) have lived in the present village for more than 20 years. As such the population surveyed in this study is relatively stable in terms of geographic location and attachment to the local environment. However, less than one-half of the sample (39,3%) were actually born in the village they now reside (Table 5). This points towards a certain mobility within this region during the past few decades.

Among the people who report having moved to their present village, we find several reasons for them doing so. The most important is to acquire land for agricultural purposes, followed by attachment to family and the search for employment. A few also report being in the present village due to the forced movement ('ujamaa') that took place in the rural districts of Tanzania in the 1960's and 70's (Table 6).

The people in this region are typically agropastoralists, i.e.

relying on a combination of keeping livestock and agriculture. For the most part, agriculture is a small scale operation including farming for both local subsistence use and selling agricultural products in markets or other outlets. Most households own relatively small land holdings, with two-thirds owning between 0 and 10 acres (table 9). Cash crop farming, subsistence farming, and selling livestock accounts for 81,3 % of the family incomes. Although other sources of income like fishing, sales of firewood and charcoal, more formal means of employment, trade, making of beverages, hunting and sales of livestock products exist, these currently contribute little to the local economies in general. However, each of these can potentially be of great importance in specific settings as there is considerable variation in land use practices and local adaptations throughout this region.

About three-quarters of the people included in this sample own livestock (cattle, goats, sheep, pigs, donkeys, chicken, ducks). Cattle dominates the livestock production (tables 7 and 8).

**Table 1**  
*Gender distribution*

N	Male		Female	
	N	%	N	%
346	244	58,6	102	41,4

**Table 2**  
*Age distribution*

Age	N	%
15-24	75	12,7
25-34	165	27,9
35-44	162	27,4
45-54	89	15,0
55-64	53	9,0
65-74	38	6,4
75 and older	10	1,7
<b>Total</b>	<b>592</b>	<b>100</b>

**Table 3**  
*Number in household*

Number in household	N	%
1-5 persons	180	30,9
6-10 persons	292	50,1
11-15 persons	72	12,3
16-20 persons	23	3,9
More than 21 persons	16	2,7
<b>Total</b>	<b>583</b>	<b>100</b>

**Table 4**  
*Length of residence in villages*

Years in village	N	%
1-5	54	11,2
6-10	72	14,9
11-20	116	24,0
21-30	153	31,7
31-50	47	9,7
More than 50	41	8,5
<b>Total</b>	<b>483</b>	<b>100</b>

**Table 5**  
*Born in this village*

	yes		no		Total
	N	%	N	%	N
Born in village	221	39,3%	340	60,5%	562

**Table 6**  
*Reasons for moving to village*

Reason for moving to village	N	%
Aquire land for agriculture	173	49,7
Find employment	29	8,3
Forced movement	15	4,3
Family	89	25,6
Fire wood		
Other reasons	42	12,1
<b>Total</b>	<b>348</b>	<b>100,0</b>

**Table 7**  
*Own livestock*

	Yes		No	
	N	%	N	%
	426	76,3%	131	23,5%

**Table 8***Livestock species and use among those who own livestock*

	Number owned		Numbers slaughtered for own consumption per year		Number sold per year		Number lost/injured by wildlife during 2000	
	Median	Mean	Median	Mean	Median	Mean	Median	Mean
Cattle	4	16,0	0	0,2	1	1,9	0	0,3
Goats	2	6,3	1	1,5	0	1,7	0	1,6
Sheep	0	2,8	0	0,8	0	1,0	0	0,8
Pigs	0	0,04	0	0	0	0	0	0
Donkeys	0	0,05	0	0,3	0	0,03	0	0,1
Chicken/ducks	11,5	15,0	5,5	7,3	0	3,7	0	2,8
Others	0	0,2	0	0,2	0	0,2	0	0,4

**Table 9***Amount of land owned*

	N	%
0- 5 acres	166	30,0
6 – 10 acres	210	37,9
11- 15 acres	89	16,1
16 – 20 acres	47	8,5
More than 20 acres	42	7,6
<b>Total</b>	<b>554</b>	<b>100,0</b>

**Table 10***Distribution of land use*

	0- 5 acres		6-10 acres		11-15 acres		16-20 acres		More than 20 acres		Total
	N	%	N	%	N	%	N	%	N	%	N
Cash crop	452	80,6	81	14,4	21	3,7	5	0,9	2	0,4	561
Grazing	206	99,0	1	0,5					1	0,5	208
Subsistence cultivation	387	68,0	146	25,7	23	4,0	5	0,9	8	1,4	569
Public land for grazing	84	30,1							195	69,9	279
Other	338	96,6	11	3,1			1	0,3			350

**Table 11***The sources of family income*

	N	%
Cash crop farming	517	32,4
Subsistence farming	573	35,9
Sale of livestock	207	13,0
Sale of livestock products	35	2,2
Sale of charcoal/firewood	2	0,1
Fishing	50	3,1
Formal employment	35	2,2
Trade/business	65	4,1
Hunting	5	0,3
Making beverages	83	5,2
Other	26	1,6

## 4.2 People – park relationships

The villages included in this study all lie in the proximity of Serengeti National Park, but at varying distances from the actual park border. However, they are located within what one may consider a bufferzone of the park, although it is not formally designated as such. Given the relatively long history (approx. 50 years) of being neighbours to a very large protected area, the everyday lives of most of the people living in the area today is influenced one way or another by this relationship. Two major institutions, the Serengeti regional Conservation Programme (SRCP) and the Community Conservation Service (CCS) of SENAPA interact more or less directly with selected communities in the Western Corridor. TANAPA puts considerable funding into CCS, and major efforts have been made to improve the performance of CCS during the last few years (Bergin 2001). Since the main objective of these programmes are to improve the relationships between the national park and associated protected areas and the communities, as well as helping to improve the livelihoods in the communities, it is important to assess the extent and type of contact between these institutions and the communities.

The results show that in the selected communities people have had significantly more contact with staff from SRCP than from SENAPA (Tables 12 and 13). However, it is worth noting that a large majority has never been in direct contact with representatives from these organisations (65,7% for SRCP, and 86,1% for SENAPA). Among those who report to have met officials from SRCP or SENAPA the majority seems to have met staff a handful of times, although the data is somewhat inaccurate since many report to have met them 'several times' and evidently do not recall the actual number of visits. This is not really surprising since these contacts have been made over the course of several years.



**Figure 4.** Most communities would like to have more interactions with the national park, for instance through supplying tourist lodges with fresh produce. Photo: B.P. Kaltenborn

Furthermore the low level of interaction between protected area staff and the villagers is not surprising considering the size and growth rate of the population in this area. However, the limited contact between managers and decisions makers and the people in the villages is an important part of the context of people-park relationships in this area. Most people report that they receive very few benefits from either of these institutions (Table 14).

During the interviews it was repeatedly stressed that there is a major difference between benefits provided as community projects in the form of schools, dispensaries, road improvement, water wells, water for livestock, awareness raising, training in beekeeping, basket weaving etc. and benefits provided to the household level. No doubt community projects are highly valued by community members, but this does not remove the need or desire for goods and services provided directly to the personal level. When we look at the latter, few people have received benefits from SRCP or CCS directly. For some the supply of game meat (mostly from the cropping programme by SRCP), reduction in taxes and fees, and information about wildlife and the environment have been significant. In some cases people have also received help in tracking stolen livestock

During the interviews the informants were also asked in an open (unstructured) question what problems they experienced with SRCP and the National Park. Relatively few people had any opinions on this question, and the answers were grouped in three categories. Game meat supply was seen by some (N=15) to be inadequate to meet the village demand, and meat was too expensive. A few individuals also mentioned that lack of support on the family/individual level (N=3) and lack of support on the village level (N=6) were significant problems.

People are also hesitant to identify direct problems with the national park. There is some mention of boundary conflicts between the park and the villages (N=30). This pertains especially to cattle. Stolen cattle is sometimes taken through the protected area, and when farmers cross the borders to track their cattle they can get arrested. Cattle sometimes ventures into the park to find water and feed, and this also leads to punishment from the park personnel when detected. There is the notion that some arrests are not motivated by actual offences, and that park boundaries sometimes are "moved" into village territory, which again forces people to move. Other boundary conflicts deal with firewood shortage, wild animals going outside the protected area and causing crop damage, contamination of water supplies, and lack of compensation from the park when problems arise.

There is also the feeling among some (N=11) that the park personnel do not really communicate with the villagers and comprehend their problems. Nor do they visit them much. The national park does not sufficiently support income generating activities on the household and village levels. Projects have been proposed but never initiated. Farmers would also

like to be able to sell their products inside the park to tourism lodges and park staff.

When people were asked in a more pro-active way how they could work with SRCP and the national park, the number of responses increased substantially. For SRCP the ideas could be grouped in three categories; provide support on the family/individual level (N=138), provide support on the village level (N=172), and access to water/irrigation (N=130). The first category covers issues like SRCP providing loans and credit schemes as well as technical support that will enable new income generating activities. There is also a desire for agricultural extension services, as well as material inputs like fertilizer and pesticides. Potential income generating activities include fish farming, chickens, pigs and beekeeping, as well as improved market linkages for produce. In this category we also find a demand for an increased supply of low priced game meat. By many these demands and problems are summed up as 'income poverty'. The second category covers demands for support on the village level, and this covers a range of social services such as construction of schools, dispensaries, and health centres. It also covers improvement in roads and infrastructure and transportation in cases of emergency. Some agriculturally related activities like equipment for milling and

cattle dips was also expressed here. Furthermore, many voiced the need for education on wildlife subjects. The third category covers the important issue of water. For many access to safe water is a persistent problem. Water sources are often either located far away from the village and/or contaminated. There is a need for improvement in water management in general (for human use as well as livestock), and for irrigation schemes. Several people expressed the need for constructing water dams and small reservoirs.

More or less the same needs are expressed versus the national park. Support on the individual/family level is voiced by many (N=169), and the key words are employment opportunities and improved economy. Again this includes help like loans for small enterprises and credit schemes, technical support to establish income generating activities, and help to establish market linkages for products. On the village level (N=176) the typical issues are social services like improved education and health, improvement of infrastructure, and equipment for agriculture (milling). There is also concern and some worry about the relationships between the villages and the park, and numerous suggestions on more meetings and information (education) about wildlife.

**Table 12**

*Experience with staff from SRCP and SENAPA*

<b>Met with officials</b>	<b>Yes</b>	<b>No</b>	<b>Total</b>
Officials from SRCP	200 34,3%	383 65,7%	583 100,0%
Officials from NP	80 13,9%	497 86,1%	577 100,0%

**Table 13**

*Number of encounters with staff from SRCP and SENAPA*

<b>Number of times with personell from National park or SRCP</b>	<b>N</b>	<b>%</b>
1,00	6	2,9
2,00	30	14,6
3,00	13	6,3
4,00	17	8,3
5,00	3	1,5
6,00	2	1,0
10,00	2	1,0
Several times	116	56,6
Do not remember, but several times	13	6,3
<b>Total</b>	<b>205</b>	<b>100</b>

**Table 14**

*Benefits received from SRCP (in per cent)*

	<b>None</b>	<b>Small amounts</b>	<b>Large amounts</b>	<b>N</b>
Money transfer to household	100,0			583
Employment training	99,8	0,2		582
Reduced taxes and fees	65,5	17,0	17,5	582
Buy agricultural prod.	99,8		0,2	583
Loans handicrafts	99,5	0,3	0,2	582
Info about nature and wildlife	65,6	14,2	20,2	585
Game meat	64,0	13,1	22,9	586
Tourist operators	99,8	0,2		581
Economic support	100,0			584
Tracking livestock	97,3	2,2	0,5	585
Fire wood	99,0	0,7	0,3	585
Other resources	100,0			568

**Table 15***Benefits received from National Park (in per cent)*

	None	Small amounts	Large amounts	N
Money transfer to household	100,0			584
Employment training	99,8	0,2		584
Reduced taxes and fees	99,3	0,5	0,2	584
Buy agricultural prod.	99,7		0,3	584
Loans handicrafts	99,8		0,2	582
Info about nature and wildlife	79,2	9,2	11,6	586
Game meat	99,0	0,9	0,2	585
Tourist operators	99,3	0,3	0,2	584
Economic support	99,8		0,2	583
Tracking livestock	93,8	3,8	2,4	584
Fire wood	99,5	0,5		584
Other resources	99,8	0,2		561

### 4.3 Hunting

Harvesting of game meat is one of the foremost issues confronting the management of the protected areas and life in the communities adjacent to the national park. As most of this hunting is illegal, the actors involved face a continuous threat of adverse reactions. At the same time, hunting for subsistence and to some extent commercial reasons is a historically important activity to the communities with salient cultural and social dimensions in addition to the direct benefits of providing food or other income for survival reasons. Given the fact that this element of the human ecology of life in the Western Corridor constitutes a widespread, culturally integrated, but illegal activity, one should expect considerable difficulty in obtaining valid results from research into this topic. Previous examinations of poaching in the areas surrounding Serengeti National Park have largely relied on information from anti-poaching patrols and arrests (Hofer & Campbell 1995). In this study we relied on voluntary information from a large number of respondents who were not apprehended or put in any compromising situation. It is difficult to assess the validity of these results based on only a few questions. Our general impression is that most people have definitive opinions on this issue, and will quite freely provide information on why hunting may be important. However, once one approaches the specific relationship of an individual with hunting one way or the other, there will be severe limitations in the information given. In other words, a study like this can yield a good understanding of the nature of the issue, i.e. what are the characteristics and dynamics of the phenomenon of (illegal) hunting. However, quantifying the problem is very difficult, if not impossible using this type of research technique.

A clear majority of the people in this study (68,8%) report that hunting is not an important activity in their village. An even larger portion of the population deny that any person in the household is a hunter. Yet, interestingly, two-thirds (67,1%) of those asked know of hunters in their village (table 16).

**Figure 5.**

*Illegal hunting can have detrimental effects on wildlife. This elephant was finally relieved of a snare set by poachers that had dug deep into the flesh. Photo: B.P. Kaltenborn*

So, while only a minority admit to hunting being important in their local environment, and even fewer report having hunters in their family or household, almost everyone (80,6%) have used wildlife products during the past year. In using wildlife products, household consumption and food supply is by far the most important reason (74,6%). A few also report using wildlife products for generating cash income, while quite a few (20,1%) claim that wildlife products are important for traditional and ritual purposes (table 18).

The somewhat less controversial question of what may be the most salient reasons for hunting yielded a lot of information. It is evident that hunting can be a very salient factor in providing subsistence benefits and economic income. To most people game meat can be very important for providing food for consumption at the household level and have as a product to sell in order to generate cash income (> 90%). Meat can enter directly into a cash economy or be used for trading other goods. These functional and pragmatic reasons for acquiring game meat far outweigh other reasons for hunting if we look

at various motivations for hunting as independent factors.

Socio-cultural motives like hunters gaining respect from the community from a successful hunt, coming in contact with the spirits of animals, seeing hunting as a way for young men to express themselves, seeing hunting as a part of the traditional culture of the communities, elicit more diversity in the responses. While in most cases, a little more than one-half of those interviewed claim that these reasons are not at all important, almost one-half of the villagers attach some or strong importance to these aspects of hunting.

Likewise, when people were asked about their perception of how hunting may affect wildlife populations, we also find a range of views. This question separated herbivores from carnivores, but the overall pattern is the same. Slightly more than one-third of the people interviewed think that hunting has no effect on wildlife (36,1% on herbivores and 31,2% on carnivores). However, as much as almost one-half of the population thinks that hunting can destroy both carnivore and herbivore populations totally (47,9% for herbivores and 46,1% for carnivores). Collectively, close to two-thirds of the villagers think that hunting has a small or a large negative effect on wildlife populations (table 19).

The results point towards some obvious contradictions in views or expressions among the people interviewed in this study, and this most likely reflects the sensitivity of the hunting issue. While most people deny the knowledge of hunters in their household or immediate vicinity, or at least are hesitant to acknowledge this, a majority still know of hunters in their village. And while most people discount hunting as an important activity in their village, almost everyone report having used wildlife products during the last year (Table 17). Most people will also agree to the importance of acquiring game meat for subsistence use or trading for cash, as a salient reason for engaging in hunting. So, there is a distinct discrepancy between the recognised role and importance of harvesting game meat and the admitted presence of the phenomenon locally. The fact that there is widespread concern over the potential effect of hunting on the size of wildlife populations also indicate that hunting may indeed be much more extensive than reported.

Furthermore, hunting is a complex phenomenon which has been a part of life in the villages for decades and in some cases centuries (Gibson 1999). In structured interviews there is always the potential for compartmentalising and oversimplifying complex issues by examining facets while ignoring the more holistic interactions. In interpreting these results there is an inherent danger in seeing harvesting of meat as a an activity motivated by a series of different needs or forces which simply complement each other. Although the people interviewed in this study place more emphasis on providing meat for personal consumption and trade, than they do in the socio-cultural aspects, it is our impression that all of these reasons are related to one-another. From more informal interviews, conversations and general observations in the villages, the impression is that the cultural aspects of hunting play impor-

tant roles, but people are weary of expressing this due to the sensitivity of the issue. In several instances people claimed that "hunting is a way of life". Some also stated that even if social services in the communities were greatly improved, and if individuals had significantly better access to food and cash income, there would still be some hunting, albeit less than the current level. It should be emphasised that there are diverging views on this. Some will claim that if poverty is eradicated, illegal hunting will disappear. Others will agree that the amount of illegal hunting co-varies with the type and degree of poverty, but will never completely disappear since hunting has always played a role in maintaining the local culture.

Hunting is an issue of great concern to people in the villages. Almost everyone has opinions when they are asked what can be done to reduce the amount of illegal hunting. The wide range of answers were grouped in four broad categories. All in all, we elicited 834 views on how illegal hunting could be reduced when we asked this as an open-ended question.

A large group (N=205) seems to think that strict *law enforcement* will make a difference. Ways to achieve this includes the training and employment of game scouts, strengthening their position by giving them more authority, increasing penalties, and even enforcing maximum sentences. Another salient area is improving and expanding the *game meat supply* legally (N=142). There is a large unmet local demand for meat, which is one of the driving forces behind illegal hunting. Provision of more meat, as well as meat of better quality (a lot of the meat that is currently supplied is more or less spoiled when it reaches the consumers). One option is to establish local butcheries for game meat, and expanding the hunting quotas for local people. There is no doubt that there is a lot of awareness around market mechanisms for meat, and how a larger legal supply of game meat can contribute to offsetting illegal hunting.

A recurring issue in the relationship between local communities and the management authorities is the need for *employment opportunities and income generating programs* (N=298). This is an overarching issue that drives a range of community problems, not just hunting. Many people feel that if economic opportunities improve, fewer people who would otherwise remain idle, will revert to poaching. The typical actions like introduction of credit schemes to facilitate small businesses, agricultural equipment and extension services, and improvement in village infrastructure fall into this category.

Interestingly, there is ample concern about typical awareness issues. *Information to and involvement from the local community* engages many (N=189). The key words here are education and information about wildlife, as well as the need to involve communities more in questions regarding wildlife management. It is worth noting that there is a proactive attitude in the communities expressing that the communities themselves need to be educated about wildlife, and that they want to have influence in management situations. The objective is that wildlife should be more of a resource to the communities. In line with this, some people feel that wildlife

ought to be a high profile media issue, in other words that it becomes a subject that is part of the public discussion on a regular basis, and where local communities have a stronger voice to the outside.

**Table 16***The role of hunting in the village*

	Is hunting an important activity in your village		Is any person in the household a hunter		Know of hunters in the village	
	N	%	N	%	N	%
Yes	132	22,4	46	7,8	397	67,1
No	405	68,8	504	85,9	195	32,9
Don't know	40	6,8	37	6,3		
Not now, but earlier	12	2,0				
<b>Total</b>	<b>589</b>	<b>100,0</b>	<b>587</b>	<b>100,0%</b>		

**Table 17***Personal use of wildlife products***Used wildlife products during the past year****Purpose of use of wildlife products**

	N	%		N	%
Yes	469	80,6%	Qwn consumption/food	475	74,6
No	113	19,4%	Sell for cash	27	4,2
			Use of skins	2	0,3
			For traditional/ritual purposes	128	20,1
			Social status symbol	5	0,8

**Table 18***Potential reasons for hunting (in percent)*

	Not important at all	A little important	Very important	Don't know	Total
Meat for subsistence/household	0,8	5,8	92,7	0,7	591
Meat to sell	2,0	3,9	93,2	0,9	588
remove animals that cause damage	38,1	16,5	31,7	13,7	583
To get cash for basic needs	3,2	7,8	87,9	1,0	588
Get trophies for sale	31,9	10,1	29,8	28,0	583
Trade meat for other goods	7,7	14,1	75,2	3,1	588
Pay for taxes	4,9	10,5	82,7	1,9	588
people feel good	61,8	16,1	10,3	11,8	584
Good hunters are respected	60,4	18,0	6,5	15,1	589
Hunting is part of heritage/culture	44,1	28,5	19,4	8,0	589
contact with the spirits of animals	58,7	19,5	11,9	9,9	586
important for young men	66,6	16,6	7,8	9,0	589

**Table 19***Perception of hunting as a potential threat to wildlife*

	Has no effect		Reduces wildlife populations a little bit		Can destroy the future wildlife populations totally		N Count
	N	%	N	%	N	%	
Herbivores	212	36,1	94	16,0	281	47,9	587
Carnivores	183	31,2	133	22,7	270	46,1	586

## 4.4 Wildlife encounters and benefits



**Figure 6.**

*Most people have a healthy respect, but also liking for the buffalo. While its one of the most dangerous animals people encounter, it is also an important source of meat.*

*Photo: B.P. Kaltenborn*

The people living in the Serengeti, Bunda and Magu districts adjacent to the Serengeti National Park live close to some of the largest herbivore and carnivore populations in the World. Since no settlements are allowed inside the protected area, and since the population density is high and rising immediately outside the protected areas, there is a sharp demarcation in habitat and land use drawn by the borders of the national park. Given the close proximity between areas with high numbers of humans and areas with large wildlife populations, large numbers of people frequently come in contact with wild animals. However, the degree of actual interaction between humans and wildlife vary considerably depending on the location of the village (distance to the protected area), types of animals, seasonal migrations, and the nature of the human activities (agriculturalist, pastoralists, agro-pastoralists, traders, employed in public and social services etc.)

Very few people report having large carnivores close to the village that they live in (Table 20). This coincides well with other sources regarding the distribution of wildlife, and carnivores in particular inside and outside the national park (Sinclair & Arcese 1995). The bulk of the lions, leopards and cheetahs remain well inside the protected area most of the time, as prey is much more plentiful here, and human disturbance and threat is minimal. The important exception is hyenas which display a very different behaviour versus humans. These animals are both stationary and migratory (commuting through the park to exploit the great herbivore migrations) and also frequent human settlements. As scavengers with a low level of fear of humans, they are found extensively also outside the protected areas.

This general picture was largely confirmed through random

follow-up interviews and conversations in the villages. In several instances, even older people had never seen a leopard, a lion or a cheetah, and they could even express a desire to once encounter these animals. In other cases stray animals had caused fear and problems in the village, and on a couple of accounts we received report of leopards and lions who had killed people in the villages (outside the protected areas) during the last few years.

As under the rubric of hunting, people were again asked about benefits of wildlife in a more general way. The use of game meat for their own consumption and as a source for getting cash income still accounts for the major category of benefit. However, when people were asked about the use of wildlife without linking it directly to hunting, the socio-cultural reasons are given more emphasis. Probably this is seen as a less threatening context, and we arrive at a more valid expression of how wildlife products enter into the local culture and belief systems (Table 21).

Wildlife causes a series of problems to people in this region. The most frequent impacts of "problem" animals are destruction of crops, killing of livestock, contamination of water supply, and transmission of diseases from wild game to livestock (Table 22). There are also a few accounts of carnivores that have injured and even killed people in or close to the villages.

People undertake a number of measures to reduce damage to crops and livestock induced by wild animals. In terms of crops there is not one dominant strategy or technique but guarding the fields, trapping or hunting animals or chasing away are the most common means of protecting the crops. Reporting to game officers or fencing in the fields are less common (table 23).

The dominant way of protecting livestock is through guarding the animals and/or chasing away wild game if it poses a threat to domestic animals. Some also report to district game officers. Informal interviews and comments following the main interviews often revealed however, that many feel this is a less than satisfactory way of getting help. District game officers are often located far away, difficult to reach, they have limited capacity to actually remove problem animals, and they cannot offer monetary compensation in the instances where crops are damaged or destroyed. A few people also choose to use poison bait to get rid of problematic game and/or keep the animals in a corral during the night (Table 23.)

If wild game is perceived to be a threat to humans, different strategies are applied to reduce the danger. By far, the most common is to try to avoid the animal (Table 24) Otherwise people might try to run and climb trees, go around the animals, make noises, warn other people, and/or actually kill the animal. Only a few report that they carry a weapon, which is not surprising since very few people own arms (Table 24.). Conflict situations with wild game takes on many forms depending on the situation and the species in question. In most cases a person will try to exercise non-confrontational behaviour and thereby avoid a direct and dangerous conflict.

Since avoidance behaviour is not always possible or desirable (if for instance a herd of animals are approaching a field of cassava or sorghum), and most people will employ different actions depending on the situation. In some cases these incidents inevitably lead to dangerous situations.

**Table 20***Presence of large carnivores near the village (in per cent)*

	Yes	No	Occasion-ally	Don't know	N
Lion	0,8	90,0	8,3	0,8	591
Leopard	1,2	93,4	4,4	1,0	589
Cheetah	0,9	89,7	3,8	5,6	585
Hyena	93,9	0,9	5,1	0,2	588

**Table 21***Benefits of wildlife (in per cent)*

	N	%
Game meat for personal use	579	40,4
Source of cash through tourism	237	16,5
For use in rituals	186	13,0
Part of our culture	413	28,8
Other uses	19	1,3

**Table 22***Problems encountered with wildlife (in per cent)*

	N	%
Destroyed crops	38,1	407
Scare me while I work in the field	4,7	50
Killed livestock	20,6	220
Contaminate water supply	14,1	151
Disturb and scare people in the village during the night	6,3	67
Attacked and injured people in the village	3,3	35
Attacked and killed people in the village	1,9	20
Transmitted disease to livestock	11,0	117
Other problems	0,1	1

**Table 23***Measures to prevent wildlife damages*

TO CROPS			TO LIVESTOCK		
	N	%		N	%
Fencing	78	8,7	Guard	225	32,8
Hunting/traps	200	22,2	Coral during night	35	5,1
Guard	229	25,4	Poison bait	26	3,8
Report to game officers	125	13,9	Report to game officers	78	11,4
Chase away/make noise	268	29,7	Chase away/make noise	230	33,5
Other	121	13,4	Hunting/traps	93	13,5
	1	0,1	Other	0	

**Table 24***Actions to protect oneself against dangerous animals*

	N	%
Try to avoid them	513	28,7
Run and climb trees	323	18,1
Kill animal	190	10,6
Go around/turn back	224	12,5
Warn other people	183	10,2
Make noise	272	15,2
Carry a weapon	74	4,1
Other	9	0,5

## 4.5 Fear and safety

Fear of large and potentially dangerous animals is a little heeded issue in conservation and wildlife management. In many Western countries large carnivores have been made extinct. In some countries populations of carnivores are now recovering either naturally or by the help of re-introductions. In many cases this causes large social conflicts. High levels of fear of carnivores among large portions of the public is turning into a serious and contentious political issue in many countries. In parts of the world like certain areas in Africa where people have co-existed with wildlife continuously through human history we might expect this relationship to be slightly different. The level of fear can be a function of several variables like direct experiences and negative consequences (crop damage, danger to human life), attitudes, beliefs, culture, and factual knowledge (Kaltenborn et.al.a).

Amongst this group of people the perception of animals as dangerous varies significantly. A key trend in the results is that when we focus on fear related to carnivores as a general issue the levels of fear are not very high (Table 25). However, when we examine fear associated with the specific species of carnivores and other large animals the levels of self-reported fear are very high for the means of the sample (Table 26).

When the people in the villages were asked how worried they

are about the safety of themselves and the safety of their families because of large carnivores, we find roughly the same distribution in answers for both questions (Table 25). A little more than one-half of the sample states that they are not afraid, while less than 10 per cent claim they are a little bit afraid. Slightly more than one-third of the sample states that they are very much afraid of their own and their family's safety because of the presence of the carnivores. However, with the exception of hyenas believe that large carnivores are commonly found close to the village that they live in, and few people actually encounter large carnivores like lion, leopard and cheetah frequently, but most people have the hyena in their neighbourhoods (Table 20).

All of the seven species included here; elephant, lion, leopard, hyena, cheetah, buffalo, hippopotamus, crocodile and snakes, are associated with considerable danger, although there is substantial variation (Table 3). Almost everyone (96,1 %) are very much afraid of the lion and the leopard, and almost as many fear the elephant, crocodile, buffalo and the hippo. Only two of the species stand out as perceived as less dangerous, the hyena and the cheetah.

**Table 25**  
*Fear of animals in general*

	<b>Not afraid</b>	<b>A little afraid</b>	<b>Very much afraid</b>	<b>N</b>
Your own safety	55,6	8,1	36,3	592
Safety of your family	55,6	5,7	38,7	592

**Table 26**  
*Fear of typical problem species*

	<b>Not afraid</b>	<b>A little afraid</b>	<b>Very much afraid</b>	<b>Do not know</b>	<b>N</b>
Elephant	1,7	6,6	91,5	0,2	588
Lion	1,0	2,7	96,1	0,2	591
Leopard	0,8	4,1	94,8	0,3	592
Hyena	19,6	22,7	57,8		587
Cheetah	15,1	8,1	72,4	3,8	583
Buffalo	2,0	6,5	90,2	1,4	589
Hippo	1,4	6,5	89,3	2,7	589
Crocodile	1,0	4,8	90,2	3,7	589
Snakes	4,2	11,5	84,1	0,2	590

## 4.6 Environmental Perceptions



**Figure 7.**  
*The common wildebeest is a highly valued species by most people. Photo: B.P. Kaltenborn*

### Species preferences

Animals are liked and disliked for a variety of reasons. In most populations that have been studied (see for example Kellert & Wilson 1993, Kellert & Westerveld 1983 for reviews) preferences are diverse and related to differences in socio-demographic background, the usefulness of the animal to human consumption and well-being, the type of environment the person in question has grown up in, the type and amount of exposure to animals, and general attitudes toward wildlife. In this sample of villagers residing around the Western Corridor there is also a lot of variation. By simplifying the picture and looking at the average scores we can identify a distinct ranking (Figure 8).

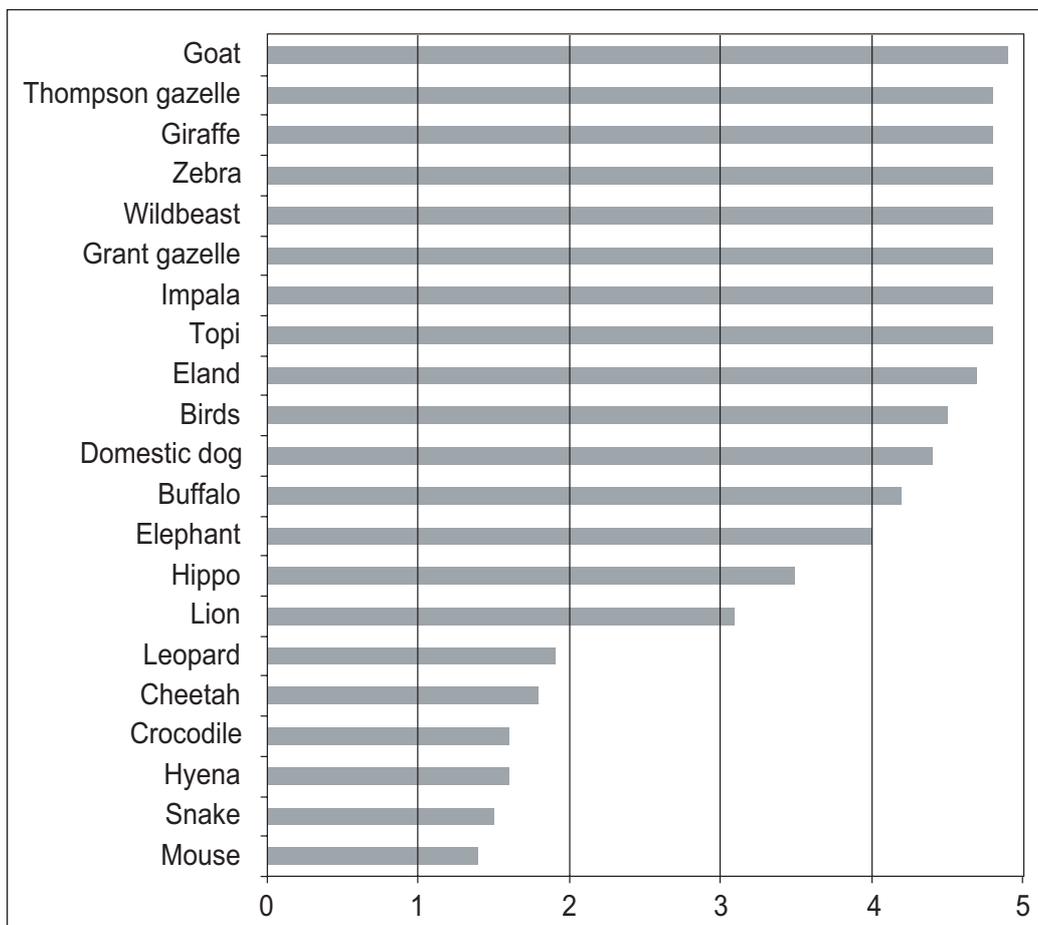
The domestic goat is the best liked animal, closely followed by a several herbivores such as Thompson gazelle, giraffe, zebra, wildebeest, grant gazelle, topi, eland, and birds as a general category. These are highly appreciated animals, and very few people have a dislike for these species. In an intermediate group we find the typical "problem animals" in the sense that they can be dangerous to humans and also cause crop damage and other problems. These include buffalo, hippo, and lion and are significantly less liked among the average villager. However, it is worth noting that these species are still rated on the positive side of the scale. Least appreciated are leopard, cheetah, crocodile, hyena, snakes and the mouse. These latter ones are clearly disliked by most people. It should be emphasized that these are average scores and for each species of animals there is a range of views, i.e. there are groups of people that like and dislike the species in question. However, even when we break down the data into categories and frequencies, the same pattern is highly evident. These results that are elicited from these questions are not surprising. The highly preferred herbivores do not present any direct danger to humans. The giraffe is a national symbol, and several of the other are known to be very good food sources and are actively hunted

both legally and illegally. Wildebeest is plentiful and a major food source during the migrations, but species like topi and the gazelles are more preferred when it comes to taste. The domestic goat is one of the most common animals kept by people in this area, and it is salient in the household economy. Dogs are also important to people in this area. It is interesting to observe that animals like buffalo, elephant, hippo and lion are quite highly appreciated, although people to a great degree also fear these animals (see section 4.5). This dichotomy can probably be explained from several factors. Obviously these animals can be dangerous to humans, and they frequently cause problems with trampling crops, and occasionally confronting and injuring people. Buffalos and hippos are known across Eastern and Southern Africa for causing a large number of fatalities every year. At the same time lions and elephants are revered in many tribes for their strength and as symbols of the traditional African environment. The buffalo is largely seen as a dangerous and aggressive animal, but it provides a very important source of food in some instances. Given its large size, it provides a lot of meat and 'value for money' when its hunted whether it is legally or illegally, although other species are more preferred in terms of taste.

Very few people have any liking for animals like leopard, cheetah, crocodile, hyena or the mouse. Leopards are known to

be dangerous stalkers and occasionally go after people. Cheetahs seldom or ever do this, but it seems that many people who have had limited experience with these animals have problems differentiating between the two. Crocodiles are notoriously known for creating problems and very real danger to humans. As are snakes, and none of these species have any meat value to speak of. The mouse is probably seen as an insignificant animal, neither useful nor having any cultural or aesthetic significance

There is some correlation between species preferences and opinions about the future size and development of wildlife populations in the area. Most people would like to see highly preferred species like wildebeest and other herbivores, as well as birds and livestock increase in numbers (Table 27). Roughly half of the respondents would like to see the populations of lions, leopards and cheetahs to remain about the same size as today, while approximately one-third would like to see these animal populations decrease. Only a few percent would like to see an increase in numbers of these carnivores. The one notable exception here is the view of hyenas. Almost everyone (92.5 %) would prefer the numbers of these animals to decrease. The latter reflects the wide presence of these animals very close to human settlements and the many problems they cause as scavengers where they now and then also threaten humans (Kaltenborn et. al. b).



**Figure 8.**  
Species preferences (mean scores)

Response format: 1:  
Do not like at all  
– 5: Like very much

**Table 27**

*Desirable development of wildlife populations in the area*

	Population sizes should				N
	Increase	Decrease	Remain the same	Don't know	
Lion	5,3	30,8	51,4	12,4	587
Leopard	5,4	31,5	50,3	12,6	588
Cheetah	5,5	30,3	45,5	18,6	587
Hyena	3,9	92,5	2,6	1,0	585
Wildbeast	83,5	8,0	7,7	0,9	588
Other herbivores	84,2	5,8	8,0	2,0	588
Birds	69,6	14,6	9,9	5,8	588
Livestock	85,1	8,1	6,3	0,5	589

## Wildlife value orientations

Expressions of how well the different species are liked are indicators of attitudes toward wildlife. However, to better understand the role and utility of wildlife in society, a typical attitude measure called wildlife value orientations was also included in this section. The measure of value orientations tap into different domains like utility of animals (consumptive values, economic aspects), cultural dimensions (part of traditions, lifestyle, identification with the environment, life practice and the past), more intangible (non-consumptive benefits) like experiential/spiritual aspects, communion with nature, well-being and recreational dimensions, existence values (animals have a right of their own to exist independent of human beings), and testament values (preserving wildlife as a resource for the future). The questions asked here are based on a methodology used in several studies of wildlife attitudes in Western countries (Fulton et al. 1996). The theory and concepts behind the questions relate to rather general and fundamental aspects of human perceptions of nature and animals. However, the questions asked here are modified to suit the particular context of rural East Africa. They are posed as statements where the respondents are asked to indicate how much they agree.

As shown in Figure 9 (and Table 28), there is a generally highly positive attitude towards wildlife amongst the people around the Western Corridor. Most of the statements elicit positive judgements, even when the collection of statements cover quite different parts of the human-environment relationship, several of which may conflict one another. This is important since it denotes a generally positive view of wildlife as a part of everyday life in this area. However, as for the questions of preferences, these are average scores, which means that for some issues there is more diversity in responses and less agreement. (Table 28). For instance, for the items 'Like having animals in the area where you live', 'Animals have rights of their own, just like humans', and 'It is good to see animals when you are outside the villages' the majority agrees, but a considerable number of people strongly disagree. So on these issues we see more polarisation. It is important to observe that utilitarian as well as experiential and cultural values are seen as salient aspects of wildlife. The majority

agrees with the importance of experiencing wildlife, in other words that it is good to see wildlife in their nearby surroundings and environment, that wildlife is a part of culture and the way of life. Also, the majority agrees to the biocentric statement that animals have rights of their own, independent of humans, and also that hunting violates the rights animals have to live. A significant majority is also opposed to hunting since it may reduce the wildlife populations in the area, which is a conservationist attitude. There is also support for the spiritual aspect that some animals have supernatural powers, and that many admire the strength of icon-like lion. In sum we can call this a relatively strong ecocentric orientation towards wildlife, i.e. that wildlife and ecosystem functioning is seen as important.

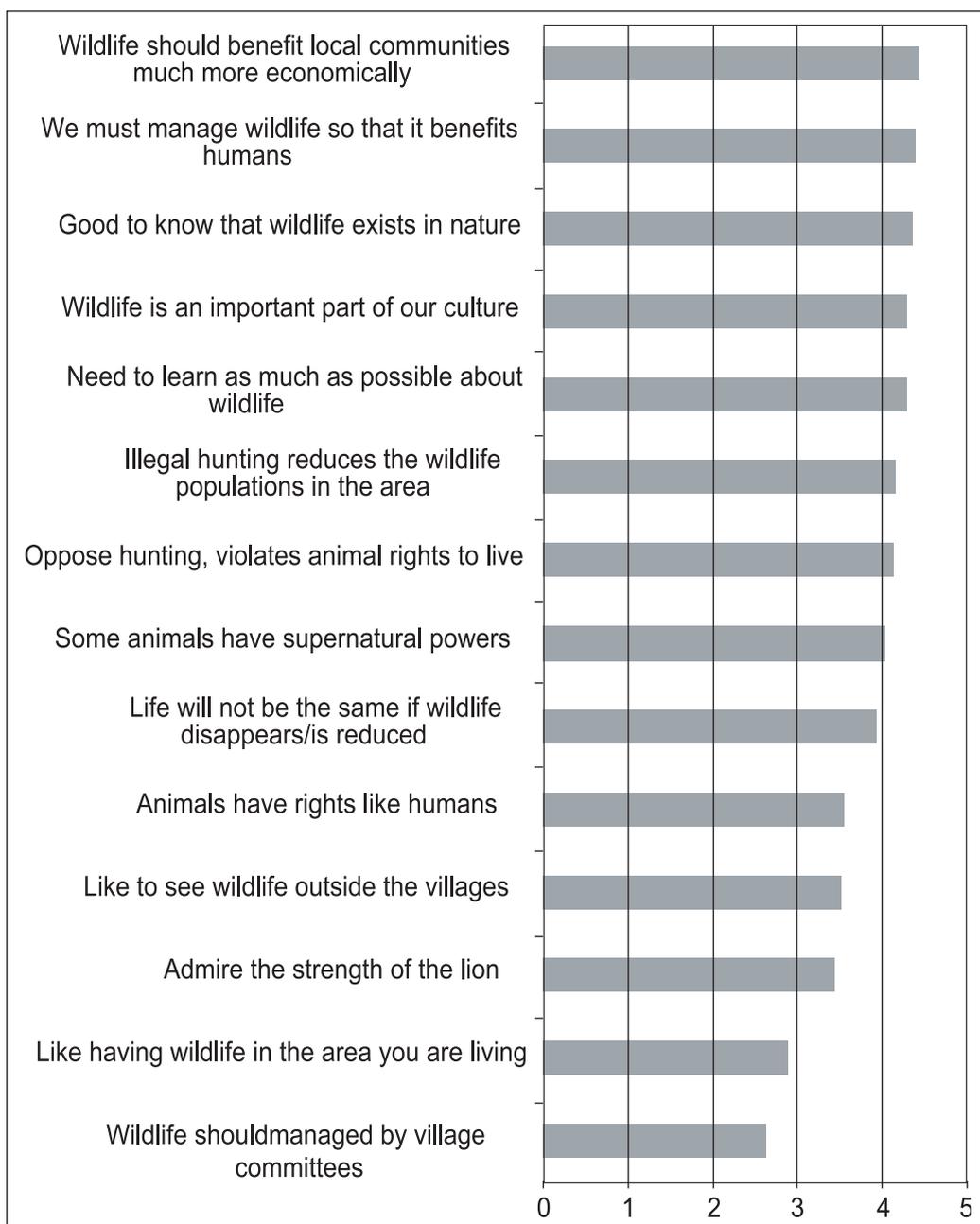
However, there is also quite a strong anthropocentric orientation expressed in these data. The great majority of the respondents feel that wildlife should benefit communities economically to a much higher degree than what is the case today. Furthermore, almost everyone thinks that wildlife should be managed so that it benefits humans. Interestingly, the statement that receives the least support is that wildlife should be managed by village committees. There is also limited enthusiasm for having wildlife in the close proximity of where people are living. Also worth noting is the fact that there is little support for having village committees managing wildlife. Apparently there is limited confidence in the capability of local institutions to either ensure an equitable distribution of benefits and/or actually manage wildlife sustainably.

The results show a distinct dualism and potential contradiction in attitudes. There is significant support for the cultural importance of wildlife and need to protect at least certain species (non-consumptive values). At the same time, there is also a strong feeling that wildlife should be managed for the better of people and livelihoods. In other words, when we simply look at the average scores of attitudes, we see at least equally strong attitudes towards utilising wildlife and humans dominating over nature in the sense that wildlife management should primarily benefit human livelihoods, as for instance opposed to preservation or animal rights.

However, a simple descriptive analysis of average scores like

this can hide important detail and differences. Firstly, there is diversity in the responses which means that in this sample there are segments or groups of individuals which are quite different from another. Secondly, most people hold a range of attitudes which are more or less compatible. For instance, other studies have shown that it is common to be in favour of conservation of animals, as long as the animals do not live close to the people in question. The same tendency is reflected in this data set. There is somewhat limited support for the statement 'Like having wildlife in the area you are living'. Attitudes often appear contradictory in light of reality since people often have limited knowledge about an issue and thus inadequately understand the ramifications and dilemmas of for instance sustainable wildlife management.

And lastly, world views, values, concrete experiences and understandings of issues form the basis of attitudes. While many will claim that sustainable management and conservation is incompatible with managing and utilising wildlife primarily for human needs, a great many others will claim equally forcefully that this is not only a viable combination, but indeed the way to achieve good management and good livelihoods. In East-Africa co-existing with wildlife and using wildlife as a resource for subsistence, cash income and cultural practice, has been prominent through human history. It would seem likely then that most people would consider it inappropriate to exterminate the very resources they depend upon for good livelihoods. So a set of expressed attitudes may or may not contain important conflicts in relation to reaching specific goals, depending on the underlying value systems.



**Figure 9.** Wildlife value orientations (mean scores, N= 584-592)

**Table 28**  
*Wildlife value orientations (in per cent)*

<b>Opinions:</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Do not know</b>	<b>Agree</b>	<b>Strongly agree</b>	<b>Mean</b>	<b>N</b>
We must manage wildlife so that it benefits humans	0,5	1,2	1,7	50,8	45,8	4,40	592
Like to see animals when outside the villages	20,5	5,6	0,7	48,3	24,9	3,52	590
Animals have rights of their own, just humans	14,2	9,8	5,9	45,8	24,2	3,56	590
Like having wildlife in the area you are living	29,7	17,6	1,5	35,1	16,1	2,90	590
It is important that we learn as much as possible about wildlife	1,5	2,7	3,4	50,0	42,4	4,29	590
Against hunting since it violates the rights animals have to live	4,1	6,3	2,4	46,7	40,6	4,14	591
Even if you don't see as much wildlife as you would to, its good to know that wildlife exists in nature	0,7	2,6	1,5	51,2	44,0	4,35	586
Wildlife is an important part of our culture	0,9	3,2	3,7	49,0	43,2	4,30	588
Some animals have supernatural powers	2,1	6,8	11,3	45,0	34,8	4,04	584
Admire the strength of the lion	9,6	18,9	16,4	29,4	25,6	3,43	581
Wildlife should benefit local communities much more economically than today	0,5	1,4	2,9	44,1	51,1	4,44	583
Wildlife should be managed by village committees	46,9	6,1	2,7	35,3	8,5	2,64	586
Life will not be the same if wildlife disappears or is strongly reduced from your area	8,0	6,6	5,1	44,6	35,6	3,93	587
Illegal hunting reduces the wildlife populations in the area	5,8	3,6	3,6	43,4	43,7	4,16	588

## Environmental beliefs

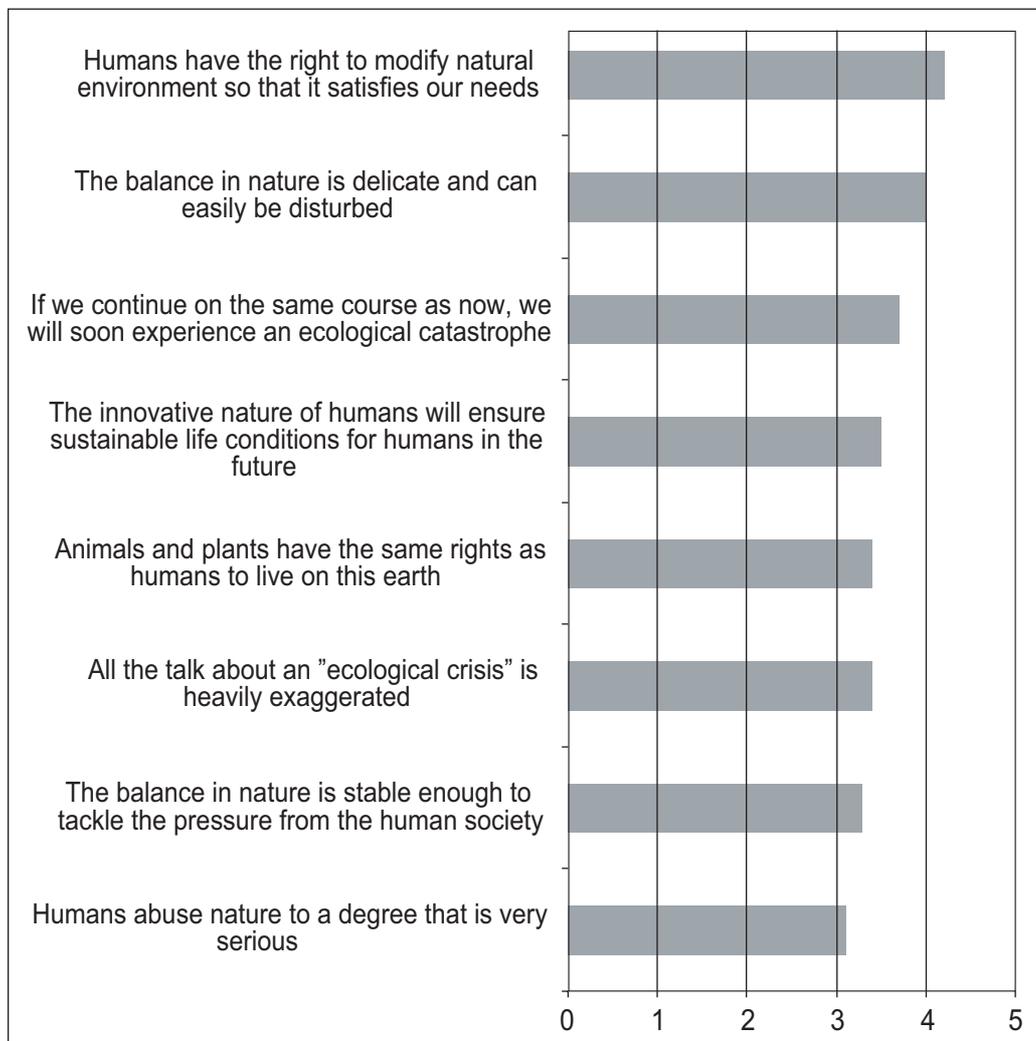
Attitudes exist in hierarchies in the human mind. As elements in a cognitive structure they are influenced both by concrete experiences (actions), knowledge and emotions. Attitudes towards specific events or objects like wildlife are to some extent shaped and influenced by more general attitudes toward the environment or in popular terms 'views of nature'. So its plausible to assume that the more basic views of the relationship between humans and nature to some extent will affect the attitudes toward wildlife. A much used approach and instrument to analyse this is the New Ecological Paradigm Scale (NEP) (Dunlap et al. 2000). The purpose of the instrument is to find out how people place themselves on an attitude scale ranging from "anthropocentric" ("humans rule over nature") to "ecocentric" ("humans must adapt to nature on nature's terms"). This is of course a great simplification of a large attitude complex. However, numerous studies in several countries and cultures have shown that NEP scores tend to associate with various background factors in interesting ways. For instance it has been shown that variables like education, social class, and cultural capital are related to environmental attitudes. Of relevance for wildlife management is for instance

that ecocentric attitudes have been shown to correlate with positive attitudes toward large carnivores (Bjerke & Kaltenborn 1999). In most Western countries where this scale has been used, we usually find two distinct factors when the data is analysed. Those who have dominantly anthropocentric attitudes score higher on the anthropocentric items in the scale (items 2, 4, 6, 8 in Figure 10 and Table 29), and those who have more ecocentric attitudes score higher on the other items (1, 3, 5, 7). The two dimensions have been given different names in different studies, but typically 'anthropocentrism' or 'human exceptionalism paradigm' (HEP) on the one hand and 'ecocentrism' or 'new environmental paradigm' (NEP) on the other.

In this study we also factor analysed the data, and found a somewhat different pattern. Interestingly, the scores clustered in three rather than two dimensions (Table 30). Rather than the traditional ecocentric – anthropocentric dichotomy we find a typical ecocentric or NEP dimension, secondly a balance/limit factor and thirdly a more anthropocentric or HEP dimension. This is particularly noteworthy since a similar struc-

ture has been identified in a study with respondents from USA, Mexico and Brazil. In the USA, a two-factor structure was identified, while in Mexico and Brazil, a similar three-factor structure was identified. Especially in the latter country the people in the study appeared to draw no distinction between protecting nature and growth (Bechtel et al. 1999). The pattern of environmental beliefs identified here coincides well with the pattern of wildlife value orientations in the meaning

that there is less of a distinction between utilising wildlife for consumptive and economic purposes and protecting nature in general and wildlife in particular. This is simply not seen as opposites to the same extent as we often find in Western, industrialised nations.



**Figure 10**  
*Environmental beliefs – The New Environmental Paradigm Scale (mean scores, N=584-591)*

*Response format: 1: Strongly disagree – 5: Strongly agree*

**Table 29***Environmental beliefs – The New Environmental Paradigm Scale (in per cent)*

Opinions	Strongly disagree	Disagree	Do not know	Agress	Strongly agree	Mean	N
1. The balance in nature is delicate and can easily be disturbed	6,1	2,4	11,0	44,5	36,0	4,0	591
2. Humans have the right to modify natural environment so that it satisfies our needs	1,5	6,3	5,8	46,3	40,2	4,2	590
3. Humans abuse nature to a degree that is very serious	23,7	11,5	11,4	38,3	15,1	3,1	590
4. All the talk about an "ecological crisis" is heavily exaggerated	7,9	24,3	14,0	27,7	26,0	3,4	584
5. Animals and plants have the same rights as humans to live on this earth	15,4	10,9	8,9	43,2	21,5	3,4	585
6. The balance in nature is stable enough to tackle the pressure from the human society	4,6	13,2	37,8	33,2	11,2	3,3	590
7. If we continue on the same course as now, we will soon experience an ecological catastrophe	7,5	4,4	26,1	38,6	23,4	3,7	590
8. The innovative nature of humans will ensure sustainable life conditions for humans in the future	3,4	6,8	42,0	34,1	13,7	3,5	590

**Table 30***New Environmental Paradigm (NEP) three-factorial structure*

	NEP	Factors Balance/Limits	HEP
Humans abuse nature to a degree that is very serious	<b>0,743</b>	0.202	0.168
Humans have the right to modify natural environment so that it satisfies our needs	<b>-0.630</b>	0.458	0.052
Animals and plants have the same rights as humans to live on this earth	<b>0.619</b>	0.371	0.173
All the talk about an "ecological crisis" is heavily exaggerated	<b>-0.561</b>	0.215	0.367
The balance in nature is delicate and can easily be disturbed	-0.004	<b>0.760</b>	-0.071
If we continue on the same course as now, we will soon experience an ecological catastrophe	0.085	<b>0.708</b>	<b>0.095</b>
The innovative nature of humans will ensure sustainable life conditions for humans in the future	0.043	-0.040	<b>0.807</b>
The balance in nature is stable enough to tackle the pressure from the human society	0.043	0.058	<b>0.791</b>

Extraction: Principal Component Analysis, Varimax rotation, Three-factor solution explains 58.8 per cent variance.

## 4.7 Perceptions of wildlife – livestock interactions

Livestock and wildlife interact inside and around Serengeti National Park. There are many unanswered questions as to how this affects grazing and availability of feed, pathology in domestic and wild species, and agriculture. Sustainable environmental management requires a lot of scientific knowledge about the ecological aspects of wildlife-livestock interactions. However, multiple experiences from environmental management shows that many stakeholders often have perceptions of human-environment interactions that diverge substantially from expert views and scientific knowledge. In some cases this can be simply be attributed to lack of knowledge and can be corrected through improved information. In other cases the differences in perception is related to more difficult reasons like the fundamental differences between experience based, traditional knowledge and modern scientific knowledge. In any case, identifying what different interest groups know and think about an issue is usually paramount for conducting good environmental management, including developing management goals and strategies, and resolving conflicts over use and protection.

Table 31 shows that most people have opinions about most of the questions raised regarding the interaction between livestock and wildlife. On most issues almost everyone has an opinion, although there is no clear consensus. The exception

is on the question of whether wildlife transmits diseases to humans where more than one-half of the respondents do not know. The rest of the answers reflect a perception that the encounters between domestic and wild animals do indeed have effects, and perhaps that livestock has less impact on wildlife than wildlife does on livestock. A little more than one-half of the respondents think that burning of grasses has a positive effect on both livestock and wildlife, and a little more than one-third disagrees (Table 31). A majority thinks that livestock and wildlife do not compete over forage, and roughly the same proportion thinks that wildlife does not avoid areas where livestock grazes. Likewise almost seventy-five per cent of the villagers disagree to the statements that agriculture reduces grasses for wildlife or reduces the places wildlife uses for shelters. And only a minority of about one-fourth of the respondents think that human settlements present a problem for the wildebeest during the migrations since availability of forage is reduced in these locations. On the other hand ninety percent thinks that migratory wildlife destroys crops. There is also a widespread belief that wildlife transmits diseases to livestock.

Although there is some divergence in views here, a significant majority of the respondents “favour” the livestock side of this interaction. Given the role and importance of domestic animals this is hardly surprising. While this reflects popular knowledge and vested interests rather than scientific fact, it still remains important information which needs to be incorporated in management strategies affecting livestock management.

**Table 31**

*Perceptions of wildlife – livestock interactions (in per cent)*

	<b>Disagree</b>	<b>Agree</b>	<b>Don't know</b>	<b>N</b>
Burning produces good forage for livestock	39,4	55,6	5,1	592
Burning produces good forage for wildlife in general	38,7	56,1	5,2	592
Livestock and wildlife compete over forage	62,1	30,5	7,4	591
Wildlife (herbivores) avoid areas where livestock grazes	63,1	30,2	6,8	590
Agriculture reduces grasses for wildlife	72,4	23,7	3,7	590
Agriculture reduces places wildlife uses for shelters	72,3	23,8	3,9	589
Human settlements is a problem for wildebeest during migrations, since wildebeest have little forage available when passing through the villages	69,6	26,6	3,8	582
Migratory wildlife destroys crops	5,6	90,8	3,6	589
Wildlife transmits diseases to livestock	3,9	88,4	7,7	588
Wildlife transmits diseases to humans	14,6	28,4	56,8	588

## 4.8. Attitudes toward management

As animals present varying degrees of problems and danger to humans, reactions to problems expressed as preferred management actions naturally vary. Since the level of fear of animals that are considered to be dangerous is high (see section 4.5) we would expect a distinct pattern of attitudes toward management alternatives. The people included in this study were asked a series of questions about their preferred reactions in three types of situations, first where wild animals were frequently observed close to their village, secondly where wildlife kills domestic animals, and finally where wildlife threatens humans. For each type of situation the question was asked for each of the species: lion, cheetah, leopard, hyena, elephant, buffalo, hippo, and crocodile. The alternatives in each case were: do nothing, scare off the animal, report to game officer or kill the animal. There was also a 'not applicable' category for the instances where the question did not make sense.

The general message from the results is not surprisingly that as the severity of the situation increases, i.e. becomes more serious to the safety of livestock and humans, the preferred reactions also become more decisive and severe. The other general trend is that for the least serious situation (wildlife observed close to village), and for the most serious situation (wildlife threatens humans), there are relatively uniform reactions across animal species.

In the first case, a little more than one-half of the respondents would prefer to report the problem to the local game officer under the assumption that this person can assist in relocating the animal(s) if necessary. A little more than one-fourth of the sample would prefer to scare of the animals themselves and/or with the help of others in the village. Around ten percent would prefer to kill the animals. The hyena stands out as more people are willing to kill this animal (Table 32).

If the animals listed here kill domestic animals, almost everyone would prefer to either report the problem to game officers or kill the animals. For the carnivores there is almost an equal split between reporting (and hence relocating) and killing. For the cases of buffalo, hippo and elephant this was seen as an irrelevant question, as these species seldom or never kill domestic animals. It is worth noting that hardly anyone consider ignoring the problem or chasing off the animals themselves as satisfactory solutions.

In the highly serious situation where wildlife actually threatens humans, all but a very few prefer to have outside help to solve the problem. For the carnivores, a majority would like to kill the animal, while a little less than one-half would choose to report to game officers. When it comes to buffalo, elephant, hippo, and crocodile, slightly less than one-half of the villagers would prefer to have the animals killed, and fifty to sixty percent would prefer to have game officers deal with the issue. Very few see ignoring the problem or trying to scare of the animals themselves as preferred alternatives.

**Table 32**

*Preferred reactions when the animal is often seen close to the village (in per cent)*

	<b>Do nothing</b>	<b>Scare off the animal</b>	<b>Report to game officer</b>	<b>Kill animal</b>	<b>Not applicable</b>	<b>N</b>
Lion	28,9	8,1	52,1	10,3	0,5	591
Cheetah	29,1	8,3	51,6	10,0	1,0	591
Leopard	29,4	8,3	51,1	10,7	0,5	589
Hyena	24,7	12,4	41,7	21,3		588
Elephant	25,4	4,7	60,8	8,8	0,2	590
Buffalo	25,4	4,7	59,3	10,3	0,2	590
Hippo	23,7	5,6	57,5	11,2	2,0	591
Crocodile	24,3	4,6	56,0	9,7	5,4	589

**Table 33**

*Preferred reactions when the animal kills domestic animals (in per cent)*

	<b>Do nothing</b>	<b>Scare off the animal</b>	<b>Report to game officer</b>	<b>Kill animal</b>	<b>Not applicable</b>	<b>N</b>
Lion	0,3	2,2	51,4	45,0	1,0	591
Cheetah	0,5	2,6	51,4	44,0	1,5	588
Leopard	0,3	2,7	51,0	45,1	0,8	590
Hyena	0,5	5,9	38,4	54,8	0,3	589
Elephant	0,5	1,0	36,2	4,8	57,3	588
Buffalo	0,3	0,8	35,0	5,4	58,4	589
Hippo	0,2	0,8	34,8	6,5	57,7	589
Crocodile	0,9	1,5	57,7	14,6	25,3	588

**Table 34***Preferred reactions when the animal threatens humans (in per cent)*

	<b>Do nothing</b>	<b>Scare off the animal</b>	<b>Report to game officer</b>	<b>Kill animal</b>	<b>Not applicable</b>	<b>N</b>
Lion	0,5	0,3	43,1	55,4	0,7	592
Cheetah	0,5	0,3	42,8	54,8	1,5	591
Leopard	0,5	0,3	42,9	55,4	0,8	590
Hyena	0,5	2,7	35,8	60,5	0,5	592
Elephant	0,5	0,7	59,3	38,9	0,7	589
Buffalo	0,5	0,7	58,0	40,1	0,7	591
Hippo	0,3	0,3	57,6	39,2	2,5	590
Crocodile	0,3	0,2	58,9	37,2	3,4	591

## 5. Concluding comments

Wildlife management is often thought of as a question of how to regulate wildlife populations. Increasingly however, successful management of wildlife resources depends on being adequately informed about the needs and values of a range of stakeholders. Modern wildlife management's greatest challenge is to develop broadly accepted policies, reflecting social, cultural, and economic goals as well as scientific knowledge about the species and populations in question. Far too often wildlife management rests dominantly, and sometimes solely on biological or ecological data, ignoring the human dimensions of wildlife issues.

This and many other studies, demonstrate that human-wildlife interactions is a complex field. People's relationship with animals and the environment is multifaceted, often full of conflicts, and difficult to deal with in a predictable way for managers. The population of people surrounding Serengeti National Park is currently on the order of two million people. The population density is highest around the Western Corridor and the annual growth is 3- 4 per cent. This indicates that population pressure will be a challenge in the foreseeable future. Furthermore, with a rapidly increasing population, the social context will also be dynamic. A large portion of the current residents adjacent to Serengeti National Park are migrants coming from other areas, and in any case the cultural and ethnic diversity is high in this region. Understanding the various human dimensions of the interactions between people and wildlife, and between people and the park management, will be essential for developing acceptable policies and on the ground management actions in the future.

This study shows that on many accounts people experience problems. Many have a distrustful and difficult relationship with the park agency and the way the park and wildlife resources are being managed. The results also show that hunting is a prevalent, and highly important activity for the communities. Poaching is frequently counted as the most important conservation impact in Serengeti. Even so, it is important to view hunting as a historic activity well ingrained in local culture, and a major component of local economies. To deal effectively with hunting, whether its legal or illegal, it must be seen in the broader context of social and regional development, and poverty alleviation. A great many villagers also encounter difficulties with animals who destroy crops, scare and injure people or transmit diseases to livestock.

However, this study also shows that the national park and its wildlife resources not only represent problems for the people living around Serengeti. There is overall a great deal of respect, affection and positive culture associated with the populations of wild game. Wild animals is a part of people's lives, their identity and attachment to the land. There is also considerable faith in the manager's capability to alleviate problems around villagers, and in protecting important resources. Many express a strong desire for more contact and collaboration with park staff and outside institutions. Over time, the

rural population in this region has been stigmatised as poor, disinterested, unknowledgeable about important issues, and generally an obstacle to conservation goals. Our impression is that there exists a large opportunity for more constructive processes around conflict issues like illegal hunting, cattle grazing in the protected areas, water management, and community development. Granted, there is a limited range of opportunities and alternatives in a situation characterised by widespread poverty and increasing population pressure. Yet, it remains important to facilitate the potential for local social and community mobilisation that is the requisite of any good wildlife management model.

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