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Dr. Rolf D. Baldus (Ed.)

Lion Conservation in Tanzania Leads to Serious Human – Lion Conflicts

With a Case Study of a Man-Eating Lion Killing 35 People

By Rolf D. Baldus

painting by Bodo Meier

GTZ Wildlife Programme in Tanzania

Wildlife Division

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"When a lion emerges from the bushes in the red dawn and lets out a booming roar, then even in fifty years humans will stand in awe."

Prof. Bernhard Grzimek, Serengeti Shall not Die (1959)

"A man returning from his field in the evening was killed by a leopard. Then a lion came, chased away the leopard and ate the victim."

My friend C.T returning from the village of Magazini near the Ruvuma in March 2004

"Last night Ossama the lion came and jumped on the roof. But we have built it with strong bundles of thatched grass. The lion tried hard, but could not enter."

A man and a woman, approx. 70 years old, in the village of Kipo on January 18th 2003 to the author

“It is unacceptable to expect people to live cheek by jowl with animals that so adversely affect their livelihood. We have something like twenty-five thousand square miles of protected land in this country, which should be enough to keep the lions’ gene pools intact. There’s no reason that they should be kept on private land.”

Richard Leakey, then Director of Kenyan Wildlife Service, Swara, Jan.-April 2001

“People living under the fear of wild animals, running a daily risk of being killed by lions and other beasts, often tend to believe that they do not live under what can properly be called a Government.”

The Guardian (Dar es Salaam), July 23rd, 1997

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Deutsche Gesellschaft für Technische Zusammenarbeit
GTZ Wildlife Programme in Tanzania
Wildlife Division
P.O.Box 1519, Dar es Salaam, Tanzania
www.wildlife-programme.gtz.de/wildlife

Foreword

This study was initiated through my involvement in assisting the Rufiji District Administration to collect information on lions which killed 35 people in 8 villages within 20 months. I should like to thank a number of persons who assisted me in the preparation of this paper. Harunnah Lyimo, an intern student and Mweka graduate, collected the data presented in Annex 1 and other information on the Utete District. Mzee Ndauka, a retired Selous warden, stayed with Harunnah Lyimo in Mkongo Division investigating man-eating by lions. The Dar es Salaam Anti-Poaching Unit under Mr. Pascal Mrina and the Utete District Game staff and office under John Eniyoye, apart from hunting the lions and finally killing the - hopefully - major man-eater, supplied information on problem-animal-control in the District and in the country. The chapter on lion hunting is co-authored by Andrew Cauldwell and originates from a joint paper on hunting in Tanzania (Baldus and Cauldwell 2004). Andrew contributed other important information, advice and proofreading. Further thanks go to Craig Packer, Ludwig Siege, Gerhard Damm, Laly Lichtenfeld, Rob Mills, Paul Funston, Ian Games and HO de Waal.

While this information was being compiled, the discussion on lion conservation took a new turn with the Kenyan Proposal to upgrade the lion to CITES Appendix I. This proposal will most probably not find the necessary majority at the Meeting of Parties, as it is based on grossly incorrect information and, most importantly, there is no significant international trade in lions. The major threats are loss of habitat and human-wildlife conflicts and not trade. However, the international discussion on lions caused by this proposal will be useful if it helps to improve lion conservation, including sustainable use. There is evidence in Tanzania that this discussion is already bearing fruits.

Human-wildlife conflict is considered as a relevant factor by CITES when deciding on the protective status of species or on export quotas for trophies. It is little known outside Tanzania that approx. 200 people are killed by dangerous animals in the country every year. The cruel story of the Tsavo man-eaters which killed 28 people in 1898/99 makes good reading in the safety of a London or Hamburg apartment, but how many people know that 35 children, men and women were taken, many out of their huts, killed and eaten by a lion between August 2002 and April 2004 close to the capital Dar es Salaam? Tanzania conserves lions and other dangerous animals by implementing a strategy which combines protection and sustainable use. The country is criticized by many for the use of hunting as part of the conservation strategy, despite it being fully in line with the Convention on Global Diversity or the principles of the World Conservation Union. Most African countries who follow a rigid protection policy and outlaw hunting are much less successful in their conservation efforts than Tanzania. But in the world of conservation politics it is not always facts which count.

It is easy to be pro-lion protectionist if one does not live side by side with these wonderful, but at the same time dangerous creatures. Tanzania deserves credit for conserving its lions, particular those outside its many protected areas.

It should be finally mentioned that the term "man-eating" includes women and children as well as killings by lions without the victim being eaten.

1.
Executive Summary

Tanzania has the largest lion populations on the continent, and they are not threatened with extinction. The population is stable in nearly all protected areas. It is of significant size and mostly stable outside these protected areas. Exact data is lacking, but the lion-population has most probably been reduced during the last decades in areas with high population growth, expansion of agriculture and livestock husbandry and in some areas in North–western Tanzania where an influx of refugees has occurred.

Although the lion range has been reduced in Tanzania in the last 50 years due to human population growth and agricultural expansion, lions benefit from a widespread network of protected areas (30 % of the country) and from vast tracts of unpopulated and populated lands with relatively undisturbed habitats suitable for lions.

Lions are protected throughout the country, and it is the policy of the Government to conserve them both inside and outside of the protected areas, as they are part of biodiversity. Some problem-animal control in extreme cases of human–lion conflict occurs, and approximately 250 lions are shot per year by tourist hunters, which is overall a sustainable yield. Empirical evidence from the Selous Game Reserve shows that off-take levels are sustainable. Lions play a major role in the hunting industry, which is economically significant and greatly contributes to paying the conservation bill. As a consequence of the Wildlife Policy of Tanzania (1998) Wildlife Management Areas (WMA) are being created where villages manage the wildlife on their land and are increasingly earning revenues, to which controlled lion hunting will contribute. This will raise tolerance levels towards wildlife including dangerous game and it will improve the possibilities for wildlife as a land use option, thereby safeguarding areas which otherwise would be lost for wildlife.

As a consequence of this relatively good conservation record, in particular when compared to many other countries, lions are a major source of conflicts with the human population. We estimate that around 200 people are killed in Tanzania every year by dangerous animals, of which around one third on an average could be by lions. Lion inflicted injuries and loss of life have been and still are more acute in Southern Tanzania. The paper presents details of one recent case where not less than 35 people were killed by one or several man-eating lions in an area of 350 km² just 150 km south–west of Dar es Salaam between the Rufiji River and the Selous Game Reserve within 20 months. It is one of the biggest individual cases of man-eating by one or two lions ever recorded and with the information presented here it is at the same time one of the best documented cases, at least in

Tanzania. Further analysis might help to understand the underlying causes better and thereby assist in devising strategies to protect humans better without eradicating the lions.

The reasons which have led to such a tremendous loss of lions in Kenya or in West-Africa are not connected to international trade. To upgrade the lion to CITES Appendix I as proposed by Kenya would not address any of the issues that adversely affect lion populations, i.e. loss of habitat to agriculture, problem animal control, poaching and killing of lions by pastoralists. It would however, make the hunting of lions more difficult or even impossible. This hunting is sustainable and giving value to lions is one major element in the range of conservation tools which Tanzania has successfully applied to protect the future of the lion.

2. The Lion Population of Tanzania and its Conservation

2.1 Ranges and Habitats Determine Populations

Like all cats lions are notoriously difficult to count. It is therefore understandable that no concrete figures exist for Tanzania as a whole and that any estimates which were attempted, as useful as they may be, may have a high margin of error.

The major requirements of lion populations are suitable ranges which are available for lions and offers prey. On the other hand, the main threat to long–term lion survival is habitat loss. This leads to the reduction of prey animals and if the habitat loss is related to expansion of human settlement, agriculture and animal husbandry this also leads to more legal and illegal killings and increased exposure to disease.

An analysis of vegetation cover and possible lion habitats from Landsat satellite imagery shows that 50 to 60 % of Tanzania is covered by habitat that remains largely undisturbed and suitable for lions in principle.

Table 1: Land Cover/Habitat in Tanzania

Category	Percentage Land Cover
Cultivated	32
Forest	2
Grassland (wet and dry)	15
Thickets, woodlands	39
Water	10

Lion populations are normally higher in protected than in non-protected areas. Tanzania has one of the largest networks of protected areas in Africa. About 30% of the country has legally protected status. 20% are strictly protected as national parks (13), game reserves (30) or Ngorongoro

Conservation Area where all human settlement and most land uses except tourism are forbidden. Ngorongoro is an exception, as the Maasai are allowed to settle there and keep their livestock. In game reserves tourism includes controlled and low impact tourist hunting. All protected areas are unfenced and wildlife is free to move unless this is hindered by intense human habitation.

Table 2: Wildlife Protected Land

Category	Approx. Area (km^2)
National Park	39,000
Game Reserve	120,000
Ngorongoro	8,300
Forest Reserve	87,000
Game Controlled Area	107,000

This high percentage of wildlife protected land shows the commitment of the Tanzanian Government towards conservation. Presently new national parks and game reserves are being established and some of the existing ones are being expanded. A new Wildlife Act is under preparation and may contain new categories of protected areas (e.g. wetlands, corridors and bufferzones) which could result in a further increase of protected land.

Wildlife, including lions, is also found in many unpopulated and populated areas which do not have any protected status. In addition to the mentioned wildlife protected areas (Table 2) approximately 70,000 km^2 of such unprotected land serves as tourist hunting blocks which indicates relatively high wildlife populations. Further areas are declared "Open Areas" where resident hunting is possible and where wildlife exists, however in smaller numbers. Other extensive tracts of land in western and southern Tanzania, are sparsely populated and sustain wildlife including lion.

There is generally a high demand for bush meat in the country and the rate of illegal killing of wildlife is significant. In some areas this illegal bush meat production is sustainable while in others it is not. To reduce this illegal off–take and at the same time reduce poverty through the use of natural resources, the Tanzania Government has created a new type of conservation area (Wildlife Policy 1998; Baldus et al. 2000), called Wildlife Management Areas (WMA). Secondary legislation is in place and the new Wildlife Act will contain this new type of conservation area.

This is legally unprotected land for which rural communities can obtain user rights in order to manage and utilize the wildlife. Possible uses are subsistence hunting, photographic tourism, resident and tourist hunting. The legal preconditions are in place and so far communities in 16 pilot areas have been allowed to establish their own WMA and test the approach. Many more communities all over the country are in the process of creating such WMA, but Government procedures are slow despite a considerable demand and political pressure from many villages in Tanzania to use and conserve their wildlife. So far the existing pilot WMA have greatly reduced illegal off–takes and improved the conservation status on their land. Around the Selous alone WMA protect around 6,000 km². Lions also benefit from this.

2.2 Population Figures

As in the global ideological fight about the protective status of the elephant, lion population numbers are political figures too. It is practically not possible to count lions except with extensive research. Even then many figures provided are still the result of theoretical modelling, estimates and projections from smaller research sites. In the case of lions dubious figures have been distributed by scientists and conservation politicians for a variety of reasons and intentions. One such example was the false figure of 15,000 lions for the whole of Africa today or the presentation of an unfounded guess that 100,000 lions lived in Africa one hundred years or so ago. They have been taken up by the media and distributed to an uninformed international public.

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An example of misused figures are those published by Bauer and Van der Merwe (2004). The two authors state clearly that they only "present an inventory of available information" which often does not contain much more than a set of educated guesses and leaves out many areas with substantial lion populations. A major omission is most of the unprotected areas. For Tanzania only Manyara, Ngorongoro, Selous, Selous buffer zone and Serengeti are given and this leads to an estimate of 7,073 (minimum 5,323 and maximum 8793). This estimate, whether correct or not, includes only the mentioned areas and leaves out all other areas in Tanzania where lions occur too. The recent Kenyan proposal to upgrade the African Lion to CITES Appendix I (Kenyan proposal 2004) uses the Bauer and Van der Merwe figures to justify the endangered status of the African lions. The proposal "recognizes the inadequacies of the recent censuses, yet it immediately turns around and cites them as if they were perfectly accurate" (Craig Packer, cf. Annex 7). Packer concludes therefore that the Kenyan listing is irresponsible.

There is a second and much more systematic and comprehensive study using a similar approach to put together all available information from Africa on lion populations by Chardonnet (2002). His estimate for Tanzania, based on a compilation of research results, is 14,432 (minimum 10,409 and maximum 18,215). Our own feeling is that most figures for the unprotected areas are underestimates.

Table 3: Total Lion Population Tanzania

Protected Area	Minimum	Average	Maximum
Serengeti, Manyara, Tarangire NP, Ngorongoro CA	3117	3896	4675
Maasailand Game Reserves & GCA	127	241	235
Maasailand NGA	168	300	312
Moyowosi-Kigosi GR and surrounding GCA	322	460	598
Biharamolo-Bugiri GR	40	57	74
Ibanda/Rumangika GR	14	20	26
North West Tanzania NGA	70	100	130
Ruaha Rungwa Complex	2352	3360	4368
Katavi National Park & adjoining protected areas	420	600	780
Ugalla Game Reserve & surrounding protected areas	196	280	364
Mahali Mts. NP	13	18	23
Central & Western Tanzanian GR	112	160	208
Mikumi NP, Selous GR & Kilombero GCA	3080	4400	5720
Southern Tanzania NGA	378	378	702

Source of data: Chardonnet 2002

Abbreviations: GCA - Game Controlled areas; NGA - Non Gazetted Areas; NP - National Park; GR - Game Reserve

Chardonnet uses for Mikumi, Selous and Kilombero (55,000 km²) a lion density of 0.08 lions/km² for the estimated average figure. Creel & Creel estimate, however, between 0.08 - 0,13 adult lions/km². Adding the cubs (29 %) would give 0,1 to 0,17 lions/km² or in real figures between 5,500 and 9,350 for this area alone. For the Southern Tanzania non-gazetted areas (45,000 km²) Chardonnet assumes 0,012 lions/km² and this gives an estimated lion number of 540 lions. We know, however, from our own local knowledge that many areas bordering the Selous have similar lion densities to the reserve and that lions are common in other areas as well. If we estimated the densities in these areas as being approximately one third of the Creel middle density then we would end up with a lion figure for these ungazetted areas in Southern Tanzania of 0,04 lions/km² or 1,800 lions as compared with the 378 lions suggested by Chardonnet. A recent study of unprotected areas outside of Tarangire National Park conservatively indicated a minimum lion density in village areas of approximately 10 times the figure provided by Chardonnet (L.

Lichtenfeld, paper in prep). However, this study also estimated that lion densities outside of the park were in peak seasons approximately two times greater in hunting blocks that did not incorporate village centers, indicating the important contribution of these habitats to lion conservation (L. Lichtenfeld, ibid).

Chapman and Booth (2002) prepared an input for the Chardonnet study and used, amongst others, estimates of ours. Their estimated population size is:

South-Eastern Tanzania:	Ca. 6,600 min. (max. ca. 10,725)
Central and Western Tanzania:	Ca. 4,865
NorthWest Tanzania:	Ca. 1,470
Massailand:	Ca. 5,080 min. (max.ca. 8,890)
Total country:	Ca. 18,015

These calculations are presented to show different options and point out how far they will in any case differ from the figures presented in the Kenyan proposal. This paper does not aim to make a serious contribution to the discussion on lion numbers. It is enough to say here that – contrary to a good number of other countries – the Tanzanian population has not experienced major disturbances. It is the highest of any African country. It is stable inside the protected areas and still exists in wide parts of the country outside those areas, where it possibly faces a slow long–term reduction.

Lion breed "like rabbits" (over 20% per year) provided they have suitable habitats and protection. The Serengeti population is probably one of the best researched on the continent. It lost one third of its population due to an apparent mutation of the Canine Distemper Virus around 1994/95 (from 3,000 to under 2,000) and is back now to an all time high of around 3,800 in that ecosystem (Craig Packer, pers.comm.).

Finally, a brief comment should be given concerning empirical lion data given by researchers. Often such data are well-founded, but they are frequently misunderstood by the public or misused by conservation politicians. Other data are just unreliable or wrong. One reason for this is that most of the data collection is done by young people freshly graduated from university and still inexperienced. Sometimes they come up with realistic figures and very often they do not. Our experience is that the academic supervisor does not always detect such errors. The data by Lichtenfeld (paper in prep.) given for Tarangire are extraordinary, and it may be useful to point out that she uses a non-invasive counting method which is extremely laborious, but which seems to

have advantages over the conventional methods using the collaring of animals. She tracks the lions with the help of traditional Hadzabee bushmen hunter-gatherers. By doing so she does not only get a much more complete overview of the population, but she also can count hyenas and leopards and observes their interactions.

The decision makers of today prefer "exact sciences" in order to avoid risks and have a tendency to disregard practical experience and indigenous knowledge. In wildlife management, however, the latter is often more relevant and useful than the former. If properly done both approaches in many cases come to very similar results. We proved this in a three year research on elephant migration between Selous and Niassa Game Reserves (Hofer et al. 2004) where we combined the latest satellite technology with the experience of traditional hunters (warumba) in the villages. Much of such indigenous knowledge is rather useless, but the same can be true of scientific data collection. We also proved the value of practical knowledge on the basis of experience in the field in the case of wild dog research in the Selous. We had estimated the numbers of wild dogs to be around 2,000 animals for the Selous ecosystem including the bufferzones and gave this figure in our internal newsletter "Habari za Selous". Creel & Creel (1995) came up with a figure of 1,300 dogs for the reserve after four years of work. Their figure was based on extrapolation of results from an intensive study area of 5 to 6 % and some observations in further 15 % of the total area. We still believe that the real population is closer to our figure, as they assumed lower densities in the areas which they did not know.

2.3 Conservation of Lions

In Tanzania all wildlife is protected under the Wildlife Conservation Act (1974) and the Hunting Regulations (2000) and may not be killed unless a permit is obtained from the Director of Wildlife. The only exception is in defence of life and property.

The national parks and Ngorongoro Conservation Area are administered by their respective parastatal authorities and covered by special legislation. No hunting or culling takes place in these areas and this includes lions. Lions are one of the major attractions of these parks. The best lion viewing opportunities are in the open plains of the Serengeti and Ngorongoro, in Tarangire and in Lake Manyara National Park which is famous for its tree climbing lions.

All other areas including the game reserves and the open areas fall directly under the control of the Wildlife Division, which is a Government Department under the Ministry of Natural Resources and Tourism. Citizens and residents may hunt a limited bag of animals on quota in specific areas during hunting season (July to December) and with a set of restrictions (e.g. short validity of licence). The animals on licence are normally locally abundant and are mainly hunted for their meat. Rarer or valuable trophy animals are available only on a tourist hunting licence at significantly higher cost, and this includes lion. There is no resident hunting for lions. Ownership of any item deriving from wildlife including lion must be proven with an ownership certificate which is only provided in the case of legal acquisition. There are also no licences for traditional lion hunting or to obtain lion products for traditional medicine. There is no particular attempt to manage lions as a species, as this is not possible. Instead all national parks and game reserves including the Selous and in the future also the WMA are managed as ecological systems. Increasingly this is done on the basis of management plans.

There are five types of non-natural mortality of lions in Tanzania - poaching (illegal killings), tourist hunting, problem animal control (PAC), traffic accidents (e.g. Mikumi highway and TAZARA railways) and research (collaring). The latter two do not occur in statistically relevant numbers and are disregarded here.

2.4 Illegal Killings

Illegal incidents are always difficult to measure, and it does not come as a surprise that the exact number of lions lost due to illegal acts in Tanzania is unknown. The highest losses are attributable to the pastoralists of northern and western Tanzania, e.g. the Maasai and the Watutsi. Lions are speared or poisoned with agricultural chemicals (organophosphates used for cattle dipping etc.;

different brand names) in order to protect livestock, as stock killers or for simple dislike on principle. In a survey of Maasai attitudes toward large predators, lions consistently ranked as the most fearful and potentially harmful predators to humans and livestock. Significantly, over half of the sample population supported the use of poisons in reducing conflicts with lions, and 15% of the population indicated they had killed a lion in the last two years, resulting in a minimum of 35 lions taken in 3 villages (L. Lichtenfeld, paper in prep). A professional hunter reported that even the offer of cash to Maasai pastoralists (so that he could sell such lions to customers) did not serve as an incentive to spare problem lions. Such retaliation killings are reported frequently by people who work in such areas, for example 21 lions reportedly killed outside Tarangire National Park in the first five months of 2004 (Craig Packer, pers. comm.). In the last month, a man in the village of Loibor Serrit in Maasailand has been hospitalized after attacking a lion that went after his donkey. The lion was subsequently killed by his comrades who set a trap for it and speared a second lion as well (L. Lichtenfeld, pers. comm.).Even the few Maasai living with their cattle at Kisaki north of the Selous Game Reserve poisoned two lions in 2002. They hunt stock raiding lions with spears and shotguns and have reportedly killed more lions than the two disclosed. The information available is not sufficient to draw an overall picture, but the killing of lions by pastoralists is without doubt the most serious cause of lion losses in the country.

Traditional hunting of lions by Maasai as part of their social life still occurs despite it being illegal. It is reported from Maasailand that capes of recently killed lions are seen during rituals, which have mainly to do with the rite of passage of boys to warrior (moran) status. No confirmed data is available and unconfirmed, vague estimates of between 20 and 400 lions per year for the Serengeti ecosystem are given by observers (pers. comm). More traditional hunts take place in other areas like the Maasai steppe where the Maasai are currently trying to revive traditional rites among adolescents, indicating a potential increase in lion hunts in the near future (L. Lichtenfeld, pers. comm.). The extremely wide range of estimates shows that very little is known.

Another cause of death for lions is through being caught in wire snares set by poachers for catching other animals for meat. Lions are generally not the target species for poachers, as there is no significant market for lion products. This does not rule out that body parts of "by-catches" of meat poaching may find their way to the local consumers, as lions play a role in local culture, traditional medicine (lion fat e.g. against arthritis) and witchcraft, but this is more incidental.

A last source of illegal killings is overshooting of quota by tourist hunters or shooting a second lion in case the first one was not a good trophy. Such cases occur to my own knowledge and they are

not uncommon due to the many rogue elements in the hunting industry. Their importance is nevertheless frequently exaggerated. All tourist hunting takes place in the presence of government staff and a multitude of other staff. Whereas the bribing of game scouts cannot be ruled out, the shooting of a lion is a high profile affair in any hunting camp and difficult to keep secret. If the offence becomes known it may lead to prosecution. However, there is another even stronger argument. Shootable lions are never abundant and every lion is the nucleus for a whole safari valued between US$ 40,000 and 80,000. Every lion is therefore too valuable for the safari company and the professional hunter to be sacrificed for an extra tip unless the particular professional hunter has only a short-term interest in the area. Overshooting of quotas is normally not an issue, as the given quota is anyway not reached in most cases.. In a particular hunting block with many lions the quota nevertheless might be overshot and the lions then booked on the unused quota of another block, which allows the export of the trophy. I know of a case of ten lions shot in a block instead of four in 2003. The professional hunter had a sublease on the block and knew that he was not hunting it the following year.

If one adds the lions killed by tourist hunters outside the quota to those animals which are wounded but not reported, they will together probably not exceed 10 % of those legally killed. This would amount to around 25 lions per year, which would not have an impact on the viability of the whole population.

2.5 Lion Hunting

by Rolf Baldus & Andrew Cauldwell

Lion hunting makes an important contribution to the tourist hunting industry in Tanzania, and certainly they are the major draw that attract hunting clients to Tanzania. This is evidenced by the fact that the majority of hunting outfitters include the image of a lion in their company logo. Hunters promotional pamphlets always show a large number of smiling clients with a good lion trophy.

The direct contribution made by lion trophy fees to hunting revenue at first glance appears low at 9.4%, being the third most important species in terms of income generation. Lion are surpassed in income generation by buffalo and leopard contributing 21.5% and 10.4% respectively. The contribution made by lions is however also a reflection of the representation of lions in the ecosystems where they live. Lion represent the top of the food chain and theirs is the smallest population exceeded by most other animals. It is therefore expected that greater numbers of other animals would be hunted than lion, this is certainly true for buffalo, their main prey species. Lion's contribution of approximately 10% does therefore indicate that they are highly sought after by tourist hunters.

To hunt a lion, a tourist hunter requires a 21-day hunting permit issued by the hunting office, for which he or she pays US$ 600 for the permit and a further US$ 100 per day. The trophy fee for a lion is US$ 2,000 and to export the trophy the client must purchase a trophy-handling permit for US$ 300. The minimum fee payable to the Government to shoot a lion is therefore US$ 5000. Many other animals can also be hunted with a 21-day hunting permit and it is therefore difficult to attribute the full amount to lions, but being the major draw, lion hunting does account for a substantial amount of the income generated from tourist hunting.

The tourist will pay a substantially higher amount to the hunting outfitter in whose concession he or she wishes to hunt. The hunting areas of Tanzania (game reserves, game controlled areas and open areas) are divided into hunting concessions that are leased by the Wildlife Division to hunting operators. The outfitters are responsible for marketing and finding clients. They are required to provide the necessary services (camp, vehicles etc) and a licensed professional hunter who will guide the client. The Wildlife Division provides a game scout to supervise the hunt and who may provide additional protection to the client if necessary.

Tourist hunting currently generates approximately US$ 10 million for the Wildlife Division. Considering the above representation of fees by lions, approximately US$ 1 million is earned directly from lion trophy fees, but a total of US$ 2.4 million could be attributed to lion hunting generated through permit fees, daily fees etc. A gross amount of approximately US$ 27 million is generated by the hunting industry in Tanzania, which includes income to outfitters, auxiliary services, taxation, Wildlife Division earnings etc. Lion hunting in Tanzania therefore generates a gross amount of US$ 6 - 7 million per annum for the hunting industry. This is a substantial income for a poverty stricken country such as Tanzania. The Kenyan proposal calculates an odd economic comparison whereby the value to tourism of a lion in Amboseli National Park in Kenya is US$ 128,750 annually while a lion which is shot by a tourist hunter in Tanzania is worth only US$ 35,000. The scientific basis for this revenue generating capacity of an Amboseli lion remains unclear, but we are doubtful that if Tanzania stopped hunting and offered all its estimated 15,000 lions for photographic tourism, this would bring in annual revenues of nearly US$ two billion. The fact is that hunting and tourism in Tanzania are mostly not competitive but complementary forms of wildlife use. Lions are important for the Tanzanian tourist industry, but most lions will spend their lives and never be seen by a tourist. Hunting takes normally place in areas with no or very limited tourism potential. In most hunting areas the so-called "consumptive" use of wildlife earns comparatively much more than photographic tourism and has a lower impact on the ecology of the area.

Approximately 250 lions are taken annually by tourist hunters in all hunting blocks of Tanzania, which exist in different parts of the country. Analysis of data from the Selous Game Reserve indicates that on average one in five tourist hunters takes a lion trophy. Not every tourist hunter wishes to hunt a lion, but certainly many more hunters wish to shoot a lion than are successful. The number of lion trophies that outfitters are able to sell from their concessions is limited by quota. Annual quotas and numbers of lion hunted in the Selous Game Reserve are presented in Table 4.

Table 4: Off-take and annual quota for lions in the Selous Game Reserve

Year	Number hunted	Annual Hunting Quota
1988	23	103
1989	50	148
1990	55	168
1991	40	184
1992	47	178
1993	61	?
1994	41	?
1995	49	?
1996	86	148
1997	98	140
1998	115	187
1999	81	179
2000	63	170
2001	83	177
2002	81	167
2003	78	167

The hunting system in Tanzania has evolved over a hundred years. The industry has become an important source of foreign exchange to the country and is one of the few industries that brings economic incentives to the remote rural areas of the country. It is the major source of revenue that sustains the game reserves and game controlled area network in the country. As shown earlier, these represent 70% of the protected area network with an area of 200,000 km².

Despite its importance, the hunting industry has suffered from stagnation in its management in recent years. Management of the industry has not adapted in response to developments in the economy of Tanzania or international developments. The current system used by the Wildlife Division to generate income is heavily dependant on game fees, which make up 60% of the total fees generated. Lease of concessions make up only 10% while permit and daily fees make up the remainder. The result of this system is that the only feasible means for the Wildlife Division to raise income is to increase the number of animals hunted through raising quotas. The current system requires that operators must utilize 40% of their annual quota.

Hunting concessions are leased at nominal rates (US$ 7,500 each) to a select group of hunting outfitters. There is no market-based competition, and many concessions are leased to persons or

companies without the necessary business skills and without the capacity to market their hunting opportunities. The result is that much of the hunting is now subleased to wandering professional hunters who shift from one concession to another taking their clients to different areas to hunt. These people have minimal long-term interest in any one area, and will naturally consider the interests of their clients before the long-term interests of nurturing a concession. They are mostly foreigners who operate on a cash basis with the companies leasing blocks, but the bulk of the income they earn neither enters Tanzania nor is it taxed here.

The Wildlife Division is developing new management procedures for lion hunting. From 2004 onwards it is planned that only lions of 6 years or older may be hunted. Age will be assessed from tooth wear and skull dimensions when export permits are requested. The precise criteria that will be used are not yet certain, but this will be an important step towards protecting the integrity of lion populations and ensuring a more sustainable off-take. Studies conducted in Maswa Game Reserve where lions are hunted together with extensive computer modelling (Whitman *et. al.* 2004) suggests that if only lions over a minimum age are hunted, then the off-take is sustainable regardless of the number of animals hunted. The critical issue is to be able to determine the age of lions before shooting them. The authors of that study found that there is a high correlation between age and nose colour, with older animals having darker noses. The authors of this chapter and many professional hunters feel that nose colour is not or not always a sufficiently reliable means for ageing lions in the field. Some old lions (6+ years) have pale noses, and some young lions have dark noses. This is evident for the lions in the Tarangire ecosystem (L. Lichtenfeld, pers. comm.). Mature lions, and even some cubs in the Moyowosi ecosystem of north-western Tanzania tend to be of a darker colour than those in the Selous ecosystem, and this may affect pigmentation of their noses. A baseline study is required therefore to determine correlations between nose pigmentation and age for important hunting areas of the country.

There is also an economic incentive to the hunting outfitters to take only older animals, as these represent better trophies, lion populations will be more stable and the off-take will possibly be higher in the long run. The problem of subleasing however destroys the theory of an economic incentive, as it is the professional hunter who makes the decision on the ground which animal will be taken by his client. When the interests of his client over-ride all else, a lion is a lion and imposing restrictions as being developed by the Wildlife Division will be extremely difficult. There is already a restriction in the case of elephants (20 kg or 1.7 m length for the larger tusk) and leopards (minimum of body length of 1.3 m excluding the tail). Both minima are easier to enforce, although we lack data how the system works. Quite a few elephants are shot which are below

minimum. We also doubt that the knowledge exists to age lions after the hunt on the basis of their teeth. This would consequently need training. We are even not sure whether exact age determination is possible at all at this stage, apart from ageing lions into broad age groups, like subadult, young, middle aged and old adults. Our experiences show that many professional sport hunters are relatively unsure of their abilities to age lions beyond these categories Using nose colour to age lions is also difficult as many lions are shot off baits where the nose is often darkened by feeding or they are shot in bad light at sunset or sunrise. In any case and apart from lion hunting a total reform of the management of the hunting industry is required in Tanzania to overcome the problems that are now inherent. The important step will be to offer the hunting concessions to outfitters based on market value, i.e. outfitters must bid competitively against each other for concessions with a sufficiently long-term security of tenure. This single step will overcome much of the subleasing problem and greatly increase the revenue generated from hunting. The species that will benefit the most from this reform will be the lion.

A system of recording trophy quality has been implemented by the Selous Game Reserve administration since 1995. Initial lessons were learned and a substantial volume of data is now available from 1999 to 2003. Lion trophy quality measurements are based on skull dimensions, i.e. skull length and skull width. A careful analysis of the lion trophy data, based on 212 records using various statistical packages has revealed no significant trend in trophy quality over the period from 1995 to 2003. This provides empirical evidence that lion off-take in the Selous Game Reserve is at a level that does not cause a decline in trophy quality and is therefore sustainable. Results are presented in Annex 6.

Some minor trends can however be detected and provide some insights into the dynamics of the Selous lion population over this time. Hunting has increased and the area used expanded in the period up to 1997. This may account for an initial increase in lion trophy quality up to 1997, as some lion prides were being hunted for the first time after a period of rest at that stage. 1998 was a year of heavy hunting and the number of lions hunted reached a maximum level that year. Trophy quality dropped as a result in 1999 but has stabilized and improved thereafter with a reduced lion off-take. The data does suggest that lion trophy quality responds rapidly to hunting intensity and lion populations are able to recover easily. It is assumed from this data that lion populations in the Selous have been heavily hunted, but their rapid recovery in response to reduced hunting pressure indicates that off-take levels are sustainable.

Lion populations elsewhere have shown capacity to recover rapidly from a drop in numbers, as has been the case of the Serengeti lion recovery following the outbreak of disease.

The system of recording trophy quality in the Selous Game Reserve has also noted the geographic coordinates of where hunts have taken place. The distribution of lion hunts in the Selous Game Reserve during 2003 based on GPS coordinates are illustrated in Annex 4. This shows that the off-take is evenly distributed over much of the reserve. The Selous Game Reserve covers an area of 48,000 km². The 78 lions hunted in 2003 represents an off-take of one lion per 615 km².

It is difficult, without further analysis to say whether the higher, but unused quota in the Selous is sustainable or not. Creel & Creel (1997) concluded that "current off-take of lions is sustainable, but current quotas are probably too high." In the absence of other publications in scientific journals this paper is widely quoted, including in the Kenyan uplisting proposal. It should be pointed out that it was based on field research in an area not larger than 2,600 km² in the Northern Selous. The Creels had no empirical insight into populations on 95 % of the Selous' area nor on the outside bufferzones with the exception of Gonabis (300 km²) north of the reserve. The actual lion counting was limited to an area of 90 km² (0,188 % of the Selous) where the authors claimed to have known all lions. This was doubted by the Reserve management. Furthermore an estimated fixed ratio between hyenas and lions was used to determine lion numbers. The paper is no more than applying supposedly sustainable off-take rates (2,7 to 4,3 % of adult male population) to an estimated lion population figure (0,08 to 0,13 adult lions/km² of which 36 % to 41 % are male). Both estimates may be right or may be not. In any case the quota is not utilized, therefore it is rather hypothetical whether it is too high or not. Many professional hunters in the Selous say that they voluntarily do not shoot their full quota, as it is too high for their particular area. We advise therefore the Wildlife Division to reduce the quota of mostly 4 lions per block as a precautionary measure closer to what is presently shot, say two lions per block, until more empirical data are available. Several blocks in the Western Selous need additional attention, and too many lions might be shot there.

In the literature off-take rates between 2 % of the adult male lions and 10 % of the whole population are given for lions (Chardonnet, p. 124), some of which sound rather unrealistic. We conservatively assume that in the case of Tanzania only the lower percentages are sustainable (around 2 % of the population) and even this level brings a noticeable, but not unsustainable impact on the populations. If one assumes that Tanzania has 14,000 lions a 2 % off-take as trophy males would be 280 lions and 4 % would be 560. If Tanzania would have only 10,500 lions then the comparable figures would be 210 and 420. The actual number of lions taken and exported

between 1992 and 2002 was 2,791 lions or 254 lions per year. The Kenyan proposal alleges that quotas are too high and it implies that these represent the numbers shot, but this is not correct in the case of Tanzania and will mislead the reader.

Other international trade in lions apart from hunting trophies is not significant in the case of Tanzania. Between 1991 and 2000 four lions were reported to have been exported from Tanzania out of which two were taken from the wild (Chardonnet, p.136).

3. Human-Lion-Conflict

3.1 A Historical Perspective

Where lions exist, problems will occur. Even the odd lions which occasionally frequent the outskirts of Dar es Salaam (on the coast about 20 km south-east of the city centre) cause problems. They attacked recently horses in a commercial riding estate, and one horse had to be put down due to injuries. The only way to reduce man-eating to near zero is to fence the protected areas and eliminate all lions outside.

It is however the policy of the Tanzanian Government to conserve lions not only within its extensive network of protected areas, but even outside, thereby following a pronounced strategy of biodiversity conservation. This rules out the fencing of protected areas and as a result, the country does not allow game ranching, as this is normally connected with fencing. Lions continue to roam all unpopulated areas and, as far as practically possible, populated areas thereby safeguarding genetic flows and avoiding genetic isolation.
This policy, however, is possible only at high economic and human costs. Where lion and human populations occur side-by-side conflicts including the loss of livestock, human injury and loss of human life are a frequent phenomenon.

This is nothing new, but has been reported widely during colonial times, starting in the 19th century when human populations were still significant lower. It continued during the English colonial period, and the control of marauding lions and elephants was one of the major tasks of the Department for Wildlife and Vermin Control, as it was called when it was established in the early 1920s. One of the worst man-eating cases on record occurred in the Njombe District in South-

Western Tanzania. The game ranger George Rushby (1965) reports that between 1932 and 1946 a total of ca. 1.500 people were killed by lions in an area of not more than 2,000 km².

The first warden of the Selous Game Reserve, Brian Nicholson, who is one of the last witnesses of the case recently gave me a description (Brian Nicholson, pers. comm.) which I repeat here in full for documentation purposes. "*Wangingombe was the centre of lions' activities which is in the northern part of Njombe District of what used to be called the Southern Highlands Province. The village is located near where the old road to Njombe branched off from the Iringa to Mbeya road. The lions operated all around Wangingombe, Rujewa and up to 20 miles north and east towards Sao Hill and Mufindi. I believe these lions originally came from the Usangu Flats where there was a lot of game in the 1930's, but permanently established themselves in the general Wangingombe area when they found easy pickings with great numbers of poorly guarded cattle through out the area. George Rushby was the Game Ranger based at Mbeya in the 1944 - 1952 period and I knew him quite well in later years. Discussing this subject with him I understood that he personally hunted these lions occasionally and killed one or two personally. He asked Ionides to send him some game scouts to help deal with these lions and Ionides did this and his game scouts worked on those lions for about 5 years. A total of 30 lions were killed in the area of which 17 had definitely killed people. Some 3000 head of cattle were killed by these lions during the same period. I was temporarily based at Mbeya in 1954 for 6 months and I did a foot safari through the Wangingombe area among others during March & April of that year. Local information was that the last lion had been killed in 1950 and there had been no sign of any since then and I personally had no evidence of any lion anywhere throughout the area and received no reports of cattle or people being killed.*

However the most interesting aspect of this killing by lions was that of the 1000 odd peopled killed very few were actually eaten by the lions. It seems that most of them were killed trying to keep the lions away from their grazing cattle and the lions would attack them and then go for the cattle to eat. Nearly all the lions killed were destroyed in set gun traps and were not tracked down and killed in the same way that Ionides and myself used to do it in the Southern Province of that time.

In the Southern Province there were very few cattle. Consequently the lions which took to man-eating ate virtually every person killed and there were about 200 people killed and eaten every year in Southern Province, which stretched from the coast to Lake Nyasa and the Ruvuma north to the Rufiji. The reason for the man-eating was hunger as throughout the settled areas there was very little game apart from elephants and no livestock. Lions regularly fed on elephant carcasses

which had been killed on control work and I am sure were it not for this the number of people being killed each year would have been a lot more. Man-eating was seasonal (March to July) in the Southern Province and it would stop once the annual fires went through. Consequently most man-eaters would kill and eat anything from 4 people to ten in a season. Occasionally a lion would go on killing all the year round. The worst Districts were Lindi, Newala, Masasi, Tunduru and Songea all of which killed up to 100 or more people each during their time. All other Districts had incidents of man-eating too. Incidentally and please note the area used by the Wangingombe lions was some 200 miles from the Selous Game Reserve and is located to the West of the Kilombero flood plains and Uzungwa escarpment."

This report by Brian Nicholson contains several points that deserve to be emphasised:

1. The Njombe man-eaters were more after cattle and most people killed were not eaten. This is interesting new information.
2. He confirms that Southern Tanzania was particularly affected by man-eating and gives a figure of 200 deaths per year, which is clearly higher than today.
3. Man-eating happened mainly during the wet season and was at low level during the dry season. This supports our data.

3.2 Incidence of Man-eating

These problems prevail and a number of individual cases of man-eating happen in most areas with lions in Tanzania every year.

An analysis of central and local statistics, interviews with district authorities in affected areas and systematic observation of reports in Tanzanian newspapers over 15 years, which frequently report such cases (e.g. “Lion pounces on loving couple and devours woman”: Daily News 3.8.02, "Hungry lion devours timber dealer": Daily News 10.4.2004, “Lion drives man into pit latrine”: Daily News 2.6.04, “Wife’s remains help man poison killer lion”: Guardian 10.6.04) has led us to the estimate that on an average 200 human deaths result from dangerous animals each year (Baldus, Siege and Kibonde 2003). The number of injuries might be in a similar order of magnitude. The figures will, however, vary greatly from year to year. For the financial year 1996/97 the Minister for Natural Resources and Tourism presented in parliament a figure of 115 people killed and 135 injured (Daily News 2.8.1997)

Depending on the area, most cases are inflicted by crocodile, hippo and lion. Other dangerous animals resulting in fewer cases are elephant, leopard, buffalo and hyena. Lion on average will account for a quarter to a third of the estimated 200 cases per year. The most affected areas are in southern Tanzania, then central and western Tanzania and to a lesser extent northern Tanzania despite high number of lions occurring there (see map in Annex 5).

Statistics are kept in the districts on such cases, but they are incomplete and are not regularly compiled or analysed. This is to some extent the result of weak administrations, but many cases in isolated settlements or in the bush are never reported to the authorities. The systematic under-reporting, might however, also reflect the dislike of giving the problem too much publicity, as it is a sensitive political issue. Meanwhile the data is centrally stored in the Wildlife Division in Dar es Salaam, and orders have been given to make an effort to collect all available past data and to record them in the future on a more systematic basis. Annex 4 presents an overview of national statistics for mortalities through lions between 1990 and 2004 as reported by the District wildlife offices. They do not include all years and all districts. In some cases they might be exact, in other cases we have evidence that they are grossly incomplete. The data provides therefore only a first general overview and a trend, but we cannot say how much it underestimates the real figures. A

total of 295 casualties is reported for the 15 years, i.e. 20 persons killed in Tanzania per year by lions. We think that the real figure should be two to three times as high.

There are other areas where lions occur, but for reasons unknown no human death or injuries have occurred. One such case is the Saadani National Park (around 1,000 km²) with 40 lions or more. It is surrounded by a number of villages and people daily cross the reserve through a network of roads or paths on foot or on bicycle. In the past the lions preyed on the cattle of the neighbouring Mkwaja Ranch (now part of the park), which reported an annual loss of approx. 400 cattle. Lions move around houses and have killed goats in the settlements, but to my knowledge no human death has been recorded in the last 40 years. The last reported incidence of a man-eating lion in the Serengeti was 1965 despite a very large lion population and many camping tourists, support staff and researchers always present.

As Nicholson points out the problem has always been more pronounced in southern Tanzania than in the other parts of the country, and it still is. Cattle husbandry is rare in southern Tanzania due to the occurrence of Tsetse, but this cannot be the only cause. Often the lack of game is mentioned. It is true that the Miombo ecosystems can sustain only relatively low game populations, but it would be expected that lower lion densities reflect this. Also further reduced game populations due to meat poaching cannot be used as explanation, as Nicholson gives a very high number of cases from the fifties where game numbers in some areas were higher than today..

Occasionally in the South of Tanzania there are even killing sprees which go on for a period of time. People are regularly snatched by lions within Tunduru town and there are areas where people are generally advised not to leave their huts after sunset. In Tunduru District, 42 people were killed in 1986. This included even the district Game officer who lost his life at night within Tunduru town. Oddly the outbreak ended as unexpected as it had started, and the incidence of man-eating in the district returned to normal levels. In the same year the scouts killed 43 lions (Koishwa, pers. comm.). Between 16 Jan 1997 and November that same year, 17 people were killed in Mkuranga District which is not more than 50 km from the city centre of Dar es Salaam. In Lindi District at least 24 people were killed and a similar figure injured in just one cluster of hamlets near the airport along the coast in 1999/2000. Game scouts killed a total of seven, mainly juvenile lions from the safety of vehicles, and thereafter the killing spree ceased. Between July 1994 and September the following year 29 people were killed and 17 injured in Liwale District. Details of an even more serious case from Mkongo Division in Rufiji District are presented below in chapter 4.

This may have been one of the most serious cases involving only one lion as the major culprit which has occurred in Tanzania.

3.3 Legal Framework and Problem-Animal-Control

Public acceptance of the consequences of this conservation of lions, namely loss of livestock und human life, is generally low. Like all dangerous game, lions are rather unpopular where they occur. Local conflicts frequently lead to accusations that the local administration and the government rank wildlife higher than people and to demands that such "vermin" should be destroyed or restricted behind fences as happens in other countries.

The Government finds itself cornered by two accusations coming from detrimental backgrounds. Despite its high cost conservation policy and its good records, the country is frequently accused by foreign international welfare circles and the misinformed public because of its pro sustainable-use-policy which includes the hunting of lions. Inside the country the Government is accused by the public, the media and some politicians of not doing enough to protect its citizens against lions. The latter is in particular unfair, as everybody who has dealt personally with the hunting of man-eating lions knows that this is extremely difficult, takes a long time and final success is uncertain in every case.

To deal with lion problems is the duty of the District Game Officer and his staff who are under the District administration. In serious cases the regional Anti Poaching Units are called in. Normally, however, the district wildlife authorities are informed and they dispatch scouts to handle the problem, if the complaints became too frequent and if transport, ammunition and duty travel allowances are available. Typically these scouts then try to eliminate every lion they can get find. Such control hunts are normally not efficient and, except in very serious cases, are not long lasting. Based on district statistics and interviews of district game officers I estimate that the lions killed countrywide on control by scouts per year will be less than 50. Most of them are young lions. The draft of the future new Wildlife Act will possibly restrict the possibilities of self help to immediate defence of life whereas the defence of property will be vested on authorized officers, i.e. the government's wildlife staff and registered village game scouts. The WMA appoint and employ trained village game scouts amongst others for crop protection and control of problem animals. The experiences with such village game scouts in the pilot WMA is that they provide more

efficient protection. Villager's subjective feeling of security is increased, as they no longer depend solely on government staff, whose availability is difficult to influence.

Legally the land owners or the villages concerned are also allowed to deal with lions. Section 50 (1) of the Wildlife Conservation Act, 1974, says: *"Nothing in this Act shall make it an offence to kill any animal in defence of human life or property or for the owner or occupier of such property or any person dependent on or employed by such owner or occupier to drive out or kill by any means what-to-ever any animal found causing damage to such property."* In many cases villagers will follow such lions with all kind of traditional weapons, muzzle loaders and shotguns or even rifles, if available. Often District administrations in such cases obtain ammunition and black powder for distribution to village councils. Tanzania has a comprehensive administrative system embracing even the smallest and remotest village. There is therefore an administrative network existing to deal with such issues and to exert a certain amount of control and management.

There is no compensation for wildlife related damage or loss of life in Tanzania. Occasionally the Government voluntarily pays small symbolic amounts of money if people get killed, like US$ 30 to 50. The draft of the forthcoming Wildlife Act does not make any provisions either. It has to be expected, however, that at some stage Members of Parliament will take up this controversial issue and demand compensation, as they have already done during public consultations of the new Wildlife Act. It is certainly popular to agitate for it.

Realistically speaking there is no easy way that compensation could be paid for crop damage or livestock losses caused by wildlife, including lions. The resulting sums would be huge and it is practically not possible to properly administer such a system and avoid gross misuse and embezzlement of funds. It would, however, be possible to envisage compensation for injury and loss of human life. The number of cases is less, evidence and organization of payment is easier and the case for compensation is stronger.

4. Case study of Mkongo Division, Rufiji District.

4.1 Area

The area where the killings occurred is a thin stretch of agricultural land along the southern bank of the Rufiji River totalling approximately 350 km² (see Annex 2). It is enclosed on its western and southern side by the Selous Game Reserve, and is a strip around 20km wide. Permanent villages are established on the northern bank of the river along the road leading to Mtemere, the eastern gate of the Selous Game Reserve. These villages were created during the cooperative Ujamaa villagisation programme in the 1970s. They have a total population of 13,217 people (6,367 male 6,850 female) in 3,000 households, and the inhabitants originated partly from areas south of the Rufiji River further West, between Mtemere and Kibambawe, which were annexed to the Selous Game Reserve in 1974. The village land consists now mainly of sandy infertile soils and villagers have always depended on the more fertile fields south of the river. People traditionally erect simple temporary structures on these farms, where they spend certain times of the year, especially during planting and harvesting, to protect their crops and chase away vermin. They then spend their nights on 2 to 3 m high lookout platforms (with or without roof) on stilts (known as "madungu" in Swahili) from which they chase away crop-raiding animals such as baboons, bushpigs, buffaloes and elephants. The only way to reach the fields on the south bank is by dug out canoe passing through crocodile and hippo infested waters. They cannot be reached by car as there is no road access and driving cross-country is not possible due to the nature of the terrain.

4.2 Details of Cases

According to our analysis of District statistics at least 58 people have been killed and 19 were injured by lions in the Rufiji District since November 1991. The intensity of the problem varies greatly. Between June 2001 and by 2004 only one person was reported killed from the district outside Mkongo ward. On the other hand, only three people were reported killed and three wounded from Mkongo Ward between November 1991 and August 2002. Between August 2002 and April 2004 not less than 35 people were killed and 10 injured in Mkongo ward. As with all statistics on the loss of life and injury by dangerous animals, this data is unreliable. The cases given

in this report are confirmed by the District Authorities and constitute the absolute minimum. We have reports of further victims and even newspaper articles, but have not included these unless further evidence could be established. But even in such confirmed cases the details surrounding the deaths are vague and interviewing different sources invariably leads to different results regarding the names, ages and circumstances of when and how it happened.

The series of killings which were obviously related to one individual lion or one pride of lions started on 31 August 2002 when a fourty year old woman (P.L) was killed on her farm on Mwageni village land. This remained the only case in that village. All cases occurred on the fields south of the river except 3 persons killed and 2 injured after one lion had crossed to the north bank of the river where it got killed.

31 % of the victims (dead or injured) were female and 69 % were male. The average age was 50 years. 5 % of the victims were children under 12 years, 12 % belonged to the age group of 13 to 25 years, 26 % were between 26 and 59 years and 57 % were 60 years and older. This reflects the fact that most of the people staying on the fields are elderly. In 22 cases the approximate time was established. There was one incident at 16.00 hours. All other cases occurred between 19.00 and midnight. The majority of cases occurred between November and January (short rains) and April and May (main rainy season). There were no deaths reported in July and September, only two deaths in August and four cases in October. July to October is the typical dry season. Between 2002 and 2004 the rains were quite irregular in eastern Tanzania and it was rather dry. The rainfall data from Utete, the District capital, are correlated with the lion attacks. It shows that most lion attacks occured while it was raining or directly afterwards. This might be because the vegetation growth provides more cover. Attacks might not be dependent upon the rain as such. Nicholson (pers. comm.) confirms that in his time the lion problems occurred after the ranges had been burnt. Interesting enough there were 7 cases in 2002 while it was dry and grass cover was certainly missing. There were no cases in the same month one year later.

No information is available on how many people stay in the area during the course of the year. The dry season will see less people, but there is always a certain number of people around. Since 2003 the area was increasingly vacated as a result of the hysteria caused by the lion attacks, and only the braver people or those who were more dependent on these farms for their survival stayed behind. The District Authorities were very concerned at that time that famine might develop in this area which faces regular food shortages from time to time anyway. Data on food supply trends is,

however, non existent , but what is certain is that the man-eating lions contributed greatly to poverty in the Division.

When the author visited the area in January 2003 many farms had been deserted and were taken over by grasses and weeds. Elephant stayed in the area and fed undisturbed on many of the food crops. Only a handful of brave (or desperate) people remained.

4.3 Methods of Attack

We were able to establish the exact details of 15 cases and were provided with more general reports on additional cases. The most frequent method of attack was that a lion forced its way through the wall of a hut which usually consisted of thatched grass or mud. Or it jumped on the roof of a hut (thatched grass), fell or crawled through, caught a person and left through the same way. Frequently the lion killed both persons inside a hut, but always left the second person behind, in one case on the roof. Many attacks on huts were unsuccessful. The author met a couple (about 70 years old) who reported that the lion had jumped on their roof two nights before. This could be verified by the visible tracks. They had made a great noise, but their thatched roof was very strong and the lion did not succeed in penetrating and finally gave up.

The second most important style of attack was for the lion to jump up onto a “dungu”, on which people take on the role of live scarecrows (usually at night) to chase away crop-raiding animals from their fields. In this case they unwittingly presented themselves as live bait to the lion.

Another less frequent method was for the lion to snatch people who left the house at night to relieve themselves. The only case during daytime was an attack on three men who were far away from the fields half way between the river and the Selous Game Reserve border. They claimed that they were fishing, but circumstantial evidence hints that they may instead have been on a poaching trip (possibly even carrying meat which attracted the lion). The area in question has been an established incursion route for elephant poachers from villages in the eighties and early nineties. Presently there is virtually no elephant hunting but meat poachers still use this route into the outskirts of the reserve, equally fishermen who fish on Lake Utunge which lies on the boundary of the reserve and where fishing is allowed.

Whenever man-eating by lions occurs in Tanzania the local people connect this with superstition and witchcraft. It is normally a "simba-mtu" (a human lion), which is a person turned into a lion and which can become invisible, if it so wishes. In the most infamous case, the Njombe man-eaters, it was supposedly a local chief whom the British colonial administration had removed and who consequently was said to have sent his lions for revenge. He boasted of his supernatural power which he would use until he could regain chieftainship. After 4 years the British reinstated him and this coincided with the last lion shot by a game scout. There was no more man-eating in that area. There have even been cases, where supposedly real men executed killings as if they had been done by lions. Such lion-men were invisible to all but the scorcerers who controlled them. Such mysterious killings were reported and examined by the authorities in the Singida area in 1920 and 1946 (Wyatt).

In Mkongo Division the people narrated a lengthy story that the fishing nets of a certain Makonde man were stolen and that he had sent the lion in retaliation.

People reported that in most cases it was a single male lion, or that a second, female lion sometimes accompanied it. It is possible that this second lion was also male but had no mane, which is not uncommon in southern Tanzania. The lion was reported as being extremely careful. It would always move in cover and usually on dark nights and avoid any foreign objects like a panga (machete knife) lying in its way. However it was obviously not afraid to approach human settlements. If the lion had time it would drag its victim away to eat the corpse including the intestines and leave the head, arms and lower legs behind. We were provided in 7 cases with the distance between the place where the killing occurred and where the lion start to feed on the victim and if the data are correct, it was on an average 45 metres, which shows that the lion(s) was either feeling safe or was rather careless.

Wildlife occurs in the area and the lion was not starved of other sources of food. The following animals were seen or tracked by the author: elephant, hippo, buffalo, common waterbuck, bushbuck, bushpig, warthog, duiker and suni. Big concentrations of game occur at a distance of less than 50 km inside the Selous Game Reserve. This lion (or lions) was thus not deprived of its normal source of food.

4.4 Lion Control Activities

In the case of problem animals, the District wildlife office normally assigns an appropriate number of scouts to the particular area in order to handle a situation, which usually entails killing the responsible animals. In the case of the Mkongo man-eaters the district game officer sent a group of District scouts to the area who sometimes stayed for several months, starting in 2002. They were strengthened in 2004 by the Anti-poaching Unit of Dar es-Salaam.

In 2002, and for part of 2003, the scouts mostly stayed on the southern side of the river. They set up their camps at homesteads and followed up cases as they occurred. Additionally they put wire-snares around huts where people stayed or on footpaths. The scouts were armed with well-worn repeating rifles of .3006, .375 or .458 in calibre, .303 Enfield military rifles, some semi-automatic Simonov and single or double-barrelled shotguns (for buckshot)

Hunting in this case was extremely difficult due to dense vegetation and high grasses with very low visibility. Local knowledge suggested that there was one male man-eater responsible, which was extremely sly and elusive. The scouts managed to kill a total of eight lions, most of which had been caught in wire snares, south of the river. They also shot one lion north of the river where they camped, and this lion certainly was unrelated to the killings. Several lions were shot at and injured, and it was reported that the lion in question had been wounded twice. According to the Wildlife Act it is legal to kill animals in defence of life and property by any method. The use of otherwise forbidden wire snares in such a case is therefore legal.

Predation of people continued unabated despite the killing of these lions. By 2003 the whole area had been evacuated by the majority of people, with the dwellings mostly abandoned and fields had became overgrown. In 2004 the scouts moved to the northern side of the river and stayed there. They only went to the southern side for occasional patrols or following up incidents. Crossing the Rufiji River which is about 500m wide was done by dugout canoes which is the common mode of river crossing. In 2004 the district provided a motorboat for some time. The area does not have any road access and cannot therefore be reached by vehicle.

While patrolling the northern side at night a hyena was killed. On one occasion two lions were reported. One was killed and another was wounded in a driven hunt. These lions were obviously unrelated to the killings and most probably came from the Selous Game Reserve which is also nearby on the Northern bank.

In 2003 we tried on several occasions to call the lions (Smuts el al. 1977), but without success. As we did not have the time to try this more often, it cannot be said whether it would eventually have been successful. We advised the scouts to obtain suitable bait from the nearby Selous Game Reserve, but they never tried this method. Our own staff built several tree hides in suitable places to improve visibility where lions had been tracked. They spent some time in these hides, but with no success. We did not try to ascertain the density of lions in the area, but we were always able to find lion tracks when we looked for them, although these tracks were mostly not fresh.

The villagers on the northern side of the river showed great interest in all activities, but otherwise provided little cooperation. All services like providing a canoe to cross the river had to be paid for. The few remaining farmers on the southern side were however cooperative. It was always easy to find men as guides. They were not afraid and were obviously used to moving unarmed through the area. One particularly courageous boatman and guide, who obviously had experience as a traditional hunter and claimed to have shot two lions in the are with a shotgun, was later reportedly killed by a lion.

In April 2004 scouts were extremely lucky and their strategy of "wait and see" bore fruit. Three fishermen slept on an island in the Rufiji River on 7th April 2004. The lion had obviously swum from the southern shore to the island and attacked one fisherman who had tried to protect himself somehow with large spiky palm leaves. The beast only gave up the attack when the other two fishermen came to the rescue of their colleague. The lion run off and left the island, but swam north instead of south. Whereas the lion had obviously not crossed the river before, he did so now, probably as a consequence of the event on the island and the resulting commotion. This lion then killed a woman north of the river on 15th April 2004 and injured another woman on 19th April. On 20th April at 21 hours it again attacked two women of 60 and 75 years old respectively who slept in a little "dungu"-hut on stilts and dragged one of the two women away and partly ate her corpse. Early in the morning the scouts were alerted, rushed to the scene and started tracking. They found the half eaten victim after about one kilometre away. The flesh of the lower part of the body from the waist downwards and the intestines were mostly eaten and upper body and the bones of

the upper legs remained. Obviously the lion had been resting and eating until it was disturbed. This behaviour was that of a somewhat careless lion rather than a cunning one.
The lion was followed by a large group of villagers for some distance. At around 14 hours the lion took cover in a bushy area. The scouts climbed trees for more visibility, as they said, and the villagers drove the forest as beaters. One villager fired at the lion with a shotgun and wounded it. It finally approached the scouts and was shot at again. It escaped, but was followed by the scouts and died in a hail of bullets and LG shotgun pellets when it finally charged.

The lion turned out to be an adult male of 3 1/2 years (ageing by Craig Packer), in good health and well fed. All adult teeth were there. They were white and in good order and tooth wear was minimal. Some teeth were damaged by shots. The skull resembled a pepper pot but measured 35 cm (length) by 21.5 cm (width) according to Rowland Wards measurement system. The lion was not previously wounded, but the bare skin showed signs that it had been caught in a wire snare at some stage. No measurements were done after killing the animal by the scouts. Neither my staff nor I were around when the actual killing happened, so the lion was not further examined. It was not possible to recover the skin, as it had mysteriously disappeared. There was a lot of superstition surrounding this lion.

No further cases of lion attacks have been reported from Mkongo Division since the lion was killed on April 21st 2004 up to now (July 2004). Given its age, the lion must have been under two years when the killing spree started. It is improbable that this lion had developed into a man-eater on his own at that age. He might instead have been introduced to it at that time by other members of the pride. It may be that these lions were amongst those killed by the scouts since then, but this is not sure. Obviously this lion was not responsible for the six killings and injuries by lions that occurred in Mkongo Division between June 9th 1994 and May 23rd 1998. We know this lion was a killer, but only time will show whether this lion was the notorious man-eater from Mkongo Division whom the people fearfully called "Ossama" and who had established himself as one of the worst individual cases of man-eating in Tanzania and possibly in Africa.

5. Conclusions and Recommendations

1. It must be appreciated that the Tanzanian Government tolerates the existence of lions outside of the protected areas as part of the natural biodiversity of the country, despite all related economic and human costs. Also the general tolerance shown by the Tanzanian people towards lions as part of the God-made environment equally deserves praise, notwithstanding certain acts of revenge that take place by pastoralists. This becomes even more remarkable if compared, for example, to the return of two packs of wolves or the expansion of lynx in Germany, neither of which pose a threat to human life, and how this issue is nevertheless received with mixed, often even hostile receptions by the people there.

It is easy to favour the protection of dangerous animals, if one is not threatened by them and only comes into contact with them occasionally on luxury safaris from the security of a vehicle or under the protection of an armed guard.

Nevertheless it must be assumed that the tolerance levels will also fade in Tanzania, and experience proves that pastoralists in particular are able to eradicate lion populations if they so wish. It is therefore necessary to draw **more attention to lion-human-conflicts** and work on remedies.

2. The publication of grossly false (or falsified) figures for **lion numbers** does not facilitate the debate on how to best conserve lions in their range. The lion is undoubtedly endangered in a good number of countries, in others - like Tanzania - it is not.

3. It is also not helpful if a country like Kenya, which for a variety of reasons unfortunately has a rather deplorable record of lion and wildlife conservation since its hunting ban 27 years ago, proposes an **upgrading of lion to Appendix I**. The proposal aims at banning international trade and this is directed essentially at hunting trophies due to near non-existence of other trade. In no way does this address the reasons which have led to the widespread disappearance of lions in Kenya. It will however, negatively affect the sustainable and consumptive use of lions in countries where this contributes to successful lion conservation.

4. Despite being overall sustainable the **hunting of lions** in Tanzania can be improved. This should be done together with the industry, as the best regulations are useless, if they are opposed by those

who have to follow them and any regulations must also be practical. An age minimum, as difficult as it may be in practice, would certainly be a good solution to enforce sustainability. Greater efforts need to be invested into developing **sustainable hunting quota**. The few blocks which are overused and the operators who have done so need attention.

The hunting of lions needs to generate a considerable income to cover the costs of protecting these animals and the ecosystems in which they live. The current hunting system is inefficient and could generate far greater revenues. Reforms to the system are required, particularly to acquire the market value for which it is worth, which can only be achieved through a system of **auctioning concessions**. This single step will overcome the problem of subleasing to wandering professional hunters that is degrading the industry.

5. Under the present hunting system in Tanzania, villages do not derive direct benefits from hunting on their land except through various voluntary contributions by hunting companies. The creation of WMA will change this and in future the major part of revenues from hunting on village land will stay with the communities. To become effective this new system of "**benefit sharing**" needs the agreement of the Treasury which is still outstanding despite lengthy negotiations with the Wildlife Division. Permission should be granted in order to **allow for direct benefits of communities from wildlife, including revenues generated from lions without further delay.** This responsibility lies with the Ministry of Finance.

6. The issue of **compensation** for wildlife related damage - including loss of human life - is a complex one and many legal, economic and administrative issues have to be considered. The author refrains from discussing here the political question whether or not compensation should be introduced. He instead restricts this paper to the following comments: Compensation for the loss or damage of property including crops and livestock can not be financed due to the high sums involved. To compensate only for loss of livestock would be less costly, but it is not possible to compensate for loss of cows and goats but not crops, which are destroyed by wildlife other than lions. Tanzania currently has neither the revenues nor capacity to implement a comprehensive compensation in a fair and efficient manner to all who are affected.

A **compensation for loss of life and serious injuries** is, however, politically more pressing and in principle it would be possible to manage and to finance it. It would be seen as a responsibility of the Ministry for Natural Resources and Tourism and would certainly not be financed from the general budget. However, the Ministry's wildlife related income from hunting and tourism is

already required for many purposes including the funding of conservation areas and conservation in general. Additionally the major share of hunting income outside protected areas will in future be revenue for rural communities.

It would, however, be fair to **charge every tourist hunter a "fee to compensate for loss of life and injury due to dangerous animals"**. Appropriate amounts would be US$ 1,000 in the case of lion and elephant, US$ 500 for leopard and US$ 100 for buffalo, hippo and crocodile. A fee specifically for this purpose is better than increasing the general licence fee, as the foreign hunting tourist would psychologically better accept such a specific fee than an unspecified payment. The cause can easily be understood and it would provide the hunter with a good feeling and a story or two that he can later tell at home. Licence fees have not been increased in Tanzania since 1991. In Germany for example most damages by wild animals are fully compensated, and it is the owner or respectively the lessee of the hunting rights who has to pay these substantial amounts.

The revenue generated would be earmarked for compensation only and administered by the Tanzania Wildlife Protection Fund. National Parks and Ngorongoro Conservation Area would also be required to contribute. Hunting alone would generate around US$ 600,000 which would have to be distributed to an estimated number of 500 families and people. To guarantee a fair and proper distribution process might not be easy but could be organized.

7. More **practical lion research and monitoring** is needed in Tanzania including lion numbers, illegal killings, human-lion conflict and hunting of lions. Such research should be closely coordinated with the respective wildlife management bodies.

8. The villages in **Mkongo Divison** are encouraged to establish a **Wildlife Management Area** between the Selous boundary and the stretch of agricultural land along the river. The area would qualify as a hunting block despite the difficulty of the terrain and its non-accessibility. The presence of hunting would facilitate the control of problem lions and other problem animals while at the same time income would be generated which could be used to strengthen houses or which could serve as a form of compensation. Proposals have been presented to annex the whole of the respective area to the Selous Game Reserve. For the Selous it would be a relatively minor addition and the resulting closer proximity of the game reserve might further endanger the livelihood systems of the people. Developing a WMA is a better solution that would lead to the communities being better able to manage their own affairs.

9. **Practical measures for better protection** of the population in extreme cases like Mkongo should be developed. This might include improving houses to make them more lion proof. Success will be difficult to achieve. More sophisticated methods like collaring prides and thereby facilitating their monitoring is not practical in Southern Tanzania.

Annex 1: List of known Human Deaths and Injuries by Lions in Rufiji District

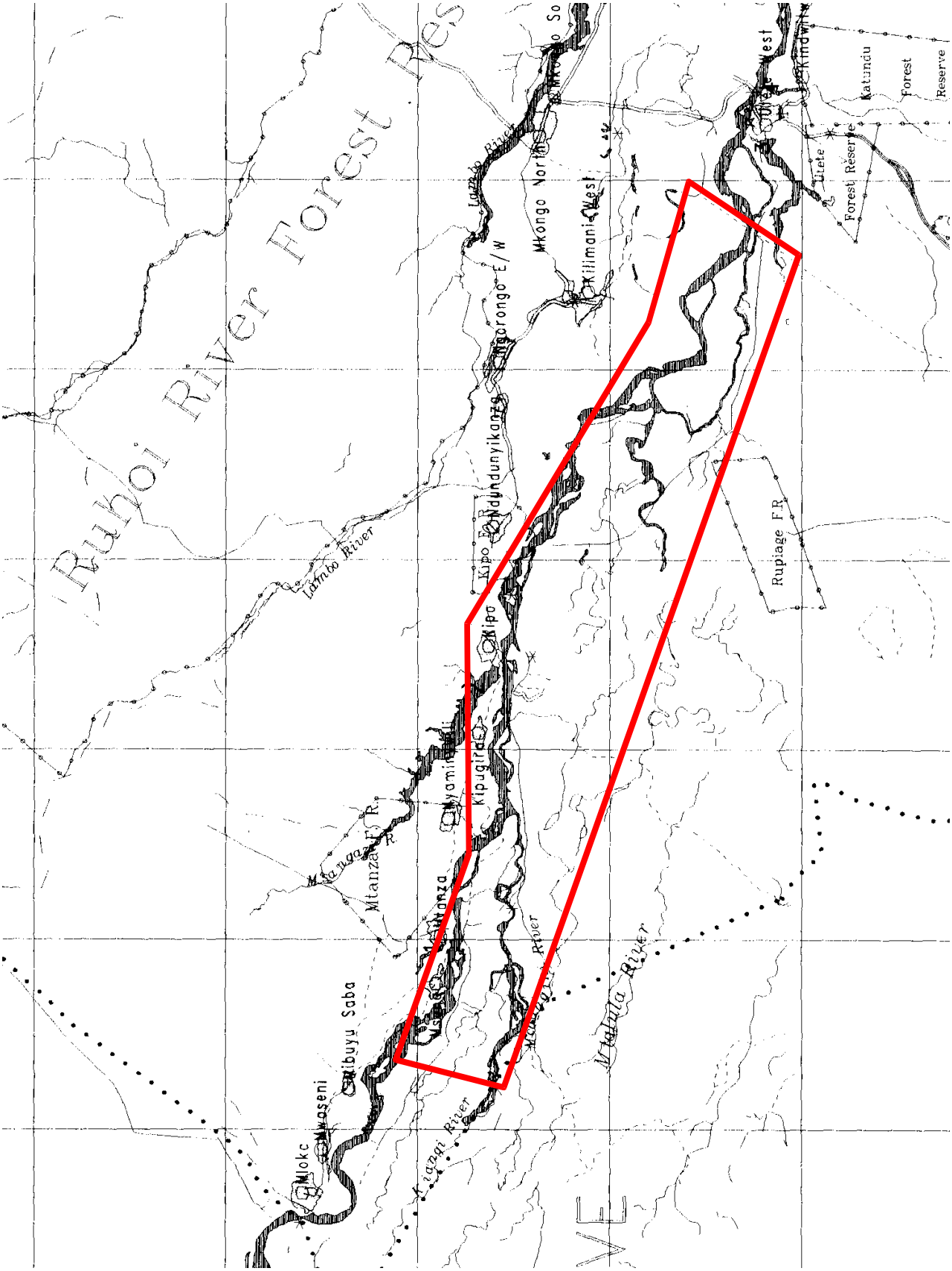
(MD = Mkongo Division Only)

	Date	Victim	Age (yrs)	Details		Place of attack	Circumstances						
				Killed	Injured		No. of lions	Time	Season		Light		
									Rain	Dry	Day	Moon	Total dark.
1	10/11/91	B.S.		√	×	Utunge	–	–	–	–	–	–	–
2	18/11/91	S.P.		√	×	Lugongwe – Utete	–	–	–	–	–	–	–
3	31/12/91	M.M.		√	×	Miulwe Utete	–	–	–	–	–	–	–
4	13/01/93	I.M.		×	√	Kiechuru Mbwera	–	–	–	–	–	–	–
5	09/06/94	Z.A.		√	×	Kilimani MD	–	–	–	–	–	–	–
6	18/10/94	S.S.	30	×	√	Kilimani MD	–	–	–	–	–	–	–
7	24/10/94	S.H.	19	√	×	Mkongo MD	–	–	–	–	–	–	–
8	22/06/95	S.H.		√	×	Kipo MD	–	–	–	–	–	–	–
9	11/12/96	H.O.		√	×	Nyakikwasu Utete	–	–	–	–	–	–	–
10	23/03/96	O.S.		√	×	Kilenge Utete	–	–	–	–	–	–	–
11	16/04/96	H.A.		√	×	Kilenge Utete	–	–	–	–	–	–	–
12	06/04/97	D.S.	14	×	√	Kingwila Kibiti	–	–	–	–	–	–	–
13	07/04/97	A.M.	3	√	×	Kitembo Kibiti	–	–	–	–	–	–	–
14	18/04/97	Y.J.		√	×	Miwaga Kibiti	–	–	–	–	–	–	–
15	03/06/97	K.M.		×	√	Mkongo MD	–	–	–	–	–	–	–
16	17/12/97	R.U.		×	√	Kingwila Kibiti	–	–	–	–	–	–	–
17	17/12/97	M.		×	√	Kingwila Kibiti	–	–	–	–	–	–	–
18	19/12/97	A.M.		√	×	Nyamabano Kibiti	–	–	–	–	–	–	–
19	06/01/98	M.A.		√	×	Kingwila Kibiti	–	–	–	–	–	–	–
20	06/01/98	I.M.		√	×	Kingwila Kibiti	–	–	–	–	–	–	–
21	15/01/98	S.M.		√	×		–	–	–	–	–	–	–
22	13/02/98	R.M.		√	×	Pagae Kibiti	–	–	–	–	–	–	–
23	20/02/98	H.M.		√	×	Nyamakonge Kibiti	–	–	–	–	–	–	–
24	09/3/98	S.P.		×	√	Kibiti	–	–	–	–	–	–	–
25	09/3/98	A.N.		√	√	Kibiti	–	–	–	–	–	–	–
26	10/3/98	H.N.		√	×	Nyamakonge Kibiti	–	–	–	–	–	–	–
27	20/04/98	B.N.	35	√	×	Ngulakula Kibiti	–	–	–	–	–	–	–
28	25/04/98	B.H.		√	×	Mchukwi Kibiti	–	–	–	–	–	–	–
29	05/05/98	J.H.	50	√	×	Pagae Kibiti	–	–	–	–	–	–	–
30	23/05/98	J.O.		×	√	Mwaseni MD	–	–	–	–	–	–	–
31	24/05/98	A.R.	8	√	×	Mahege Kibiti	–	–	–	–	–	–	–
32	25/05/98	K.M.		√	×	Mchukwi Kibiti	–	–	–	–	–	–	–
33	28/10/00	H.M.		√	×	Mpumbe Ikwiriri	–	–	–	–	–	–	–
34	28/11/00	N.N.	70	√	×	Katundu Utete	–	–	–	–	–	–	–

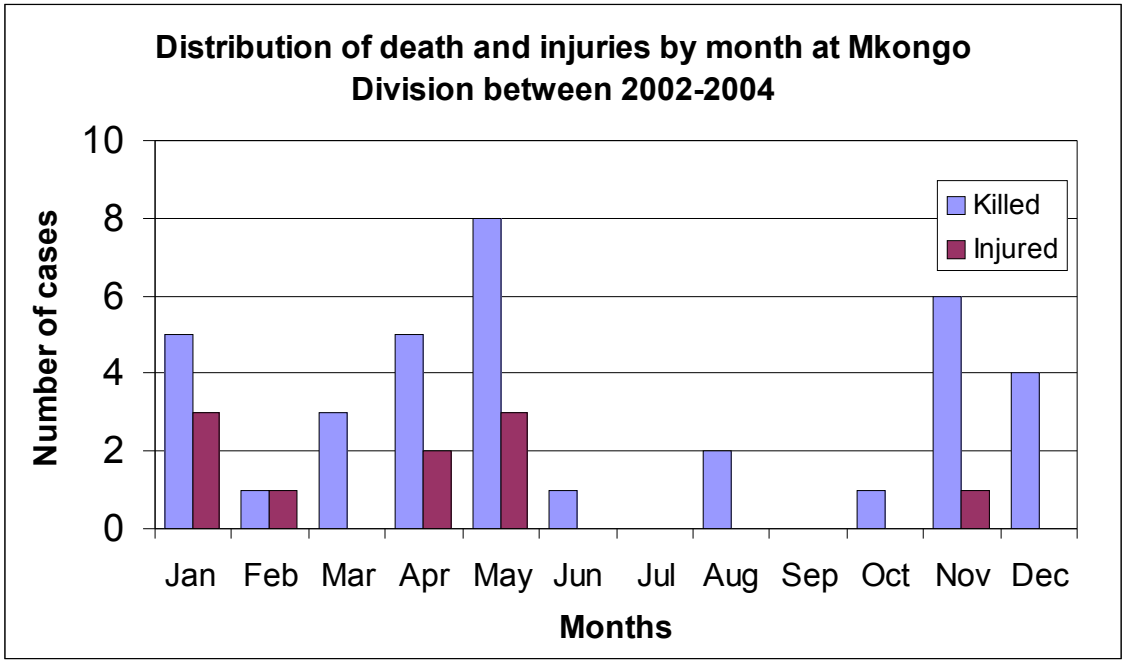
35	17/06/01	S.S.		√	×	Mpumbe Ikwiriri	–	–	–	–	–	–	–
36	31/08/02	P.L.	40	√	×	Mwaseni MD	–	–	–	–	–	–	–
37	24/10/02	M.M.	18	√	×	Kilimani MD	–	–	–	–	–	–	–
38	04/11/02	A.D.	22	√	×	Ndundunyikanza MD	–	–	–	–	–	–	–
39	04/11/02	H.G.	62	√	×	Ndundunyikanza MD	–	–	–	–	–	–	–
40	06/11/02	S.M.	65	√	×	Kipo MD	–	21:00	√	×	×	×	√
41	14/11/02	S.M.	7	√	×	Kipugira MD	–	–	–	–	–	–	–
42	15/11/02	A.M.	65	√	×	Kipo MD	–	20:00	√	×	×	×	√
43	22/11/02	A.M.	40	×	√	Ndundunyikanza MD	–	–	–	–	–	–	–
44	26/11/02	S.S.	48	√	×	Kilimani MD	–	–	–	–	–	–	–
45	04/12/02	A.M.	70	√	×	Nyaminywili MD	–	–	–	–	–	–	–
46	07/12/02	M.N.	72	√	×	Ngorongo MD	–	–	–	–	–	–	–
47	23/12/02	S.S.	80	√	×	Mtanza MD	–	–	–	–	–	–	–
48	25/12/02	Y.H.	70	√	×	Mtanza MD	–	–	–	–	–	–	–
49	12/01/03	T.N.	45	√	×	Kipo MD	–	22:00	√	×	×	×	√
50	24/01/03	Y.M.	65	√	×	Kipugira MD	–	–	–	–	–	–	–
51	24/01/03	T.S.	65	×	√	Kipugira MD	–	–	–	–	–	–	–
52	04/02/03	M.N.	50	×	√	Nyaminywili MD	–	–	–	–	–	–	–
53	30/03/03	Z.A.	70	√	×	Kipugira MD	–	–	–	–	–	–	–
54	30/03/03	A.M.	75	√	×	Nyaminywili MD	–	–	–	–	–	–	–
55	07/04/03	M.M.	70	√	×	Ngorongo MD	–	–	–	–	–	–	–
56	12/4/03	A.M.	60	√	×	KipoMD	–	22:00	√	×	×	×	√
57	09/05/03	M.K.	60	√	×	Nyaminywili MD	–	–	–	–	–	–	–
58	12/05/03	S.M.	45	√	×	NgorongoMD	–	–	–	–	–	–	–
59	12/05/03	Z.N.	66	×	√	Ndundunyikanza MD	–	–	–	–	–	–	–
60	23/05/03	O.J.	17	√	×	Nyaminywili MD	–	–	–	–	–	–	–
61	27/05/03	M.M.	70	√	×	Ndundunyikanza MD	–	–	–	–	–	–	–
62	27/05/03	Z.O.	67	√	×	Ndundunyikanza MD	–	–	–	–	–	–	–
63	27/05/03	M.M.	5	√	×	Ndundunyikanza MD	–	–	–	–	–	–	–
64	27/05/03	R.W.	×	√	×	Ndundunyikanza MD	–	–	–	–	–	–	–
65	30/05/03	A.M.	70	×	√	Ndundunyikanza MD	–	–	–	–	–	–	–
66	30/05/03	Z.S.	25	√	×	NdundunyikanzaMD	–	–	–	–	–	–	–
67	30/05/03	S.M.	70	×	√	Nyaminywili MD	1	20:00	√	×	×	√	×
68	18/06/03	H.H.	25	√	×	Dibala	–	–	–	–	–	–	–
69	19/08/03	H.M.	38	√	×	Kisiliwindi-Kipugira MD	2	19:00	×	√	×	×	√
70	18/01/04	A.S.	26	×	√	Nyaminywili MD	1	22:00	√	×	×	√	×
71	25/01/04	S.N.	50	×	√	Nyaminywili MD	1	21:00	×	√	×	×	√
72	25/01/04	J.M.	70	√	×	Nyaminywili MD	1	21:00	×	√	×	×	√
73	31/01/04	S.S.	45	√	×	Kipo MD	2	23:00	×	√	×	×	√
74	31/01/04	M.A.	35	√	×	Kipo MD	2	23:00	×	√	×	×	√

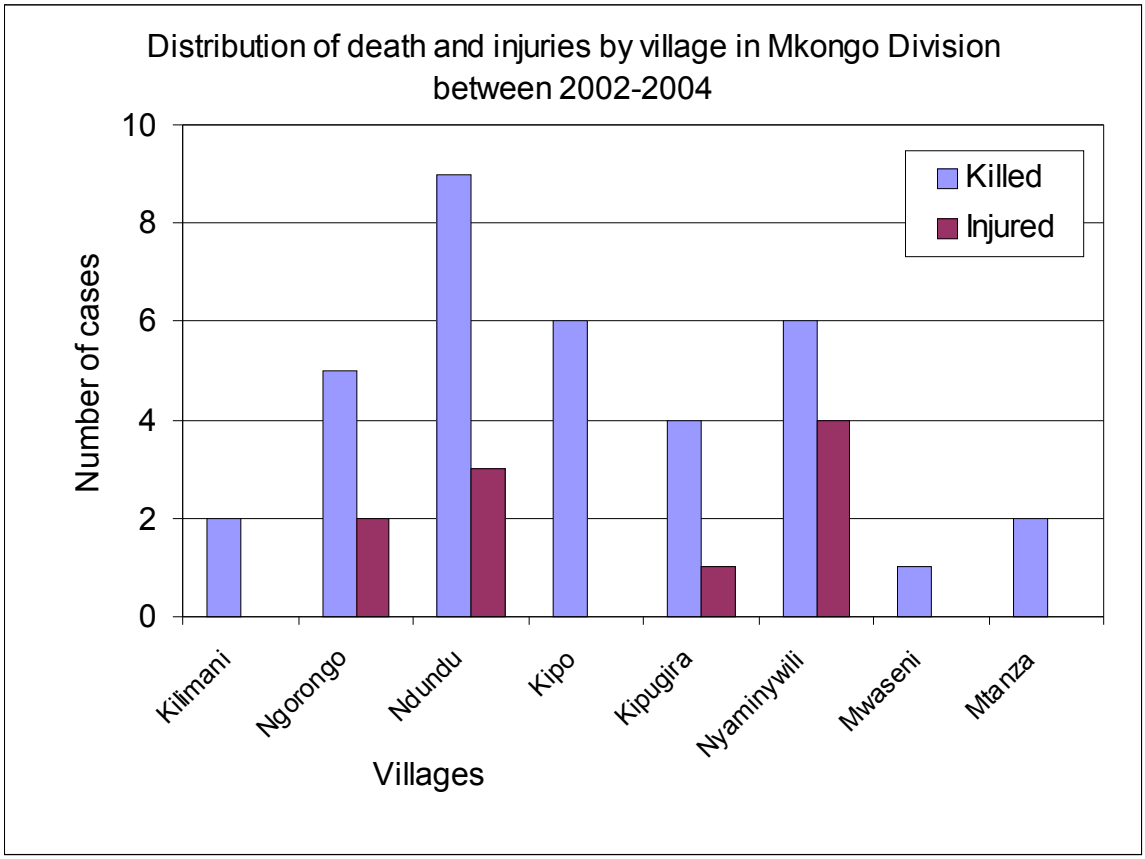
75	15/02/04	H.M.	70	√	×	Nyaminywili MD	1	24:00	×	√	×	×	√
76	22/03/04	O.R.	22	√	×	Ndundu (N'yikanza) MD	1	16:00	√	×	√	×	×
77	07/04/04	Y.F.	–	×	√	Ngorongo MD	1	19:00	√	×	×	×	√
78	15/04/04	A.M.	60	√	×	Ndundu (nyikanza) MD	1	22:00	√	×	×	×	√
79	19/04/04	Y.W.	–	×	√	Ngorongo MD	1	19:00	√	×	×	×	√
80	20/04/04	S.S.	75	√	×	West Ngorongo MD	1	21:00	√	×	×	×	√
81	20/04/04	A.S.	60	√	×	West Ngorongo MD	1	21:00	√	×	×	×	√

Annex 2: Map of Mkongo Division

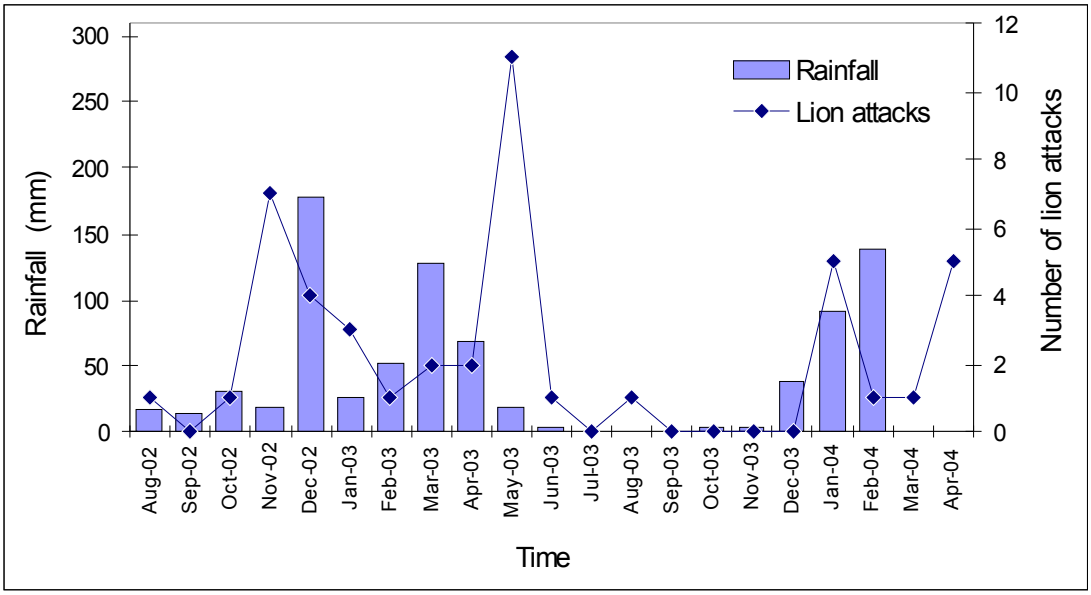


Annex 3: Analysis of man-eating incidents in Mkongo Division, Rufiji District





Relationship between rainfall and lion-attacks in Mkongo Division, 2002 – 2004



Annex 4: National statistics for man-eating in Tanzania (1990 - 2004)

The following data are highly incomplete

I. SOUTHERN ZONE

SONGEA REGION

A. Songea/Namtumbo Districts

	NAMES OF VICTIMS	SEX	AGE	DATE OF EVENT	PLACE OF ATTACK (Village)
1.	-	-	-	14/2/1992	Likusanguse
2.	-	-	-	26/2/1992	Amani
3.	-	-	-	08/3/1992	Lusewa
4.	S.H.	M	48	01/06/1999	Mkongotema
5.	J.M.	M	12	01/06/1999	Mkongotema
6.	C.N.	M	24	19/08/1999	Mnywamasi
7.	V.K.	M	52	06/11/1999	Mnywamasi
8.	J.P.	M	50	07/11/1999	Ligera
9.	M.M.	M	54	15/12/1999	Mkongotema
10.	J.M.	M	70	16/12/1999	Kipiki
11.	V.M.	M	50	16/12/1999	Kipiki
12	A.A.	M	40	../12/2000	Ligera
13	M.M.	M	65	../10/2002	

B. Tunduru District

14.	R.M.	M	60	09/08/1991	Nanyoka
15.	H.D.	F	25	30/10/1991	Mbati
16.	T.T.	M	10	25/01/1992	Sisikwasisi
17	B.K.	M	15	25/01/1992	Sisikwasisi
18	M.A.	M	35	02/02/1992	Mkwajuni
19	S.O.	M	64	19/03/1992	Marumba
20	A.C.	F	18	21/03/1992	Mbati
21	A.C.	F	25	21/03/1992	Mbesa
22	A.B.	M	9	27/03/1992	Mbesa
23	S.K.	M	35	29/03/1992	Mtonya
24	B.S.	F	60	31/03/1992	Mbesa
25	S.C.	M	5	31/03/1992	Semeni
26	A.H.	M	26	05/04/1992	Ligunga
27	S.A.	F	18	20/04/1992	Tulingane
28	Y.H.	M	21	06/05/1994	Mkutamo
39	S.H.	F	10	19/01/1995	Namwinyu
30	I.M.	M	32	22/08/1996	Lukumbule
31	A.M.	M	14	15/04/1997	Lukumbule
32	A.S.	M	10	28/04/1997	Semeni
33	P.M.	M	50	13/04/1998	Mkowela
34	M.M.	M	45	07/04/1999	Semeni
35	A.H.	M	16	27/04/1999	Majimaji
36	B.Y.	F	35	10/05/1999	Nakapanya
37	S.R.	M	5	20/10/1999	Makaudu
38	A.M.	M	9	20/10/1999	Chikomo

II. CENTRAL ZONE

SINGIDA REGION

A. Manyoni District

39	I.M.	M	N/A	09/04/1991	Kamenyanga
40	N/A	M	N/A	1991	Mhanga
41	N/A	M	N/A	1992	Chikola
42	N/A	F	N/A	1993	Mgandu
43	N/A	F	N/A	1994	Sasilo
44	N/A	M	N/A	1994	Azimio
45	N/A	F	N/A	1997	Sasilo
46	N/A	M	N/A	28/09/2000	Aghondi
47	E.C.	F	N/A	10/3/2002	Ipande

B. Singida (rural) District

48.	A.H.	F	18	29/07/2001	Mpugizi
49	A.S.	F	45	22/05/2003	Ighombwe
50.	S.S.	F	6	22/04/2003	Misake

51.	K.S.	F	46	02/06/2003	Ighombwe
52.	N.D.	M	40	09/07/2003	Nkorongo
53.	L.J.	M	36	06/10/2003	Nkorongo
54.	M.N.	M	28	18/12/2003	Nkorongo
55.	C.M.	M	40	20/01/2003	Mhintiri
56.	R.M.	M	40	11/03/2004	Mnyange

C. Iramba District

57.	M.J.	M	42	06/07/1994	Songambele
58.	M.N.	M	32	03/09/1998	Urughu
49..	M.K.	M	42	07/07/1998	Zinziligi
60	Y.E.	M	26	04/07/2002	Urughu
61.	L.B.	M	34	07/01/2003	Urughu
62.	B.K.	M	18	03/08/1991	Mayamaya
63	J.N.	M	N/A	03/8/19991	Mkodai
64	A.A.	F	8	19/08/1991	Mkodai
65	K.L.	M	35	03/08/1996	Mtungutu
66	P.J.	F	7	06/10/1999	Ilangali

E. Kondoa District

67	J.H.	F	14	30/10/1999	Itolwa
68	M.S.	M	14	15/12/1999	Mwailanje
69.	S.H.	F	12	12/12/1999	Soya
70.	M.I.	F	50	11/08/2000	Magasa
71.	A.S.	F	2	07/09/2001	Nkurali
72.	S.S.	F	3	19/09/2001	Mapango
73.	-	N/A	N/A	15/10/2001	Mrijo
74.	N.H.	M	15	21/11/2001	Isusumya
75.	A.R.	M	14	03/07/2003	Mrijo juu

F. Mpwapwa District

76.	A.S.	M	46	1997	Igoji - I
77.	A.K.	M	50	1997	Igoji - I

III.WESTERN ZONE

TABORA REGION

H. Igunga District

78.	P.S.	M	28	01/03/1989	Igunga
79.	H.S.	F	50	01/03/1989	Igunga
80.	J.M.	M		01/01/2001	Igunga
81.	J.M.	M		23/01/2001	Igunga
82.	M.N.	M		06/01/2002	Igunga
83.	K.H.	M		31/05/2003	Igunga
84.	M.M.	M		21/01/2003	Igunga

85.	S.E.	M		13/09/2003	Igunga
86.	D.J.	M		24/12/2003	Igunga
87.	K.H.	M		25/12/2003	Igunga
88.	T.C.	M		30/09/2003	Igunga
89.	M.M.	M		01/08/2003	Igunga
90	M.J.	M		28/01/2004	Igunga
91.	M.S.	M		30/01/2004	Igunga
92.	K.M.	F	7	13/03/2004	
93.	W.K.	F	7	18/03/2004	Igunga

I. Uyui District

94.	M.N.	M	50	30/05/1997	Kizengi
95.	M.G.	M	55	09/05/1997	Loya

KIGOMA REGION

J. Kigoma District

96.	Z.A.	F	40		Ilagaga
97.	M.S.	M	60		Rubaga
98.	M.H.	F	35		Mahanga

IV. COAST ZONE

COAST REGION

K. Rufiji District

99.	B.S.	M		10/11/1991	Utunge
100.	S.P.	M		18/11/1991	tete
101	M.M.	F		31/12/1991	Utete
102	Z.A.	F		09/06/1994	Kilimani
103	S.H.	M		24/10/1994	Mkongo
104	S.H.	M		22/06/1995	Kipo
105	H.O.	F		11/12/1996	Utete
106	O.S.	M		23/03/1996	Utete
107.	H.A.	F		16/04/1996	Utete
108	A.M.	F	3	07/04/1997	Kibiti
109	Y.J.	M		18/04/1997	Kibiti
110.	A.M.	F		19/12/1997	Kibiti
111.	M.A.	M		06/01/1998	Kibiti
112	I.M.	M		06/01/1998	Kibiti
113	S.M.	M		15/01/1998	
114	R.M.	M		13/02/1998	Kibiti
115.	H.M.	F		20/02/1998	Kibiti
116.	A.N.	M		09/03/1998	Kibiti
117	H.N.	M		10/03/1998	Kibiti

118	H.N.	M		10/03/1998	Kibiti
119	B.N.	M	35	20/04/1998	Kibiti
120.	B.H.	M		25/04/1998	Kibiti
121.	J.H.	F	50	05/05/1998	Kibiti
122.	A.R.	F	8	24/05/1998	Kibiti
123.	K.M.	F		25/05/1998	Kibiti
124.	H.M.	F		28/10/2000	Ikwiriri
125.	N.N.	M	70	28/11/2000	Utete
126.	S.S.	M		17/06/2001	Ikwiriri
127.	P.L.	F	40	31/08/2002	Mwaseni
128	M.M.	M	18	24/10/2002	Kilimani
129.	A.D.	M	22	04/11/2002	Ndundunyikanza
130.	H.G.	M	62	04/11/2002	Ndundunyikanza
131.	S.M.	M	65	06/11/2002	Kipo
132.	S.M.	M	7	14/11/2002	Kipugira
133.	A.M.	M	65	15/11/2002	Kipo
134.	S.S.	M	48	26/11/2002	Kilimani
135.	A.A.	F	70	04/12/2002	Nyaminywili
136.	M.N.	M	72	07/12/2002	Ngorongo
137.	S.S.	M	80	23/12/2002	Mtanza
138.	Y.H.	M	70	25/12/2002	Mtanza
139.	T.N.	F	45	12/01/2003	Kipo
140.	Y.M.	M	65	24/01/2003	Kipugira
141.	Z.A.	F	70	30/03/2003	Kipugira
142.	A.M.	M	75	30/03/2003	Nyaminywili
143.	M.M.	M	70	07/04/2003	Ngorongo
144	A.M.	M	60	12/04/2003	Kipo
145	M.K.	M	60	09/05/2003	Nyaminywili
146.	S.M.	M	45	12/05/2003	Ngorongo
147.	O.J.	M	17	23/05/2003	Nyaminywili
148.	M.M.	M	70	27/05/2003	Ndundunyikanza
149.	Z.O.	F	67	27/05/2003	Ndundunyikanza
150.	M.M.	M	5	27/05/2003	Ndundunyikanza
151.	R.W.	M		27/05/2003	Ndundunyikanza
152.	Z.S.	F	25	30/05/2003	Ndundunyikanza
153.	H.H.	M	25	18/06/2003	Dibala
154.	H.M.	M	38	19/08/2003	Kipugira
155.	J.M.	M	70	25/01/2004	Nyaminywili
156.	S.S.	M	45	31/01/2004	Kipo
157.	M.A.	F	35	31/01/2004	Kipo
158.	H.M.	M	70	15/02/2004	Nyaminywili
159.	O.R.	M	22	22/03/2004	Ndundunyikanza
160	H.M.	M	82	15/02/2004	Logeloge
161	A.B.	M		23/04/2004	Nyambikile
162	A.M.	F	60	15/04/2004	Ndundunyikanza
163	S.S.	F	75	20/04/2004	Ngorongo
164	A.S.	F	60	20/04/2004	Ngorongo

L. Kisarawe District

165	S.A.	M	-	24/10/1995	Kisemvule
166	M.M.	F	-	10/11/1995	Kibamba

167.	M.A.	M	-	10/11/1995	Vianzi
168.	S.C.	M	-	10/11/1995	Mwanambaya
169.	A.M.	M	-	05/12/1995	Vikindu
170	N.M.	M	-	05/12/1995	Kibamba
171.	-	M	-	1995	Kibamba
172.	-	F	-	12/11/1995	Mwanzega
173.	A.O.	M	-	22/09/1995	Mwanambaya
174.	S.C.	M	-	27/06/1995	Vikindu
175.	R.A.	M	5	12/09/1991	Mkuranga

M. Mkuranga District

176	M.M.	M	13	16/03/97	Mkuranga
177	M.H.	M	12	14/03/97	Mbezi
178	H.M.	M	14	27/03/97	Magoza
179	J.B.	M	9	03/04/97	Mkuranga
180	A.M.	F	46	20/04/97	Mihekela
181	R.S.	M	10	24/04/97	Mwalisembe
182	K.J.	M	8	29/04/97	Msolokelo
183	M.N.	M	58	20/05/97	Tegelea
184	S.M.	M	8	08/06/97	Mbezi
185	H.S.	M	11	30/06/97	Magoza
186	S.H.	F	39	04/07/97	Mwasani
187	S.M.	F	29	09/06/97	Vikindu
188	M.K.	F	12	08/07/97	Tegelea
199	M.M.	M	9	04/07/97	Hoyoyo
190	S.A.	F	13	07/07/97	Kipalanganda
191	M.C.	F	12	10/07/97	Mbezi
192	R.A.	M	11	12/07/97	Mbezi
193	.M.	M	16	18/07/97	Kitomondo
194	P.J.	F	56	24/02/03	Biga
195	M.S.	F	35	04/01/03	Biga
196	M.M.	M	14	29/07/03	Mkuranga

LINDI REGION

N. Kilwa District

197	H.K.	M	54	03/08/99	Kisarawe
198	A.H.	F	36	04/10/99	Milumba
209	B.M.	M	20	17/11/99	Mitandi
200	T.S.	F	9	23/02/00	Njinjo
201	A.H.	M	40	19/07/01	Pande
202	M.S.	M	35	20/07/0I	Makangaga

O. Liwale

203	H.K.	M	18	05/05/99	Mlembwe
204	Z.M.	F	27	14/07/99	Mpigamiti
205	H.A.	M	57	18/07/99	Ngongowele
206	Z.M.	F	60	04/05/99	Lilombe

207	M.	M	40	11/09/99	Kipule
208	A.K.	M	8	08/06/99	Ngongowele
219	C.M.	M	15	04/08/99	Ndapata
210	M.M.	M	60	03/11/99	Ndapata
211	M.S.	M	45	04/12/99	Mangirikiti
212	S.A.	M	41	23/02/00	Mpengere
213	K.L.	M	30	30/01/02	Mlembwe
214	B.M.	M	40	10/02/02	Mlembwe
215	A.M.	M	50	20/04/02	Mlembwe
216	C.N.	M	31	01/03/02	Likombora
217	A.T.	M	50	28/05/02	Lilombe
218	H.C.	M	40	31/03/02	Kipule
229	M.M.	M	14	04/11/03	Ngongowele
220	H.M.	M	47	27/12/03	Ngongowele
221	M.M.	F	3	14/03/03	Nabuja
222	S.M.	F	7	14/03/03	Nabuya
223	S.M.	F	41	20/05/03	Mpengere
224	O.M.	M	8	20/05/03	Mpengere
265	S.M.	F	36	13/06/03	Kichonda
226	Z.K.	F	55	10/03/03	Muungurumo
227	S.A.	M	41	24/02/03	Mpengere
228	H.P.	M	51	27/02/03	Muungurumo
239	K.P.	F	4	27/02/03	Muungurumo
230	M.K.	F	40	10/02/03	Muungurumo
231	R.M.	F	36	10/03/03	Muungurumo
232	A.M.	F	30	10/03/03	Nabuya

P. Lindi

233	Z.C.	F	10	16/04/02	Mputwa
234	S.J.	M	10	16/04/02	Mputwa
235	M.S.	F	9	20/05/02	Nachunyu
236	S.I.	M	48	17/02/02	Kineng'ene
237	S.M.	F	7	17/02/02	Sudi
238	M.H.	F	8	02/12/02	Litanda
249	S.Y.	F	8	08/05/02	Navanga
240	G.C.	M	12	31/05/02	Nachunyu
241	J.M.	M	58	28/06/02	Nachunyu
242	H.H.	M	10	26/11/02	Milola
243	J.L.	M	2	21/11/02	Milola
244	S.A.	M	53	16/11/03	Mnolela
245	S.H.	M	40	06/11/03	Mnali
246	Z.L.	F	26	13/01/04	Sudi
247	E.N.	F	35	18/11/03	Nachunyu
248	Z.I.	F	40	13/01/04	Hingawali
259	B.F.	F	35	08/02/04	Sudi
250	M.R.	F	25	10/02/04	Hingawali
251	B.M.	M		23/02/04	Tandangongoro
252	S.M.	F	45	09/02/04	Simana

253	H.S.	M	18	06/03/04	Hingawali
254	H.S.	M	7	09/03/04	Ruhokwe
255	S.K.	M	4	09/03/04	Mnolela
256	S.M.	F	14	17/01/04	Sudi
257	M.H.	F	25	20/03/04	Kilidu
258	E.B.	F	34	02/03/04	Nyangamara
269	F.A.	F	5	21/05/03	Nyangamara
260	H.J.	M	4	05/06/03	Mnolela
261	L.D.	F	13	18/06/03	Mnolela
262	M.I.	M	8	21/06/03	Nyangao
263	N.	M	50	22/07/03	Milola
264	B.K.	F	8	29/08/03	Nyengedi
265	A.B.	M	40	01/09/03	Nangaru
266	S.M.	M	22	28/08/03	Mipingo
267	A.A.	F	9	22/10/03	Mnali
268	M.	M	24	28/10/03	Nangaru
279	F.A.	F	43	19/03/04	Sudi
270	A.M.	M	65	11/03/04	Mkundi
271	H.L.	M	18	05/03/04	Sudi
272	F.N.	F	35	23/02/04	Sudi
273	H.N.	M	68	01/09/04	Simana
274	V.S.	F	71	10/01/04	Mingoyo
2765	A.N.	F	55	11/04/04	Mingoyo
276	M.U.	M	35	13/04/04	Kitulo
277	S.A.		30	17/04/04	Mingoyo
278	A.Y.	M	12	19/04/04	Ndumbwe
289	M.B.	F	40	16/05/04	Kilimanjari
280	M.A.	F	60	10/05/04	Nyangamara
281	A.K.	M	8	14/05/04	Nyangamara

Q. Ruangwa

282	S.A.	M	50	07/04/02	Mandawa
283	M.A.	M	40	10/08/02	Mandawa
284	A.S.	M	35	15/09/02	Mandawa
285	B.T.	M	37	25/06/01	Chibula
286	O.N.	M	56	29/06/01	Nanjaru
287	F.M.	F	34	30/06/01	Namtamba

R. Nachingwea

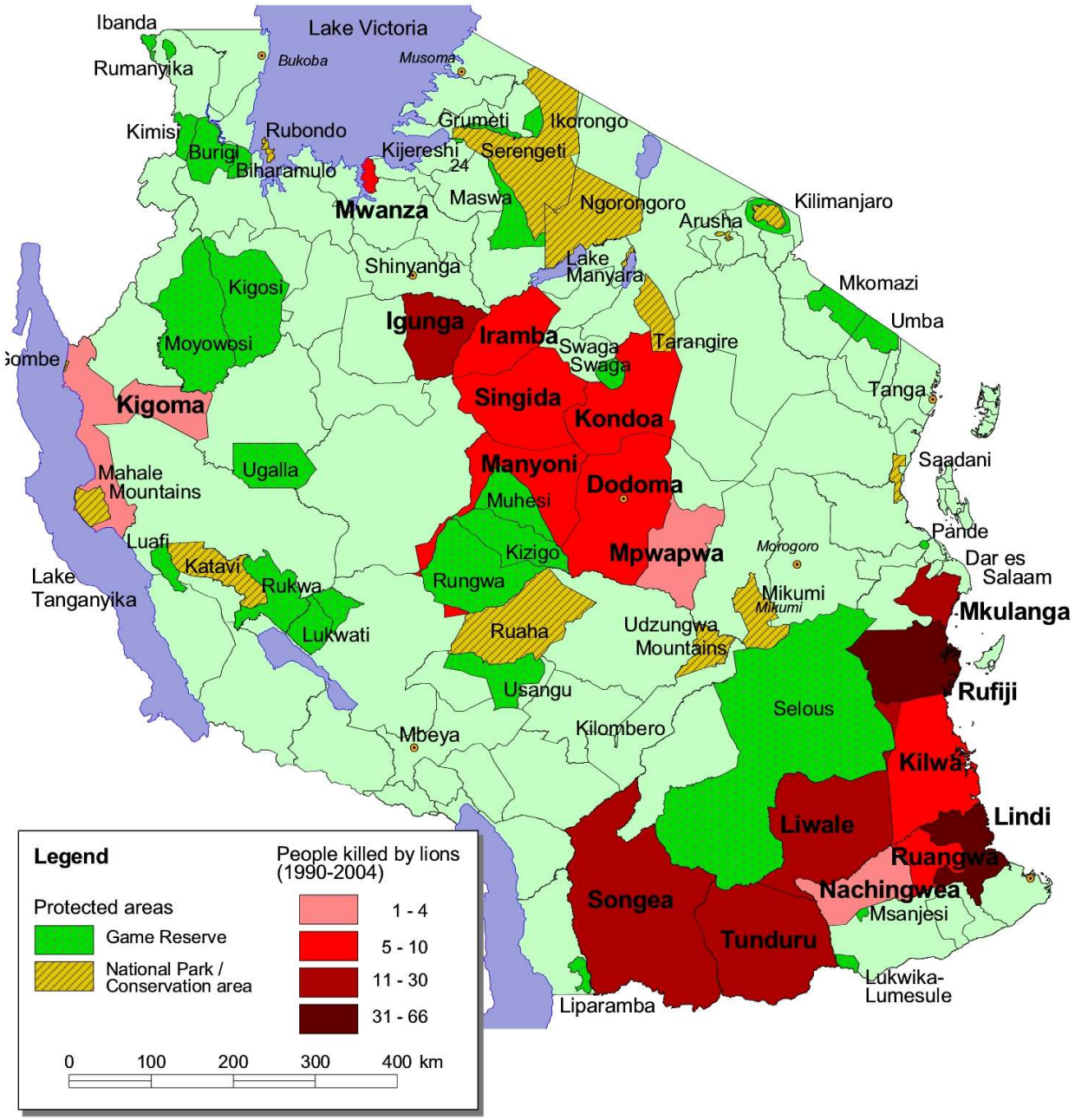
288	H.H.	M	25	29/03/99	Kilimarondo

LAKE ZONE (Mwanza Region)

289	M.J.	M	16	12/03/1990	
290	S.O.	M	32	09/05/1990	
291	M.M.	F	24	10/06/1994	
292	H.B.	M	18	22/08/1994	
293	H.J.	F	30	22/11/1995	

294	M.C.	M	35	02/09/2003	
295	J.K.	M	25	28/03/2004	

Annex 5: Map of districts with lion attacks from 1990 to 2004



Data are compiled from the official but incomplete statistics. These are useful to indicate trends.

Annex 6: Results of lion trophy hunting data from the Selous Game Reserve

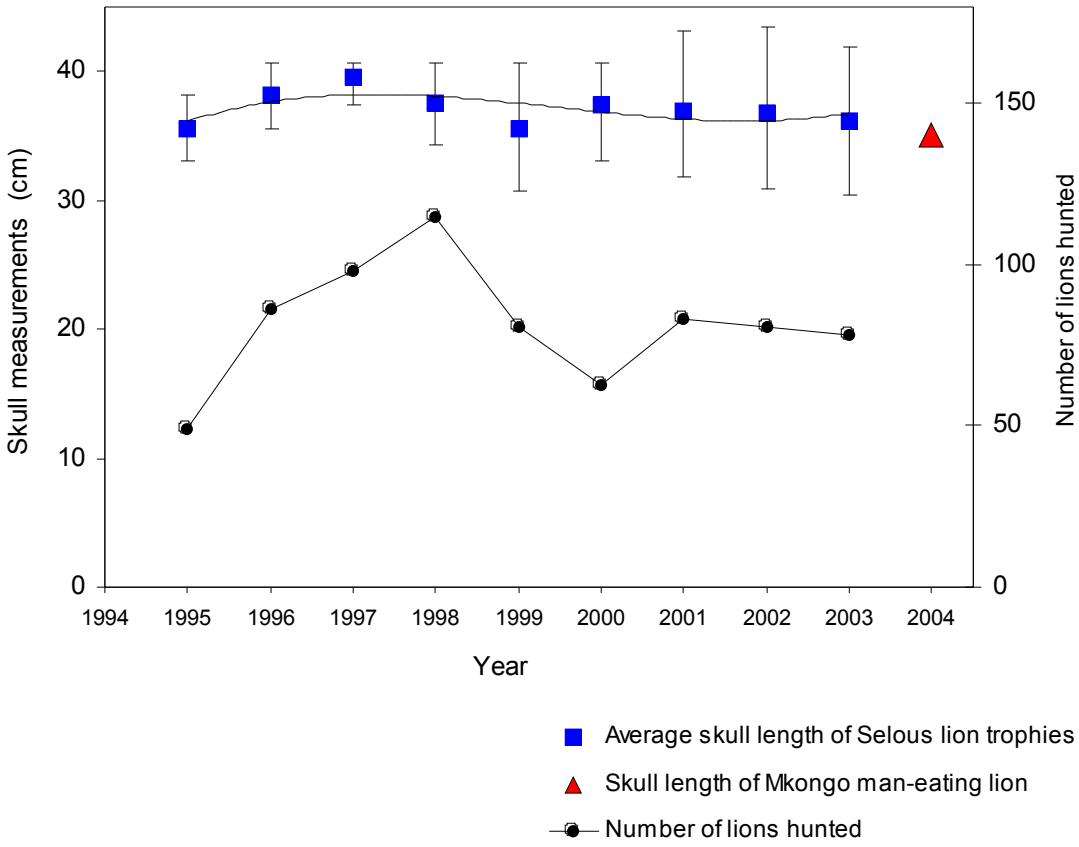


Figure 1: Trends in measurements of 212 lion skulls hunted in the Selous Game Reserve from 1995 to 2003, and length of the Mkongo man-eating lion

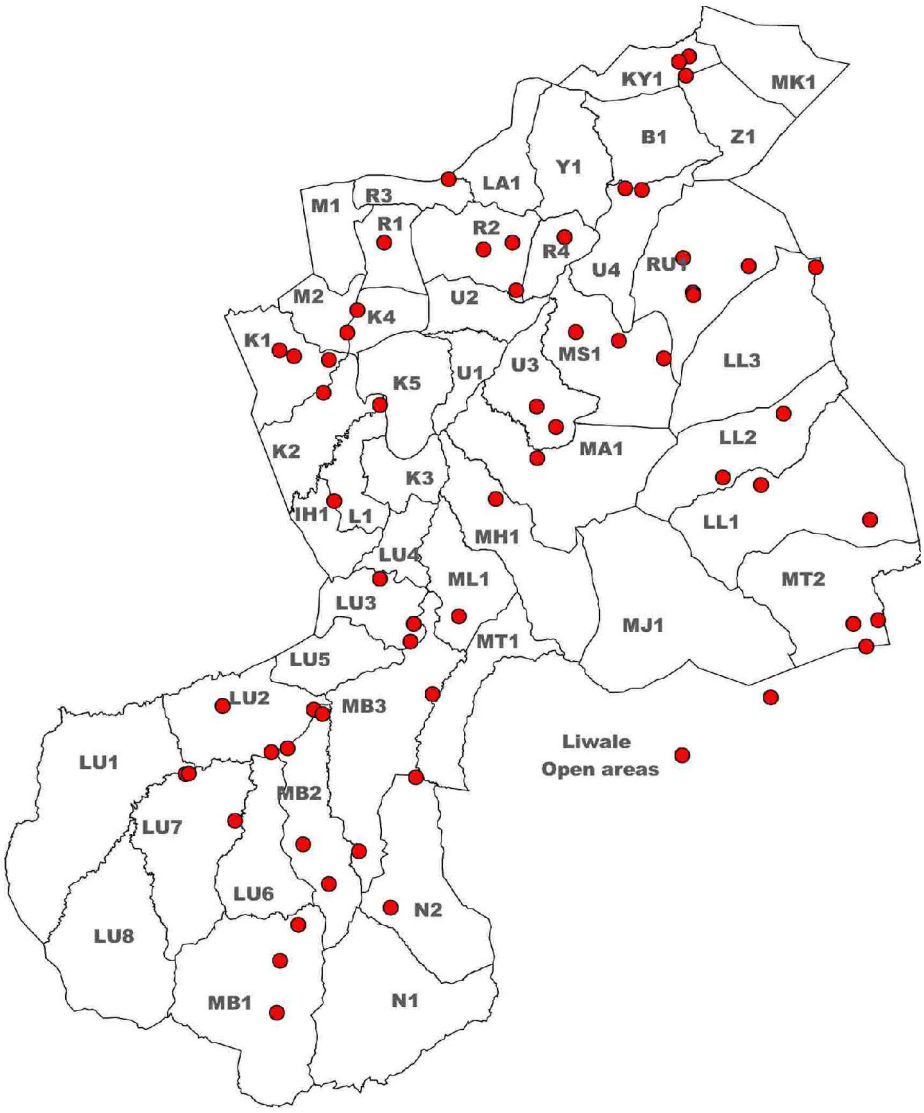


Figure 2: Location of 80% of lion hunts (represented by large dots) in the Selous Game Reserve during 2003

Annex 7: Interview with Prof. Dr. Craig Packer

Date: June 16th, 2004

1. *Dramatic lion figures are being published by the world media: According to some scientists there are only 15,000 lions left in the whole of Africa as compared to 100,000 in the past. Is the lion an endangered species?*

The earlier figure was never meant to be taken seriously as a population estimate

it was just a rough guess of the order of magnitude of the overall population size. Instead of a million lions or ten-thousand, the authors said there were probably on the order of a hundred thousand. The recent numbers stem from the first systematic attempts to tally all the lions on the continent. This time each guess was scaled down to the size of a single reserve or park, and then the guesses were summed up to give a crude total. The two most widely cited total guesses, Bauer/Van der Merwe and Chardonnet, used different techniques, and the more inclusive estimate came up with a larger number. So it is simply wrong to claim that these surveys show a "dramatic decline" in lion numbers – we'll never know what happened to lion numbers over the past 20 years. On the other hand, I do think that there probably are fewer than 100,000 lions left in the wild – which is less than the number of chimpanzees or elephants – so it is important to take active steps to conserve the species while we still can.

2. *What are the main causes for declines of lions where they occur?*

Lions are dangerous animals that kill people and livestock. Rural Africans face real threats from lions, and they retaliate to livestock losses or personal injury by trying to remove the "problem animal." The number of lions killed by vengeful humans each year is far greater than from any other cause.

3. *If international trade or trophy hunting are not threatening the lion, then the Kenyan uplisting proposal at CITES would have no basis?*

The Kenyan listing is irresponsible. It recognizes the inadequacies of the recent censuses, yet it immediately turns around and cites them as if they were perfectly accurate. Even worse, the Kenyans claim that lions are being decimated by FIV (feline immunodeficiency virus) and distemper. Our Serengeti studies are by far the most exhaustive investigations on lion health, and we cannot find any evidence that FIV causes significant health effects. While Canine Distemper Virus did cause a 35% decline in the Serengeti lions in 1994, the population recovered completely within 5 years – and is currently at its all time high. By far the most important threat to lions comes from problem animal control, and by putting lions on Appendix 1, the Kenyans would do much more harm than good. Tanzania has more lions than any other country in the world, and the majority of these animals live outside the national parks. If lion trophy hunting were stopped, they would have no economic value, and there would no longer be any incentive to conserve the lions. Opponents of trophy hunting have provided no alternative mechanism for funding the large-scale conservation efforts required to protect the species.

4. *Kenya has had no hunting of lions since 27 years and the lion population has been greatly reduced. Tanzania has lion hunting and at the same time the biggest population on the continent. What is the role of well managed hunting of lions for conservation?*

I think that the situation in Kenya illustrates that lions would be viewed only as threats to people and livestock in the absence of trophy hunting. Lions in Amboseli National Park were exterminated by angry Maasai in the early 1990s, and three-fourths of the lions in Nairobi Park were speared in the past year. Lions inflict serious damage to these people's livelihoods, so why should they be tolerated outside the parks? The Tanzanian hunting industry certainly has the potential to play an important role in lion conservation, but there is significant room for improvement. Hunting companies need to engage local communities directly and help them to co-exist with lions.

5. *It is argued that the phenomenon of maneless lions is a result of trophy hunting. Why are there lions with and others without manes?*

Mane size is largely a response to average temperature in the environment. Serengeti and Ngorongoro lions live at fairly high altitudes where temperatures are quite mild, and they have luxurious manes; lions in the hotter climates of Tsavo, Selous and India have quite short manes. Even in the 1890's these hot climate lions were known for being maneless – long before there was any significant trophy hunting.

6. *How can lion hunting be Improved?*

Lion trophy hunting must be recognized as the primary mechanism for protecting viable lion populations outside the national parks. First and foremost, hunters must work to discover the circumstances where people and livestock are attacked by lions. Conservation of such a dangerous animal rests with the tolerance of local people, and practical projects improving animal husbandry and personal safety should be implemented in cooperation with the local and regional governments. Lions kill dozens of people each year and hundreds of livestock. Rural Africans are becoming less and less tolerant to these losses, and I wouldn't be surprised if they eventually started to view problem animals with the same intense hostility as rural Swedes or Americans! Second, it is essential to restrict lion hunting to males that are at least 6 years of age – old enough to have raised their first set of offspring. By enforcing an age minimum, the wildlife authorities

will make giant strides in forcing hunting companies to prevent over-exploitation. Finally, the business of trophy hunting needs to be based on providing its clients with an unforgettable adventure – rather than selling them dead animals. African hunting companies must become associated with wildlife conservation in the same way that Ducks Unlimited is associated with wetlands conservation – rather than being associated with dead ducks. Lion conservation is going to be very expensive, and hunting companies will have to raise more and more income from diversified activities – there is no way to stake their fortune on shooting more and more animals. In addition, the industry needs to attract more long-term investors. By increasing the stability of the hunting blocks (through extended contracts and restrictions on who can actually hunt in those blocks), hunters will increasingly regard the young lions on their properties as their crop of the future rather than something that should be hastily plucked before it is ripe.

Dr. Craig Packer is a Distinguished McKnight Professor from the University of Minnesota. He has done 26 years of research on the lions of the Serengeti and is regarded as one of the world authorities on lions.
The interview was conducted by Dr. Rolf D. Baldus

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