Mbojo: Lion Attacks on People West of Tarangire N.P, Tanzania

University of Wisconsin-Madison
Department of Geography
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Mike Skuja
Advisor: Matthew Turner

Abstract

Between the days of November 11th and November 26th, 2000 I conducted a study of problems villagers were experiencing with lions in northern Tanzania. The study took place in the villages of Sangaiwe, Sarame, Chem Chemu, Mawemairu, Kiongozi, Gichameda, and Kisangaji. These villages all lie west of Tarangire National Park, between the Sangaiwe and Mbulu hills. Data collected in the field was concerned primarily with documenting the problem and work done at UW-Madison with analyzing the data and establishing land-use trends. Field interviews were undertaken with the village chairmen, secretaries, and elders. Results showed that lions have been preying sporadically on domestic animals since roughly the establishment of the villages, and as prey steadily disappeared, they shifted towards domestic stock as a steady and reliable source of food. When lions cannot hide in vegetation to hunt wildlife due to a drought, they often migrate into the villages in search of domestic food. The phenomena of man-eating started only recently in 1997. Results and field observations indicate that lions are still found in the area in the first place because of favorable habitat, a water source, and an adequate prey base in the form of domestics. The reasons for the recent man-eating behavior varies slightly depending on the geographical area in question, but in general, there has been a lot of immigration in the past few years putting the settlement ever closer to the forest which was, or recently became, void of wildlife due to drought. The closer settlement to the forest allows the lions to see more clearly where the domestic animals are taken for the night, and with a decline in pastoralism and the advent of villagers grazing their animals closer to the villages than before, the lions have taken to roaming about the villages more, making chance contact with humans more likely, and often fatal.

Chapter One: Introduction

Lions, perhaps the most charismatic of all Africa's wildlife, have been an important attraction to outsiders ever since Tanzania's tourism industry was in its infancy. Indeed, the "King of the Jungle" pumps much needed revenue into Tanzania's economy via attracting visitors to national parks and appearing on items from postcards to t-shirts. "The wildlife of the park (Tarangire)…is, next to Ngorongoro, the most important in the Arusha Region and must be preserved if the tourist value of Tanzania is to be maintained" (Borner, 1985). Large predators are therefore central to all wildlife-based enterprises. Tourism virtually requires lions, as does big game hunting. In ecological terms, large predators are keystone species. Through their influence on grazers and browsers, lions can affect vegetation patterns which has ramifications for the entire ecosystem. Protecting big game animals generates money that can be used to protect little animals (Adams, 1992). However, to spot a lion through a camera lens and to see one as it is hurdling your boma are two completely different things. This beautiful and majestic creature transforms into a deadly threat to your livelihood and even your family.

Conservation in and around Protected Areas in E. Africa, specifically Tarangire, TZ

Hostilities between locals and the Park have gone on since the National Parks were created in 1960. The park's perspective sees livestock trespass, illegal hunting, wood theft, and species extripation. In the old days, it was thought the ordinary villager had no interest in conservation, and saw wildlife only as meat (Mlay, 1992). It was thus a

waste of time for the conservationist to interest the villager in conservation and they would continually fight each other (Mlay, 1992). Game laws used to reflect this sentiment, in that they favored whites. Europeans thought Africans would wipe out the game if given license to hunt. An ironic sentiment given the fact that this 'pristine' nature the Europeans saw, and feared Africans would destroy, was a result of African management regimes. But of a village is hungry, they can't have the noble paradigm of conservation and sustainable development. The local community sees reduced access to ancestral lands, restrictions on customary resource uses, and predation by wildlife. "Rural Africans rely on their natural resources for their livelihood, and they have always been willing to make sacrifices to manage it" (Adams, 1992).

This 'People-Park' conflict is rooted deeply in a historical sense, in European colonialism and European ideas of a scenic African landscape. The geographic expansion of protected areas in a country whose population is mainly rural and agrarian produced a conflictual relationship between people and parks. 25% of Tanzania is under the central government's protection, yet 80% of agriculture is produced by peasant households averaging less than 2.2 hectares (DANIDA, 1989). Yet this notion of the pristine still persists even today as seen in a British travel Brochure by OAT stating: "Tanzania provides travelers with a profoundly rewarding glimpse of a land unspoiled by the ravages of modern civilization" (OAT, 1999).

While we know very little about carnivores outside protected areas, it is clear that increasing numbers livestock and humans are causing the populations of carnivores, especially the big cats, to shrink rapidly. Wildlife that serve as prey for the cats lose habitat and consequently numbers due to livestock needs, and the cats then have fewer

prey options not related to man's activities. The line where Tarangire National Park and the forest reserves end is exactly demarcated and quite clear at the base of the Sangaiwe and Mbulu hills. However, this doesn't stop interactions and flows between what is 'nature' and what is 'society' from taking place, both welcome and unwelcome. People often go into the forest to graze their cattle and lions often come into the villages to go after those cattle, and occasionally a person, if the opportunity presents itself. This exemplifies the peoples' inability to successfully plug up the porous opening of flow between nature and society. A lion jumping a boma or fence is symbolically a violation of the barrier men set up to keep wildlife separate, and has grave consequences physically and emotionally for the people, changing the reality beneath their seemingly peaceful rural homestead. Cattle predation and man-eating are strikes against the very core of the people, as their cattle symbolize life for them and their family is life. This creates the current reality of insecurity and almost war-like attitudes towards what lies beyond the village boundaries in the form of 'mbojo' or evil lion spirits.

It is only in eastern and southern Africa that large numbers or carnivores living in populated areas still persist. It is in unprotected areas that conservation is often most demanding, simply because a *laissez-faire* management policy is not an option. Management should be active, based on accurate information, sensitive to changing conditions, and approved by the community. Unfortunately, many local people have historically had to bare the brunt of the negative consequences that come about from the abundance of wildlife in the national parks. Tarangire National Park ends at an exact line, yet wildlife, being ever opportunistic, do not respect arbitrary lines.

> "Nature surfaces as an actor…in unexpected ways to thwart our most diligent efforts to preserve it. In other words, National Parks are paradoxical. The culturally constructed

aesthetic ideal of the natural landscape can never be preserved because the dynamism of ecological processes defies preservation" (Neumann, 1998).

Lions and their relationship to People

Lions are no exception and will be found where there is favorable habitat and a steady prey base. To the west of Tarangire lies forest and mountainous terrain, a favorite haunt of the predator, and an influx of prey in the form of domestic animals where wildlife such as wildebeest and zebra used to abound. This has caused conflict between lions and people ever since the lay of the land was transformed into a primarily human-dominated landscape when most of the villages were established in the late 1960's and early 1970's. Combine this with a steady increase in human population and settlement closer to the doorstep of the forest in the past five years, and the situation is exacerbated even further. The domestic animals of the villages no longer just pass through the forest and then go far away; rather they are taken back home after grazing so close to the forest that the lions can actually see where their quarry is going for the night. This has been a recipe for disaster, as the lions have turned increasingly not only to domestics as a food source, but man as well in the past few years as they search for food in the villages.

It has been said that effective conservation must take into account the needs of local peoples, as they can be a valuable asset to improving the state of the environment. This is most pressing in the ecosystem that Tarangire lies within, because "Tarangire National Park is a relatively small protected area in Tanzania and cannot be considered a self-sustaining ecosystem" (Malcolm, 2000). In fact, it covers only 2,600 square kilometers. Almost the entire large herbivore population migrates east outside of the park in the wet season and returns in the dry season. But all along the western borders of the park, the environment has already been transformed into cultivated land and professional

hunting camps encircle. The lions' prey disperses out of every side of Tarangire except the west, where it comes to an almost complete halt. "The primary reasons for this decline are to be found in the loss of wildlife habitat due to the expansion of agriculture and livestock" (Malcolm, 2000).

The high degree of interactions with lions in my study area, suggests a relatively large population, which could prove useful because "National Parks and Reserves are fast becoming islands in a matrix of humanity. Can we look at these protected areas as natural islands, or are they unnatural fragments isolated from the original larger area? The answer to the question lies in the degree to which there has been significant gene flow between the populations" (Sinclair, 1997). Indeed, these lions travel between Tarangire and Lake Manyara parks via the Kwa Kuchinga wildlife corridor, but also through the villages at night from the Sangaiwe hills to the Mbulu hills. Yet here, in many other areas, "Agricultural expansion is encroaching on wildlife dispersal areas and corridors crucial for the integrity of park ecosystems" (Pearce, 1999).

One way to contribute to the success of community-based conservation is to minimize human-wildlife conflict, which is being experienced quite acutely in my study area, and address it properly when it arises. The easiest way to do this with lions is to take into account biogeographical features of the landscape surrounding the proposed land for protection, land-use changes that are likely to occur in the near future, and the biology/ecology of *Panthera Leo* in both protected and human-affected areas before establishing a park.

In the case of Tarangire, Makungunero Game Controlled Area (GCA) borders the park to the south, Simanjiro GCA to the east, Lolkisale GCA to the northeast, and Mto

wa Mbu GCA lies directly north. Although there is some settlement in these GCA's, the permanent settlement still proves quite sparse near the borders of the park excluding the west (see Figure 8; other months of the year show fairly consistent farm distribution and farms in my study area were not recorded which accounts for the blankness on the west side). The crop cover to the west is also much heavier. Yet there is no GCA to act as a buffer zone in the west, just the mountains. This puts man in especially close contact with wildlife in villages close to the hills. In the past, people were originally kicked off of land to make room for the parks (Turner, 2001). Now with the parks already established, one must shift focus because "The economic and ecological benefits of wildlife have to be balanced against the political expediency of giving in to the demands for more land from a growing population of farmers and pastoralists. One way, perhaps, of overcoming this problem is to regard the boundaries of the game reserves as zones rather than rigidly enforced lines of separation between wildlife an African farmers and livestock owners" (Pollack, 1974). Indeed, in the case of Tarangire, "Evicting traditional occupants from the dry-season range of an ecosystem and ignoring the wet-season range secures only half of the ecosystem for wildlife migrants. The land annexations have stirred up animosity toward wildlife among traditional occupants of the land, creating enemies at the threshold of migratory pathways" (Western, 1997).

Unfortunately, alleviating this very scenario isn't possible west of Tarangire. Moreover, the remoteness and/or inaccessibility of many of the villages result in poor lines of communication between the smaller villages and their larger governmental counterpart. This paper seeks first to document the most acute problems the villagers are

facing with lions. Next, speculations as to why this area, and not others, is experiencing such problems and the policy implications that result are discussed.

Chapter Two: Methodology

Study Area

The study area consists of seven villages west of Tarangire National Park, lying between the Sangaiwe and Mbulu hills south of Lake Burungi. Sangaiwe, Sarame, and Chem Chemu lie very close to the Sangaiwe hills, whereas Gichameda, and Kisangaji are situated closer to the Mbulu hills. Mawemairu and Kiongozi are somewhat in between, yet still fairly close to both hills.

The Land:

The area is classified as Eco-climatic Zone V rangeland (Gwynne, 1997). It has relatively low rainfall and high daytime temperature, belonging to the East African Woodland Biogeographical Province (Udvardy, 1975). Vegetation is Somalia-Masaai phytochorium dominated by acacia species such as *A. Kirkii, A. Siberiana, and A. Drepandelobium*. Much of the area is semi to mostly wooded cover. Acacia woodland occurs in the valleys and the *Commiphera Combretum* deciduous woodland on the ridges of higher ground. The Sangaiwe hills are to the east and the Mbulu hills are to the west. Forest reserves are peppered throughout the area, and are usually close to the hills to stop erosion and desolation of the landscape.

The People:

The area has been increasingly populated and thus agriculturalized since people started coming into the area in mass from the late 1960's to mid 1970's. Farmers, pastoralists, and tribes engaging in both activities abound, especially the Wabugwe,

Waburu, and Wadatoga. Many people practice a combination of agricultural and pastoral activities, and herds held by those with a established plot of land tend to be smaller, as opposed to large scale ranches, of which only a few exist. The Datoga have tended to surrender land suitable for agriculture to agriculturalists and seek land with more pasture for themselves (Fukuni, 1970). In turn, they trade to get grain for livestock and so are integrated into the larger political economy with other tribes much like the Masaai of Ngorongoro Crater depend on trade with other non-Pastoral people and have been marginalized when they must practice Pastoralism without the option of trade. In the dry season, the Datoga are forced to enter bushland with its risks of predation from wild animals (Lane, 1990).

Maize, millet, and beans are key crops grown by the agriculturalists. The WaBugwe were ordered to move their homes to Sangaiwe in 1967. They are originally from the shores of Lake Manyara. They are Pagan and Catholic in religious affiliation. Considered by Guillotte to be loyal to their tribe before the nation, they are therefore more conducive to the Ujamaa socialist villigization scheme, as it is meant to be molded after traditional kinship extended family ties (Guillotte, 1973). Tribal leaders were needed to endorse this national movement. The same consideration should be addressed when promoting any conservation-development scheme. Villages are in general small, and populations number from about 150 to 600 people (Skuja, 2001).

Aerial censuses show that herbivores such as wildebeest and zebra, which used to be common, have virtually disappeared with the advent of villages and are extremely rare, if existent at all, presently. This most likely has been exacerbated even further

recently because of the drought, although animal censuses specifically in the hills have not been performed.

Interview Techniques:

Methods used in this study consisted mainly of unstructured or informal interviews with people of the affected villages. This was due to the fact that what kinds of problems the lions were causing for the people were virtually unknown to others outside of the local village governments. Responses to questions dictated where the interviews would go after that.

This proved to be very effective for my study because it led to a slight change of focus in my research. From early on in the villages, I found that predation on domestic animals had been going on for a long time and was too large of a problem to document numerically. Instances of attacks were far too numerous to recall, but man-eating was a relatively new phenomena that had just started in 1997. Therefore, the interviews and research took a more in depth approach to this angle.

It was by far the most effective and time efficient to talk to the village chairmen and secretaries. In particular, the secretaries were of greatest value because they knew the filing system and records of everything that had happened in the village as well. However, these men were not always present when I arrived. They might not only be absent from their office, but the village itself. My translator and I then tried to locate someone with keys to the village office and files that could act in the village leaders' places because of their absence. The elders of the village were also asked to gather in order to pool memories for the sake of recording specific information. It should be noted that even in the presence of the village leaders, the wazee (elders) proved invaluable due

to their ability to compare how the area has changed over time and look at things with an objective eye. Their sitting in should be welcomed at all interviews. Asking other villagers for the needed people and telling them who I am and what I am doing enabled me to encounter all needed interviewees. From then, one just waits patiently. This technique minimizes bias, as I appeared with no advance notice, and the governmental letter I obtained encouraged them to take me to the village records, show me in writing the accounts of death, and then ask questions only after I had finished mine.

The remoteness or inaccessibility by good roads of most of the villages led to biking as a primary means of transportation from Sangaiwe to the selected villages. This was because many of the villages were found in semi-wooded areas far of the main road, often with just small sand roads leading into them. When the rains came, walking had to take the place of biking. This was time consuming and exhausting, but often the only alternative. When possible, buses were taken for part of the way.

In addition to 'sit down' interviews at the village offices, informal interviews at the home of the elders of Sangaiwe were conducted whenever possible. This was due to my residence there and consequently an increasingly intimate relationship with the villagers. Subject matter ranged from history of the area to how other villages differed from Sangaiwe. Village maps in the office were also studied and were very helpful in getting a perspective on where I was and where I would be traveling to, as the study area proved to be very large, sometimes villages like Chem Chemu were approximately 13km away each way.

Chapter Three: Results and Discussion

Results for each village are dealt with individually. Prey on domestic animals is too frequent to record each account, and thus are described in general frequency of attacks. Sex and age of the man-eaters are mentioned when known.

Sangaiwe Village

Sangaiwe village was established in approximately 1965. Lions pass rather infrequently through the area, and domestic animals have not been preyed upon very often. The first and only man-eating incident took place in July of 1999 around 9pm. A lion killed a Barabaig woman, the wife of Guanga Gitabek, when it came into her boma located in the center of the village. The woman, thinking it was a hyena, followed it outside where she was killed. (Her name is not mentioned because the husband was suspicious of westerners, a trait more common to the Barabaig than other tribes) The lion started to eat her right in the village and was chased off later by the villagers. They were not able to kill the lion, and a Tarangire National Park officer never came out to assist (Shauri, 11/21/00).

Sarame Village

Sarame village was established around the same time as Sangaiwe. They have been having problems with lions preying on domestic stock for a long time, too long to recall when it started and every instance. This mainly happens in the forest and lions come only a couple of times a year into the village. The man-eating started in 1999. On July 31st, 1999 Asha Huseni was killed. She was outside making dinner at 8pm when a

lion came in and took her out to the forest, leaving her two children crying. Body parts were found the next day in Sanka Forest. On December 14th, 1999 Musa Nasoro and his daughter were killed. They were in the midst of constructing a new house, and were temporarily in a grass hut. Around 10pm, while he was sleeping, a lion entered the house and took Musa. The wife went outside, screaming with the baby, after which another lion took the baby. A third lion followed the other two out to the forest. The villagers have killed three lions on their own, and have not gotten assistance from the government (Vizent, 11/15/00).

Chem Chemu

Chem Chemu, which was established in 1968, is the only village that has not experienced man-eating. Cattle, goats, sheep, and donkeys are preyed upon almost daily however. The lions attack during the night, but have even hunted during the day recently, as people have started keeping their animals inside their houses for the night. These problems started in 1980, when the wildlife disappeared. Villagers do not move about at night at all (Gelemu, 11/20/00).

Mawemairu Village

Mawemairu was established roughly in 1955. Lions started to come to look for cows in 1988, which is the same time they started to keep the cows outside because of the increasing size of the herd. When lions jumped the boma's fence, goats were the most frequently taken animals. Lions come into the outskirts of the village itself, especially in the dry season from July until it rains. They do not come in the rainy season. Herders have always had problems with lions in the bush however. The lions come from the park and the Ngari Forest, and are usually females. On July 15th, 1998 Juliana Simion was

killed while fetching water around 7pm. on the outskirts of the farm. On July 1st, 1999 Emmanuel Obed Kilama was killed at 4:30pm while grazing his goats in the farm with five other children. On July of 2000, Saidi Vicent, a 14 year old, was killed coming from his neighbor's house on the way home at 7:30pm. The last incident took place on September 19th, 2000. A friend of Mama Mary's from Dareda village was coming home after drinking at a bar and was attacked on the main road in Mawemairu village. The villagers have killed two lions, both females east in the forest. A Tarangire Park official came after the death of Saidi Vicent (Roman, 11/17/00).

Kiongozi Village

Kiongozi village has not experienced any cattle predation. They keep their animals inside and avoid grazing deep in the forest. Man-eating began in 1997. Asani Masempari was the first to die as the 60 year old was walking home through his maize farm at 10pm. He was in the outskirts of the village near a small forest at the time. On August 3rd, 2000 Bakari Juma, a 15 year old boy, died while going outside to take a shower at 7:30pm in the Kiongozi River with three other children. There was one female and male lion. The last incident took place towards the end of August 2000 when one lion of indeterminate sex came and killed a child of Darasa la Nne while he was milking cows at home at 8pm. The villagers have not been able to kill any lions yet, and the government or park has not come to help (Juma, 11/18/00).

Gichameda Village

Problems began in 1997 with lions; wildlife disappeared from the area in 1996, according to the villagers who hunted the wildlife frequently up until then. The first man-eating incident occurred in Darakuta Ranch where a man and a woman died coming

home from a bar at 11pm. They were coming home from the bar and were passing near forest close to the hills. On June 1st, 1997 at 9pm. a 60-year-old man was killed by a lion near Darakuta Ranch very close to the Mbulu hills while coming home from work. A piece of head was recovered deep in the forest the next day. On November 3rd, 1999 Mariamu Ramadani was killed in Kinambich sub village as she left with another girl to use the bathroom at 2am. The next morning the search party saw three lions in the area. On June 13th, 2000 a baby died in Kinambich sub village after being snatched off her mother's back. The men came and scared the lone lion off, but the baby was already mauled to death (Giruwaweit, 11/22/00).

Kisangaji Village

Lions have been going after cattle for a long time, and in 1995 started coming after goats in the day. Man-eating occurs in the sub village of Shaurimoyo, which was established in 1974. An 11-year-old boy was attacked at 8pm, but did not die, in late June of 2000. The lion was chased away by neighbors nearby. In July the previous year however, a 13 year old schoolgirl was killed a 7am near Vick Estate, where body parts were found. Vick Estate has 100+ acres of coffee, sugarcane, and cornfields and is closet to the forest and hills (Bura, 11/21/00).

General Reasons for Conflict:

The results differ from village to village slightly because of differences in each village's reaction to lions, natural features of the land, and to a smaller extent history. Therefore, each village will be discussed briefly in turn. But first, some general statements across the whole study area can be made.

Lions were found in the Sangaiwe and Mbulu Hills, and were continually preying on domestic animals because of their relative abundance compared to wildlife. Studies by Schaller in 1972, Smuts in 1978, and Packer in 1983 suggest that young lions disperse widely from the prides in which they were born. As long as there are source populations outside the study area, which would come from Tarangire, the Sangaiwe and Mbulu Hills lion population could be constantly augmented from outside. Previous studies have said that large felids will take preference to wild prey, if abundant, over domestics. When prey is down however, they will shift to livestock (Bowler, 1991). The forest is a good habitat to live in and ambush prey. However, the drought mentioned in news sources to have occurred in 1996 (Pan-African News Agency 1997, Figure 10) had the effect of reducing cover for stalking wild prey because the grass is not as high and I believe this contributed strongly to the lions' more aggressive behavior in hunting domestics and coming into the villages and taking humans if the opportunity presented itself. To compound the problem yet further, rainfall is especially low from June to September to begin with (see Figure 10). By far the vast majority of attacks take place within this time frame. Margje Voten states "cattle showed overlap in resource use with zebra in the early wet season and with wildebeest in the early dry season" (Voten, year unknown). This may have helped habituate lions to cattle as they slowly came to replace wild animals in dominance in the forest.

The biophysical features of the land are also quite conducive. There is a river running north to south parallel to the mountains that draws the cats across the villages to drink, more frequently during times of drought (Pan African News Agency, 1997). In all areas, after attacks on man and his animals, lions were able to get away without being

excessively hunted to local extinction in the area. This is because local weapons prove very ineffective against them, and park officials with guns come out relatively infrequently to the area. However, women in these areas reported difficulties in obtaining firewood and timber for construction and traditional medicines due to harassment by park rangers when they go towards the park (Igoe, 1999). The forest that harbors so many lions has not been cut down either, due to the fact that it is valuable against erosion, and therefore regulated by the government in its use. However, there is not significant prey, if any, to warrant lions moving with their prey, especially when they have other options related to man's occupation in the area in cattle and even man himself. However, there still is said to be wild game in the Sangaiwe hills as the locals cannot go into them that often. In contrast, the Mbulu hills lost game according to the locals in 1996, which is just when the drought struck, leading me to conclude that they have a good grasp of what kind of wildlife was out there and when. In any case, censuses have to be taken in the hills before a clear connection can be made, something that no one has yet undertaken. Figure 7 shows how almost all the wildlife migrates outside of Tarangire on every side but the west side, so the lions are forced to subsist off of other non-wild game. They did this because it was readily, and in many cases, easily available.

The Trend of Man-Eating:

Man-eating, which started only in 1997 shows some expected trends. Victims are taken at night (see figure 6), which is consistent with lion predatory behavior, as ambush and escape are easier. Moreover, victims are usually alone and children are preferred, being easier targets (see figure 1). Most attacks occurred during the dry season (see figures 2 and 4), because of more difficulty obtaining wild game compounded by less

available cattle to go after as the cattle starve and many die in greater numbers during times of drought. The yellow grass of the dry season is also perfect camaflouge for a lion stalking prey. "Denser vegetation during this season (dry season) may also increase the likelihood of accidental encounters between humans and lions and increase the opportunity for lions to ambush humans and livestock (Chellam, 1994). When there is little rain, cattle are taken twice a day to graze instead of just once (Anderson, 1987). A study in the Laikipia District of Kenya also shows how lions go after cattle more when there are less wildlife to cattle (see Figure 9). Also, more people are out in the SMH grazing their animals and the lions come into more regular contact with them and can see where they take their animals for the night. During a dry time in the 1920's in Malawi, lion became so habituated to cattle that they killed several hundred per year in the Kusungu District, specifically the Hisuku Hills (Anderson, 1987). Mwalyosi stessed that even the domestic grazers, such as cattle, cannot survive in dry lands unless suitable woody cover is also available (Lundholm, 1976). The locals also take their cattle into the hills more in July as this is the last month they are green, and there is also a peak in deaths in July. Lastly, there has been a decline in traditional pastoralism, as there is less land available to spread out the grazing of domestic animals. When more farmers move in, they see open land that is vacant and they take it. This land often was vacant only seasonally, but occupied by pastoralists in other times of the year. Speaking of the Barabaig, "It seems that a necessary aspect of modernization is the transformation of the traditional sector, which invariably means the destruction of pastoralists' traditional land-use management systems based on common land tenure (Lane, 1990). This is not a TOC as Hardin puts forth though, as there are Barabaig tribal regulations already in place.

Therefore, people have taken to a more agricultural way of life, grazing their cattle closer to the home and village (Mduma, 2000). Also, under the Tanzanian village agricultural production system, each villager is allocated a plot of land, and as more people immigrate, re-allocation is constantly taking place and plots often become smaller (Mwalyosi, 1992). With less animals passing through the forest, the lions have come into the villages more where the prey are most likely to be found. Here, they are also most likely to encounter people, and this increases the likelihood of man-eating. The farmers of the areas are also pastoralists, and take their cattle out to graze occasionally. These trends are applicable to all villages, yet some apparent differences are to be found in each. It should never be underestimated how adaptable lions are in their prey preferences. According to Ammann, the Serengeti-Mara lions specialize in killing buffalo, the Malawi lions specialize in killing young elephants, the lions in the Rufiji Basin in Tanzania prefer crocodiles, lions from Virunga National Park in Zaire specialize in young hippo, and the Tsavo (and many other less 'famous' areas) specialized in hunting men.

In Sangaiwe village and Sarame village, there has been a change in land protection. The Sarame Forest Reserve was established in 1999. This was to stop deforestation around Sarame, and to stop encroachment of Sarame villagers into land Sangaiwe villagers thought was theirs. At the same time, man-eating started in 1999, and this could be due to the fact that around Sarame the forest is a lot thicker now and better habitat for lions. The lions that come into the reserve are often coming from the Sangaiwe Game Reserve, where they are shot at and driven away. If injured lions are finding refuge here, they are much more likely to become man-eaters. The lions are

being shot at and driven away in order to increase wildebeest and zebra numbers to attract tourists to the area, and lions are seen as a threat to that.

Chem Chemu is also right next to the Sangaiwe hills and much more in the bush than any other village. The forest is thicker, and more expansive, yet this is curiously the only village where no one has been eaten. I believe this is due to the fact that absolutely no one goes out at night, since there are so many attacks on cattle. Moreover, being farther into the park and more heavily wooded, it can be assumed that wild game is also more abundant. Lions come almost every night, so the people have altered their habits of going about at during the evening hours, when they are most likely to be eaten. Moreover, stories of man-eating in other villages near and also close to the forest reserve encouraged such cautionary behavior.

The villages of Kiongoizi and Mawemairu are very close to the forest around Chem Chemu, yet don't alter their behavior as much as the Chem Chemu villagers, due to the fact that they are not as deep in the forest and are not in such regular contact with lions. When roaming about at night, they have fallen victim to the lions that come from the forested area that extends all the way into Chem Chemu however. The lions prefer the gulleys to sleep, where villagers often passs. The people also make a marked effort to graze their cattle on the edge of the forest to avoid lions, and keep them in their house at night. This works to decrease cattle predation, but at the same time draws hungry lions into the village where they know the cattle are.

The villages of Gichameda and Kisangaji have problems with man-eaters that come from the Mbulu hills. Once again, there have been more people roaming around the forest looking for potential homesteads recently (Giruwaweit, 2000). However, wild

game of the Mbulu hills was decimated roughly in 1996, according to both village heads (Giruwaweit and Mago, 2000). This is also when the drought hit and coincides directly with when the attacks were shortly after to begin, in 1997. This is due to desparation on the lion's part faced with no game, which had been declining, but was still available before 1996. Although old, a 1958 survey showed that lion densities in Tarangire are virtually zero during high attack months in my study area (See Figure 12). Further research to see where these lions go that are leaving Tarangire would be advisable since this is contradictory to the concentration of herbivores in the dry season.

It is important to note that reports of man-eating in Tanzania are poorly disseminated. News of attacks often does not reach mass media, and if it does, it might be mentioned briefly in a news article. In Tanzania, other known cases of man-eating I have found show that, while 18 deaths is an very alarming number, it is not so abnormal. I include these two accounts of Tanzania specific before launching into parallel studies because other than basic facts, I could not gather any other information regarding the instances. During the period of 1985-1988, 48 people were killed and 36 others were injured by lions in the Kajima village of the Tunduru District in Tanzania. This is an average of 12 deaths per year and 9 injuries per year (Songorwa, 1999). Later, on December 2, 1995 the *Daily News* reported that 29 people were killed and 17 others were injured by lions between the brief period of July 1994 and September 1995. This again happened in the Tunduru district of Tanzania. These numbers, and the numbers in my study, rank fairly high in death to injury ration when compared to other similar instances in India where maulings outnumber deaths.

Although the previous and following accounts are all of lions, it is useful to note some trends among man-eating tigers. Caldwell states, speaking of south China man-eaters, that they became so bold as to enter houses to search for prey. He goes on to state, "clearly, time was running out for this population, forced to depend largely on domestic livestock and human prey" (Caldwell, 1925). In the Malay archipelago in the 1840's, 600-800 people were killed per year and Burton attributes this high incidence of man-eating to scarcity of not only natural prey, but domestic livestock. He said at certain times of the year there is hardly any game and cattle about, so the tigers, desperate from hunger, attack people. Turner attributes man-eating to tigers that are pushed into marginal habitat where tigers had formerly existed at low density (Turner, 1959). He also says that they often followed cattle into the hills and were left without domestic prey in the hills when the villagers brought their cattle into villages in hard times. They therefore came to search in the villages. Now and days, tigers are protected and do well in many parks. This causes many subadults to be pushed outside and disperse into human-occupied lands that often have little natural prey. The result is attacks on domestic livestock with attacks on man closely associated and following (Project Tiger Directorate, 1985). We therefore can see in these cases similar situations in SMH where Tarangire's at capacity lion population induces dispersal into marginal, low-density habitat for lions west of the park. Close association with domestic livestock predation often is coupled with attacks on humans, especially when livestock are short. The following case studies deal only with lions.

Parallel Case Studies:

There are many parallels of my findings to other areas. In Zimbabwe, areas bordering wildlife reserves were the areas with lion cattle-raiding problems. Lions jumped into fortified kraals at night and killed cattle, donkeys, and small stock. Attacks were most common in the dry season (80%), and 76% of kills were made at night. Rudnai conducted a similar study in Kenya and found more kills in the dry season (Rudnai, 1979). Njumbi, another Kenyan, stated that in the Masai Mara, "depredation rates are the highest when there is little wildlife available and lowest when the wildebeest migration occurs (Njumbi, 1997). In Zimbabwe attacks accounted for an average loss of 12% of each household's annual net income (Butler, 2000). The people graze cattle by day, and lock them up at night, a practice followed by the people of the Sangaiwe and Mbulu Hills (SMH) as well. Lion predation was stochastic and there were few attacks, but several kills at each attack. In Butler's study, lions killed all livestock with a mean kill of 3.7 animals per attack. Moreover, it is the cattle which are the most economically valuable. Other communal lands in Zimbabwe don't have big predators problems but Gokwe does because predators cross into Gokwe from the Sengwa Wildlife Research Area (Butler, 2000). This is geographically similar to Tanzania, in that locals say the lions go from Tarangire National Park to the hills, then into Lake Manyara National Park. The same goes for problems being experienced by villagers with lions in the Caprivi Region of Namibia: the area affected was between Mudumu and Mamili National Parks (Biological Conservation, 2000). It seems that two protected areas close together allowing lions to move across villages contributes to these problems. The main migration

route for herbivores and lions lie to the east, but solitary lions can also move through the west end.

Yamazaki conducted a study in 1999 of fatal attacks on local people by lions in the Luangwa Valley of Eastern Zambia. Boys were attacked on the outskirts of villages around 8pm like all of the villages I studied, and one lion even entered a woman's hut like in Sarame. All attacks were on the border of human habitation. Yamazaki says small lion prides have every possibility of overlapping with human habitation, especially in an area which provides good lion habitat adjacent to a densely populated area. Such a situation increases the chances of conflicting encounters between lions and local people (Yamazaki, 1999). "Lions can construct a flexible social organization adjusted to their respective regional conditions" (Yamazaki, 1996). In the human-disturbed region in Zambia (Luangwa Valley) this included range disagreement among prides, male and female copulations among different prides, and acceptance of new companion males by a pride male. The SMH lions could just as well be adjusting the normal lion social organization in all or some of the above ways.

The Gir Forest in India has been subject to extensive studies on lion-human conflict. The following statements are taken from a 1994 study. The area is semi-arid and has dry conditions similar to my study area, except the rains come in monsoons for the wet season. The people living outside the park are Maldhari herding pastoralists.

82% of attacks occurred on private lands outside of the reserve. The land outside reserve is intensely cultivated and lacks native populations of ungulates, as aerial surveys of ungulate dispersion in Tarangire support for SMH. Lion densities in Gir were highest in the forest and were one lion every five kilometers squared. This is comparable to the

highest densities reported for lions in East Africa (Elliot and Cowen, 1978). Lions in the SMH could very well be relying almost solely on cattle when they have to because in Gir livestock account for 35% of the kills (Chellam and Johnsingh, 1993). Chellam states that the percentage of livestock for prey is even higher for displaced subadults who roam solely in the periphery outside of the park which is void of wildlife. The subadults in Gir were involved disproportionately in attacks, as they were displaced from or were dispersing from their natal territories. In almost all cases in SMH, the sex of the lions could not be identified. Besides the difficulty of night sighting, this could be partly due to the fact that subadults are medium sized and without the characteristic manes and thus hard to sex quickly. Similarly, many livestock raiding lions in Namibia (Stander, 1990) and man-eating tigers in Nepal (McDougal 1987) are subadults displaced from their former home ranges.

A drought, which occurred from 1987-1988, caused an increase in attacks on people from 7.3 per year to 40 per year. Lion aggressiveness was widely reported to increase greatly during the drought. This included lions entering villages with increased frequency, jumping compound walls to gain access to livestock, and trying to enter villagers' houses in search of livestock. In areas like Kenya where there are no man-eaters, the lions just panic the cattle from outside the corral. However, in Gir and SMH, the lions aggressiveness due to the drought seems to cause them to go as far as to jump the over the corral fences. The attacks were highly clustered during the drought and the lion population outside of the park increased from 75% to 87%. Whereas before the drought, no spatial correlation could be made between attacks in Gir, after the drought,

attacks were higher in villages bordering the National Park and in villages which had a higher land to forest edge ratio.

The resultant events linked to the drought in SMH in 1996 parallels these events. While there were rains on the coast of Tanzania, it was poorly distributed and erratic causing two harvests to fail and leaving SMH dry (Pan-African News Agency, 1997). In Gir there was a marked seasonality of lion attacks, with the two to three years following the drought being very high in attack numbers. In SMH, a drought occurred in 1997, with attacks lasting through 2000. This drought was the worst since seen in Tanzania since 1974 (Capdevila Interpress, 9/16/1997). In 1997, the world was also in the grips of the largest ENSO event ever recorded (Rickets, 2000), and El Nino events bring drought to the Sangaiwe and Mbulu Hills. Before 1997 no one had ever died in the SMH. Even after a drought like that which occurred in 1997, and even if the weather is favorable in 1998, it will still be a difficult year because of the drought (President Benjamin Mkapa, 1998). Saberwal says there is an escalation in attacks during times of drought due to the lions' aggression and tendency for villagers to bring their surviving livestock into their dwellings. This aggressiveness led to one lion even entering a household and attacking in Gir. This is similar to the event that occurred in Sarame, where a lion actually dragged a man from his house. The lion could have been coming into the house in search for cattle, which are kept inside to protect them from attacks by lions. Nuemann says that high elevation pastures are very important to local grazing regimes in Tanzania during drought (Neumann, 1998).

According to Saberwal, lions penetrate farther into villages during droughts. Increasing conflict leads them to bring their cattle inside, but this increases conflict yet

further as the lions are roaming about closer to the homes now. Lions ranged long distances from the park prior to attacking humans and forest edges increased the likelihood of conflict. The lands outside were "intensively cultivated and lack populations of native ungulates. Hence, livestock are the only available prey for lions, a situation that readily brings lions into direct conflict with the human population already occupying these areas" (Saberwal, 1994). Problem lions that were captured in agricultural areas returned quickly to agricultural lands after they were collared and released. In times of drought, the deaths of livestock are more numerous and thus there is less prey for the lions to attack outside the village, so they enter villages in search of the few remaining cattle (Chellam, 1994). They find these cattle assiduously protected, and in these confined spaces, conflict between lions and villagers is most acute. The drought mirrors a similar, more ancient episode in Gir, where an 1899-1900 drought caused a killing spree where 66 people were killed by lions from 1901-04 (Wynter and Blyth, 1950). There appears to be a lag in killing and droughts, which is why the 1997 drought in the SMH caused a few deaths each year through 2000.

At first it might seem paradoxical that lion attacks occur in villages when during drought times villagers are taking their cattle into the hills more often and increased cattle attacks would be the only expected results. However, what eventually happens is that in drier times domestics are coming into the lion-populated hills more, which are already losing wild game, causing lions to subsist even more on cattle than they were originally. Next, as expected, attacks on cattle go up. Combine deaths of domestics by wild animals and due to starvation, and the herder/small-scale farmer is faced with his last remaining stock being all the more valuable. This leads to the logical step of him next keeping the

cattle closest to home, even sometimes in his house, to protect what is remaining. This also causes the lions to come into the villages to search out the last remaining quarry as they too are hungry due to the drought.

Chapter 4: Conclusion

Summary and Limitations of the Study

This paper has looked at conflict that villagers are experiencing with lions and made speculations as to why there has been a recent trend in man-eating, based on field observation and similar case studies. Predators such as lions demand a lot of space and an adequate prey base. However, when there is no buffer zone between them and civilization, they will change their preferences towards domestic animals and even man, as they are adaptable to change when given the right circumstances.

Limitations to this study are many, and are due mainly to the fact that for the field component of the study, data for this area has not yet been established thoroughly, and much of it had to be taken from nearby areas and not my exact site (i.e. parallel cases). Moreover, the remoteness and/or inaccessibility of some of the villages prevented me from reaching every affected village, and these other villages could have led to more insight. This yields incomplete field data. However, the problem has been documented, and more so, land-use changes that can provide near direct correlations have been established as best they can. Anderson once said "...successful environmental conservation is contingent upon the active involvement of local communities" (Anderson, 1987). This is ever truer today. In order to get local communities to be allies in the conservation movement, one just needs to stop and listen to their voices. It will often yield surprising and unheard of results. One example is that the lions travel from Sangaiwe to Mbulu hills, and then on Manyara. The villagers don't harbor a great deal of resentment or anger towards the park however. This leads me to conclude that any assistance or effort to help, no matter how small, would greatly improve relations. In

contrast, conservation efforts often thought of as crucial to working with local communities may not be applicable across the board. Environmental education proves on example. Outside cursory assessments often assume a need for it where there is environmental degradation. However, at least in Sangaiwe, there is a respect for the wildlife and interest in visiting the park. The fear of children not seeing a rhinoceros was also mentioned as a concern. Therefore, spending time and money on environmental education would be a waste of valuable resources and it would be more prudent to focus more heavily on other areas relating to ICDP's (Integrated Conservation and Development projects).

Recommendations

Lion hunting is an often-purposed way to give villagers a tangible economic benefit to offset the costs of living with the predators. There are tremendous possibilities here, but economic and political issues seem to be able to overpower any approaches. If one were to restrict the hunting of lions to stock-raiding or man-eating animals, there would be a double economic advantage. The villagers would earn a considerable income while at the same time getting rid of a liability. This utilization is good because locally-based eco-tourism tends to be less susceptible to the whims of the outside world when the communities have other forms of economic activity (Honey, 1999). The professional's fee for shooting a lion in Tanzania is $2,500 to $3,000. However, lion hunts usually occur only as part of a safari which may last up to 21 days, and each member of the hunting party pays $1,00 to $2,000 per day. This goes towards lodging, services of the professional staff, and transportation, which would be particularly high to get to the hills. This is telling, in that the actual income from the lion itself is only a fraction of the total

brought in by the lion hunting opportunity. However, Pieter Kat stated that excellent trophy lions in Botswana are bringing in fees of $20,000. However, stock killers or those that attack people may not necessarily be males with big manes. They could be juveniles or young males. In one case in Sarame, three lions were sighted near an attack on a villager, suggesting that they might be females hunting together. Nevertheless, the financial possibilities are still undeniably quite high and this type of killing wouldn't necessarily increase the number of lions killed annually. However, it would be hard to coordinate the hunter's safari to coincide with the time at which a stock-killing incident occurs and to divide the money which would be a fair cut from the lion hunt portion of the safari. A more flexible option would be to line up several potential hunters who can come on short notice in the area, but this obviously restricts the potential pool of safari hunters. Moreover, there might be significant pressure put on a village leader to report a stock raider even if there is no predation occurring, so that a lion can be hunted and the resultant income collected.

There is also another problem of the lions' social biology which further complicates hunting, and that is infanticide. When new males enter a pride, they kill the babies to bring the females into estrus. It has been suggested that if pride males were shot regularly, as might be the case as they are the most attractive, the resulting turn over of males would lead to litters being killed constantly. This would ultimately depress cub production of the entire population. However, it is not known, and seems rather in doubt, if populations in the hills have a classic social structure. Yamazaki's 1996 study showed that trophy hunting of males in the Luangwa Valley of Zambia reduced the number of males associated with each pride. One could try to target nomadic males and not pride

owners. This would require detailed knowledge of local lion populations though, because it is hard to recognize pride males as they are frequently not with the females. Detailed knowledge, or for that matter, any knowledge of local lion populations west of Tarangire National Park does not exist.

The lions between the Sangaiwe and Mbulu hills could be found in one of up to 15 given villages at a certain time. Thus, lion hunting would need to be managed over large areas and this demands close cooperation between multiple villages. While some villages might not allow sport-hunting, they might see one of their lions being hunted in the land of another village. This could cause inter-village conflict and lead to villagers trying to take advantage of hunting when a lion is sighted on their land. Lion hunting would demand sophisticated management that takes into account both the biological needs of lions and the sociological complexities of land ownership. To have a sustained yield hunting scheme, detailed information on lion ecology must be known. This includes take rates, lion dispersal into the hills from other areas, and the population's reproductive response to the removal of other lions, particularly males. Compound this with the fact that large carnivore populations are subject to population fluctuations caused by changes in prey availability, mortality from not only hunting, but disease, and social variables, and sound science makes a difficult case for sport-hunting. Carnivore ecology is flexible. What is true for lions in the prey-rich Serengeti may not be true for those in the lower-density populations of the Sangaiwe and Mbulu hills. Research would need to be done for at least three to five years to obtain adequate data to cover seasonal and annual variation. Future field research would need to emphasize: population numbers and trends, distribution in the hills, mortality and recruitment rates, sources of mortality,

movement, dispersal, and home range patterns (if home ranges exist), social group sizes and territoriality, and food habits (including predation rates on domestics). Therefore, given the current state of research and political problems, sport hunting does not seem to be the best option for the hills. Current studies are being undertaken by Whitman and Packer in Tanzania to address the nomadic male identification problem. Whether that could be applied somehow to my study area remains to be seen.

Conditioned taste aversion is yet another option to reduce contact between lions and people. Conditioned taste aversion occurs when the animals feed upon food that has been treated with a chemical and this chemical, usually lithium chloride, causes severe nausea (Revusky and Bedarf, 1967). It has been applied with varying success in North America and Africa. In Africa, Dr. Fumi Mizutani tried it with leopards. This approach could be effective, if thoroughly tested, and has the advantages of being inexpensive and easily applied. The techniques only appear to succeed when applied according to established principles of animal learning, so this would require a biologists presence (Gustavsen, et al., 1982).

Since the lions coming into the villages in search of cattle are the ones man-eating, an armed guard of the village, given a small salary by the government, could do a great deal to deter such behavior. A study by Frank in 2000 stated that night guards and herders are frequently able to scare off lions by firing shotguns before any livestock are killed. Even if a lion does kill stock, a shotgun can be used to scare it off and show the felid that killing stock will not result in a meal, making coming into villages less desirable. Perhaps the best way to avoid conflict with lions is through lion-proof corrals. When I state "lion-proof", I mean corrals which are sufficiently high and strong to

prevent cattle from breaking out of them and lions from jumping in. This could be simple thorn corral, just higher and with markedly tightly packed walls. They could be made with locally available materials, with stone or posts to aid in strengthening. These walls should be curved to prevent cattle from piling up on one side, where they then have space to run towards the other end when a lion approaches. Other "open boma" systems have been suggested by Brian Heath, in which cattle are kept between fires outside and the herder sleeps with them. If a lion comes, a light can usually scare it away, but if one domestic escapes, it is likely to be isolated and not cause a stampede that can be damaging to other animals. This isn't very practical for my study area however, as most attacks occur in villages where agriculturalists live. Pastoral lifestyles are the only ones that could efficiently accommodate such a strategy, as this idea comes from the Oromo people of the Tana region in Kenya. Therefore, a more classic corral strengthening approach would be best suited for the hills.

There are no political issues associated with lion-proof corrals, as there might be with sport-hunting utilization schemes. By reducing loss to cattle, it will become increasingly disadvantageous to head to villages for food, thus reducing chance encounters with people that have taken lives in the villages between the Sangaiwe and Mbulu Hills. Moreover, predation on livestock represents a financial loss not only in the loss of the animal taken, but also in the cost of preventing such predation. Further, small-scale farmers often only own a few cattle, so death of a single animal can be a serious setback. However, one should look closely at each individual kill to determine whether or not actual predation occurred, or if it was a diseased animal that the lion simply came to feed upon. Only certain lions become stock killers and even fewer come to target

people. Reducing interaction will help reduce this already minority of problem lions in the population. The only thing to consider is that dragging large materials in to fortify the fences would affect different segments of the population differently. It would be more difficult for pastoralists to do this, as they move around more and cannot spend a lot of extra time fortifying a fence, only to move on shortly thereafter. However, the Datoga people did not have as much problems with lions as the agriculturalists in the area. It would therefore make sense to pursue this strategy with the more sedentary segment of the population. Frank cited wire corrals as the weakest, as a determined lion can easily leap over these structures. However, a lion can often leap over a thorn corral too, so placing lamps around the corral can further discourage a lion from attacking.

If there was to be some sort of compensation scheme for villagers who lost cattle to lions in SMH, problems with a similar scheme in India should be avoided. In Gir, 81% stated that they did not file for compensation when they lost livestock because of the procedural problems associated with filing claims. These included excessive travel to report losses, the likelihood that an official would be available to register a report of livestock depredation within 24 hours after its death, and subjective differences in assessing a value to the animal. This should all be noted in SMH, especially the travel issue. As Tarangire is most closely accessible only by traveling over Sangaiwe hills, and once in the park, the western edge is less frequented by both tourists and employees, and there is no ranger station nearby.

Establishing good lines of communication between the locals, the park, and the larger branches of the government is essential. Many natural resource professionals I talked to prior to my research were unaware of the problems, or the extent and/or severity

of them. These problems need to be documented as they arise and made public so that the appropriate actions can be taken promptly. The National Oceanic and Atmospheric Administration quoted a Tanzanian government official as saying "Drought this year (1999) has killed the normal prey of lions and leopards. As a result, the large cats have killed 21 people". This shows that the information is out there, it is just poorly disseminated. Local people will be much more open to conservation if they feel the government is making some sort of effort on their behalf and don't have to live in constant fear of the animals the park is preserving. Various authors have stated some of the parks are more profitable than others, but the most profitable appear to be overutilized by tourists, while the least profitable underutilized. Since one is already underway, I think projects trying to establish photographic safaris by boosting game animals that are going on around Sangaiwe already should be supported and professionally managed. It should not be the only measure taken though, as eco-tourism is reflective of the whims of the outside world, often concerned with aesthetic pleasures of wildlife, without taking into account resultant socio-political issues.

One must therefore be cautious when implementing any type of ICDP program, such as those mentioned above. As Neumann says, buffer zones extend the authority of the park (State) to monitor and restrict land/resource uses. Unlike CAMPFIRE, Tanzania's Community Conservation Service or CCS doesn't involve a devolution of tenure and the impetus for CCS came from outside the country in the form of financial aid and technical support from AWF, the African Wildlife Federation. The CCS offers "no suggestion of any retreat from the spatial segregation of nature and society" (Neumann, 211). Although this is detrimental, a positive side of CCS is that the heart of

the program is the return of a share of park tourism revenue directly to communities surrounding the parks. Not only are parks threatened by social, political, and economic forces, but they are active sociopolitical forces in their own rights (Neumann, 2001). It is therefore necessary to find mechanisms for controlling access that are seen as legitimate by affected communities. Incorporating locals into the buffer zone planning stage could help here, since any hunting or compensation scheme brings about an ICDP aimed at ameliorating conflicts between wildlife and people and makes buffer zone of some sort. For the time being, the power to propose, design, and enforce buffer zones lies far from village communities. These local communities are not homogenous however, and they have different sets of common interests and taking note of who the "winners and losers" produced by the increasing integration into the modern economy via ICDP schemes is key. Many past systems have made people settled next to protected areas live in an ecologically benign way which is very hard; Westerners certainly don't do it. Communities are labeled either traditional or broken down, and who is allowed to partake in certain activities is then defined. If they 'modernize', they have been tainted by civilization and have no place in pre-cultural African landscapes of parks and reserves, and are thus either a destroyer, or protector, of nature (Neumann, 2001). Classifications of 'indigenous', 'non-traditional', 'substinence farmers', or 'pastoralists' maske age, gender, class, and ethnic differences within communities (Neumann, 1997). Differential access and ownership within communities depends on the type of activity, the type of resource, location, and the intended use of the resource, in this case wildlife. Interventions by NGO's may favor one group over another. This shows that Parks and the management they require are influenced by the historical factors and social actors that

shape the local context at each site. These local forces are in turn, affected by larger national and international social, economic, and political forces. Understanding these contexts is essential to developing lasting management approaches (Brandon, 1998). Therefore, it would seem that conflict resolution work to be done in the Sangaiwe and Mbulu hills almost becomes an exercise in anthropology.

> "Recognizing the persistence of notions of the primative in buffer zone proposals offers an opening for recoceptualizing relations between conservation advocates and rural communities in Africa. The opportunity lies in breaking down the constructed boundary of modern and traditional, civilized and primative, us, and them. By abandoning these undifferentiated categories we can see local indigenous societies as subject to some of the same troubling politics of class, ethnicity, and gender that confront us. (Neumann, 1997).

It is useful then to watch for socio-economic stratification in the community. Lessons here can be gained from Zambia's AMADE program, where Chiefs and local elites grabbed disproportionate amounts of power, even though the program was modeled after 'traditional' African land tenure systems. When linking villages to the private sector and external markets (hunting, photographic safaris), rural populations won't be represented unless they are sufficiently educated of their rights and can truly determine their needs. Otherwise, politicians or well-off farmers or government officials could disproportionately dominate (Havnevik, 2001). Land and resource tenure is often more complex and flexible than originally thought (Neumann, 1997). While the photographic game reserve being planned in Sangaiwe has some definite prospects, locally based eco-tourism is less susceptible to the whims of the outside world if the communities have other forms of economic activity (Honey, 1999). Moreover, it should be determined what the market is looking for. Often, this means unrealistically high numbers of animals for the SMH in order to make for easy picture taking. The future looks most bright if we don't put all our eggs into one basket, so to speak. With Tanzania's community

conservation program still top-down, many would argue real gains cannot be made until there is a devolution of power to the local level, like in Zimbabwe's CAMPFIRE program.

Since much of Africa is too dry to be arable, the areas of tourism and commercial hunting will prove to be the most profitable local enterprises compatible with nature preservation, if executed in a responsible manner. The study area's ability to attract tourists and hunters is increased a tremendous amount if large carnivores are present in reasonable numbers. However, the residents of these lands depend heavily on their livestock, so the presence of carnivores can be seen as a constant liability. Therefore, where carnivores are present, local people must be able to see how the income from tourism and hunting can counterbalance livestock losses from depredation. As Adams says, "The world can no more afford to run Africa's Parks than the Africans. Unless the protected areas become embedded once again in the local culture, they will disappear" (Adams, 1992). In a recent session of Tanzania's Parliament, a member of the Singida region in north-central Tanzania, said that although the region has beautiful wildlife, no game reserves exist. This is profound in that it is the first instance rural Tanzanians have volunteered their land for a game reserve (Adams, 1992). Perhaps Neumann's rural peasants' whispers are slowly becoming more audible. Locally based conservation calls for a new vision of interconnections. If conservation is to become embedded in daily activities, nature and society must be intimately linked in people's minds.

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Record of Deaths - Table 1

Date	Village	Name	Surviving Kin/Contact Person
July '97	Kiongozi	Asani Masempari	
April '97	Gichameda	50 yr. man, women 40	Contact Rafael Bapst
June 1st, '97	Gichameda	60 yr. man	Contact Rafael Bapst
July 15th, '98	Mawemairu	Juiliana Simion	Simon Filipo
July 1st, '99	Mawemairu	Emmanuel Obed Kilama	
July '99	Sangaiwe	Barabaig Woman	Guanga Gitabek (husband)
July '99	Kisangagi	13 yr. girl	Ask Andrew Laswai
July 31st, '99	Sarame	Asha Huseni	Ali Haji (Husband)
Nov. 3rd, '99	Gichameda	Mariamu Ramadani	
Dec. 14th, '99	Sarame	Musa Nasoro, +baby	
June(early)'00	Kisangagi	11 yr. boy	
June 13th, '00	Gichameda	baby	Maria Masaai (grandmother)
July '00	Mawemairu	Saidi Vincent	
Aug. 3rd, '00	Kiongozi	Bakari Juma	
Aug.(end) '00	Kiongozi	10 yr. boy	
Sept. 19th, '00	Mawemairu	middle aged woman	Friend of Mama Mary

Data is incomplete due to lack of good records in some villages. Gichameda includes the subvillage of Kinambich and Darakuta Ranch, where all the attacks took place. The same is true for the sub-village Shaurimoyo of Kisangagi village.

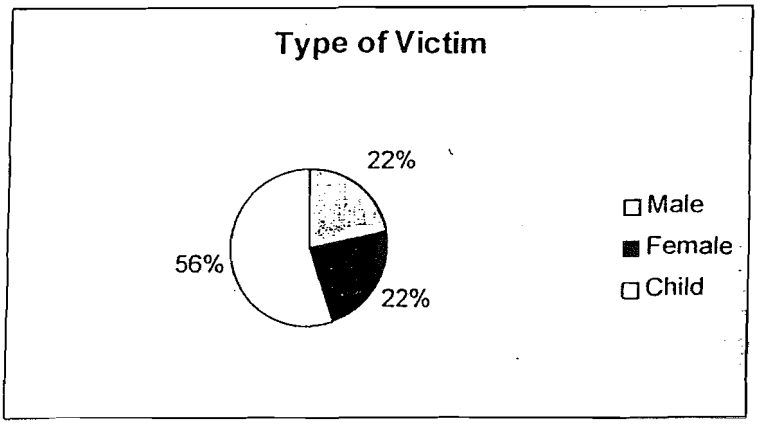


Figure 1

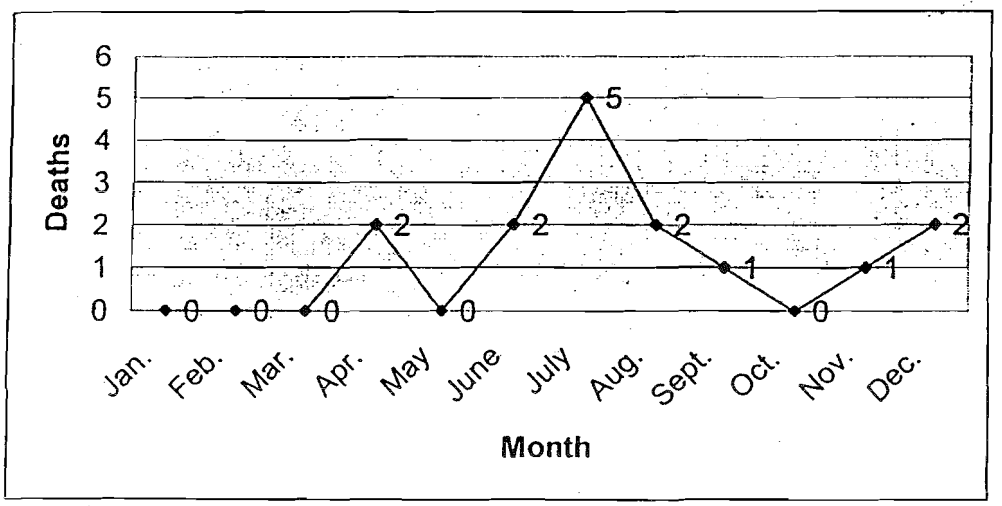
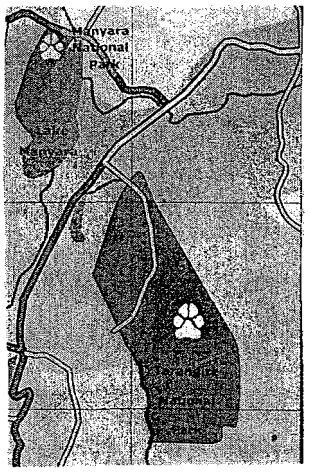


Figure 2



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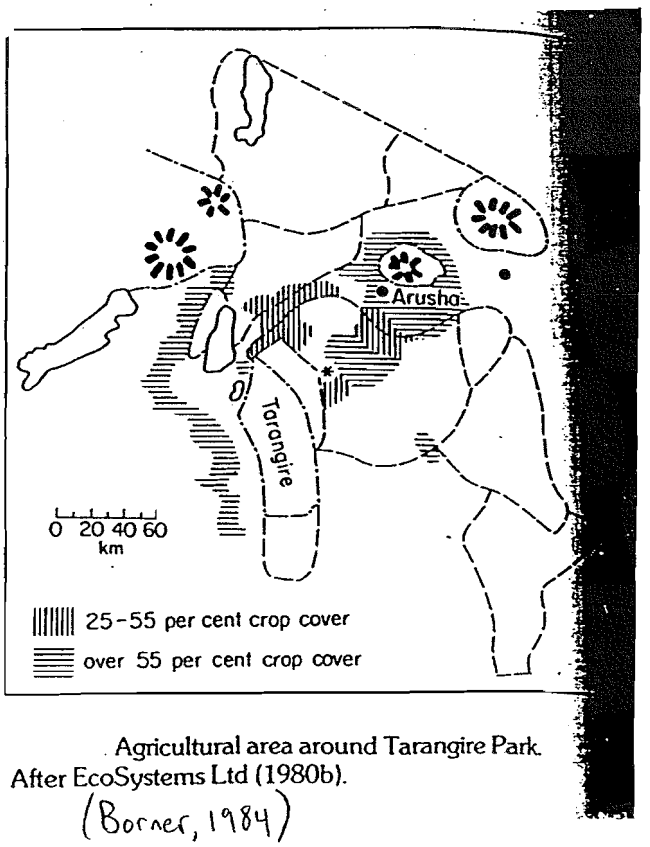


Figure 3

Agricultural area around Tarangire Park.
After EcoSystems Ltd (1980b).
(Borner, 1984)

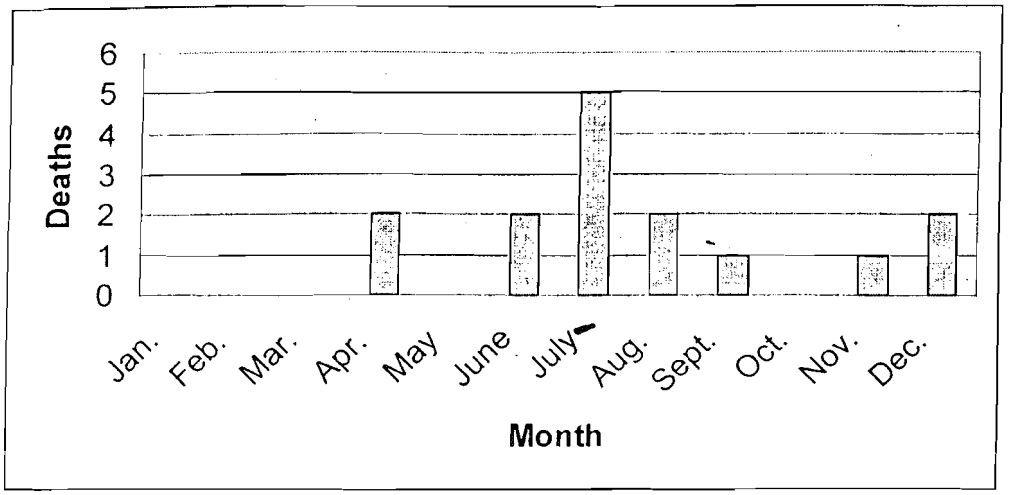
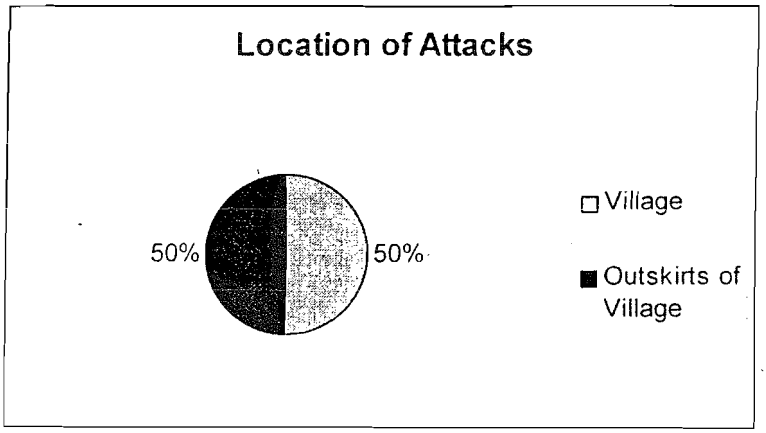


Figure 4



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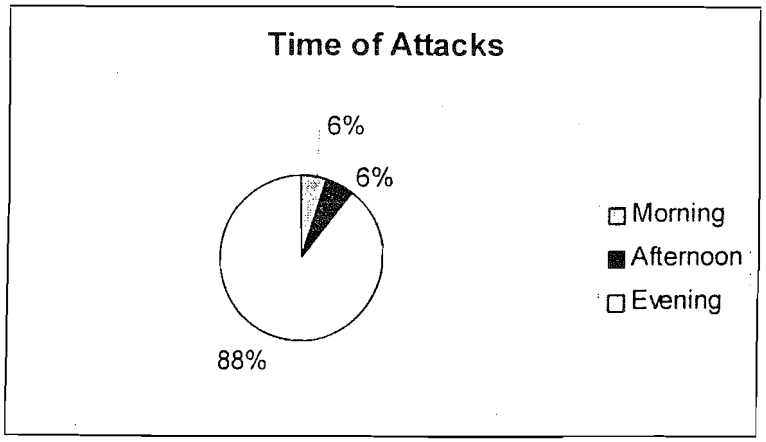
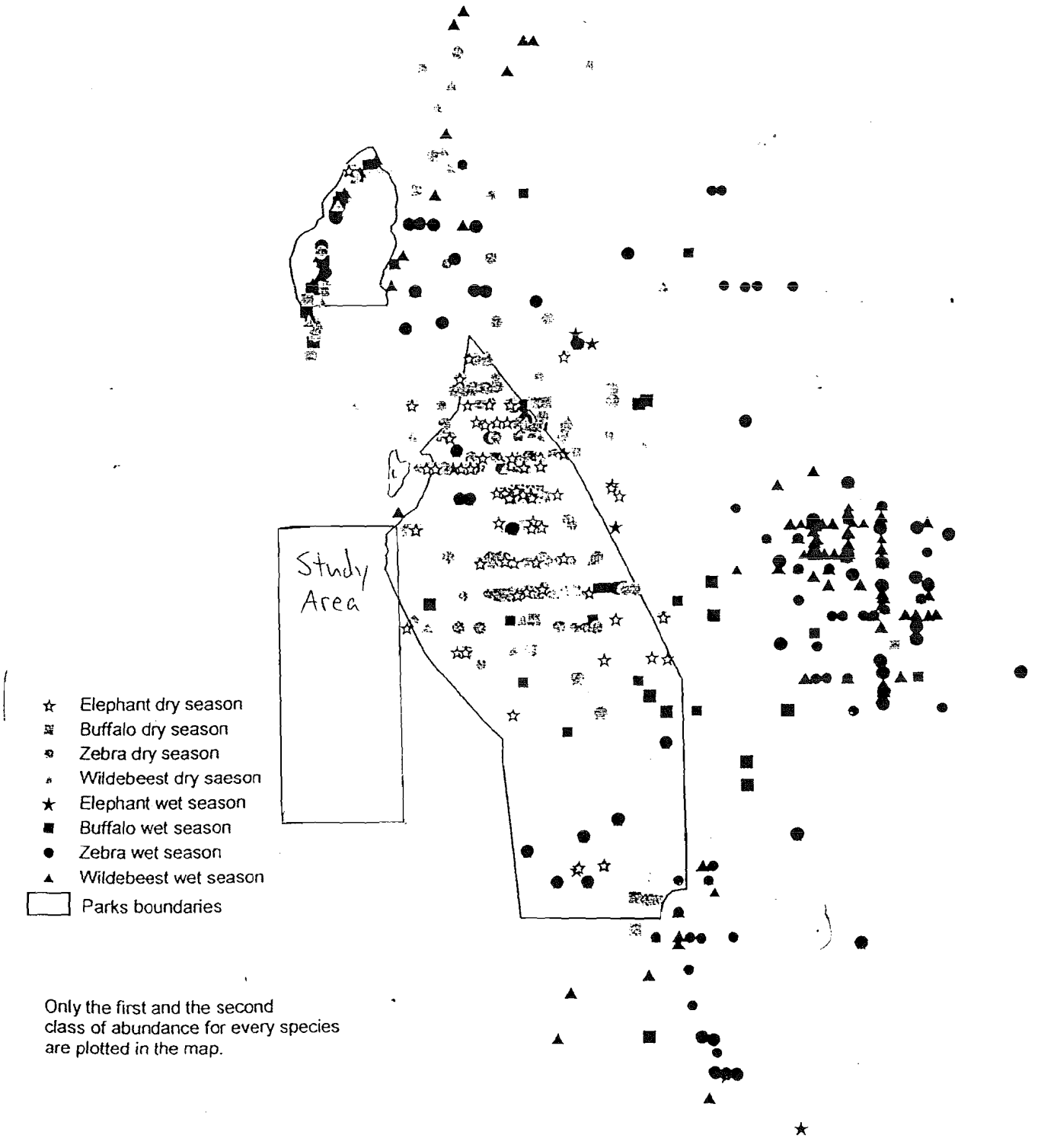


Figure 6

Figure 7 Elephant, buffalo, wildebeest and zebra dry and wet season distribution 1988 - 1996

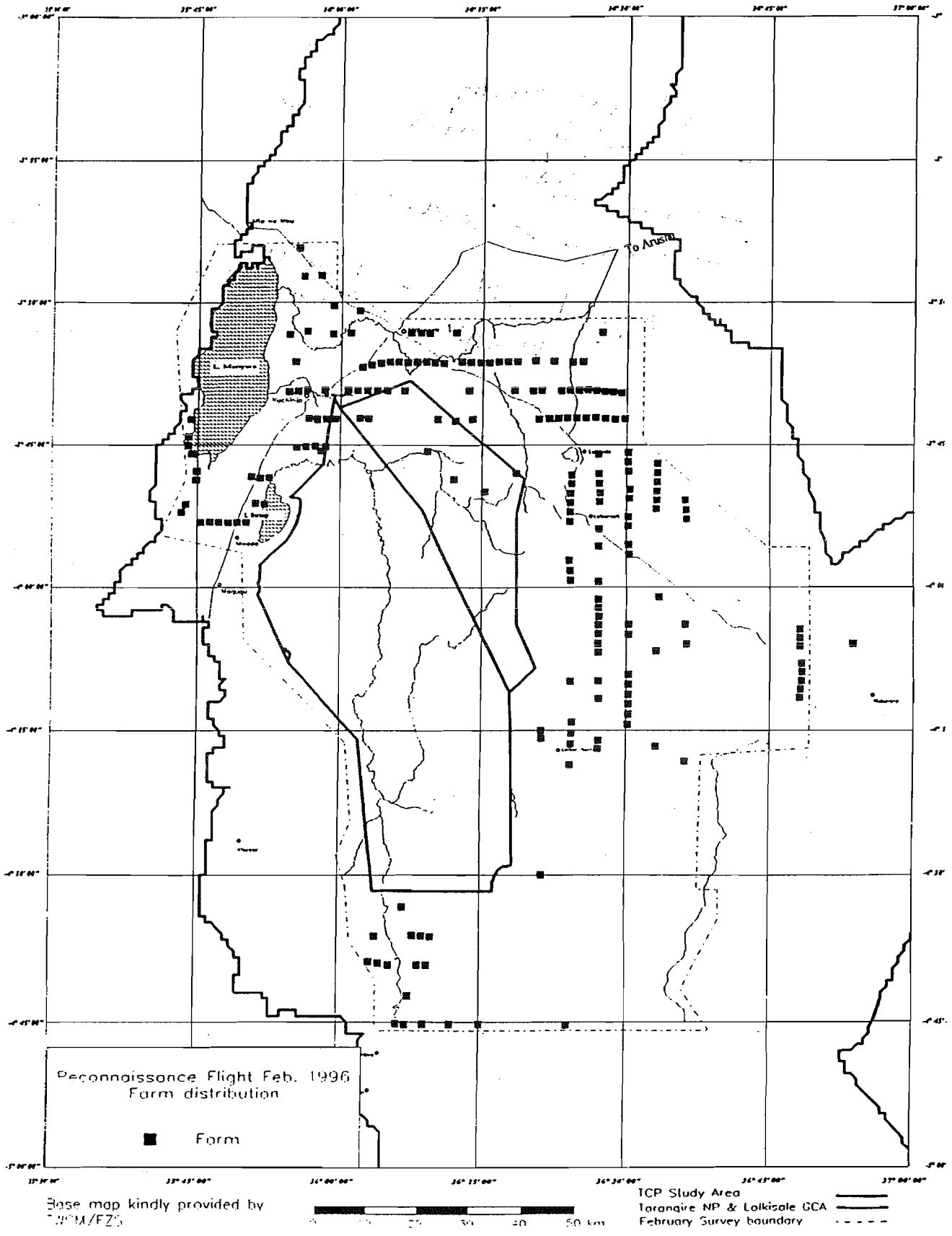


(Various, 1997)

TARANGIRE CONSERVATION PROJECT (TCP)

Figure 8

Farm distribution in February 1996 RF



(Various, 1997)

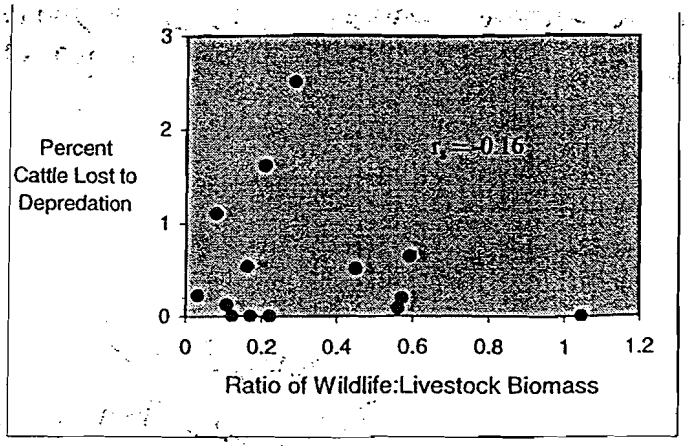


Figure 9

. Relationship between annual depredation on cattle herds and relative abundance of wild prey versus livestock on large-scale Laikipia District ranches.

(Frank, 1998)

Sangaiwe

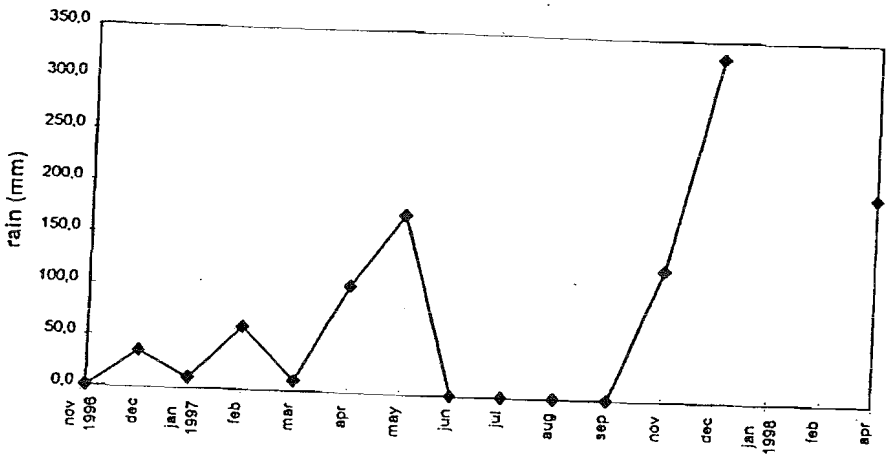


Figure 10

Rain data from Sangaiwe Ranger Post, November 1996 - April

(Various, 1997)

Tarangire NP

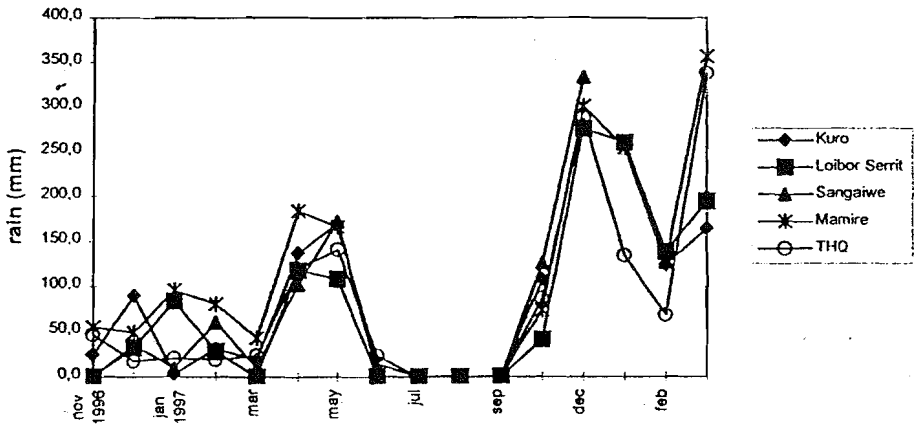


Figure 11

Rain data from Tarangire NP, Ranger Posts and Head Quarter, November 1996 - April 1998. (Various, 1997)

TABLE I. cont.

	Grant's Gazelle	Elephant	Rhino	Lesser Kudu	Eland	Other Herbivores	Total Herbivores	Total less Impala	Lion	Other Carnivores	Total Carnivores
1	1.31	0.58	0.37	0.16	0.0	0.32	(92.02) 70.79	(41.14) 19.91	0.26	0.0	0.26
2	0.66	1.13	0.72	0.0	0.0	0.28	100.90	17.70	0.28	0.17	0.45
3	1.11	0.0	0.26	0.0	0.0	0.16	79.08	8.37	0.10	0.37	0.47
4	0.0	0.0	0.23	0.17	0.0	0.12	65.89	5.68	0.0	0.0	0.0
5	0.0	0.5	0.27	0.06	0.0	0.04	64.43	5.94	0.09	0.04	0.13
June 6	0.0	0.0	0.12	0.10	0.0	0.12	(82.79) 67.71	(26.53) 13.33	0.0	0.08	0.08
July 7	0.0	0.28	0.17	0.40	2.17	0.40	83.55	46.01	0.0	0.03	0.03
8	0.11	0.22	0.29	0.90	2.43	0.91	110.07	71.72	0.56	0.19	0.75
9	0.38	2.81	0.11	0.79	2.15	0.50	137.76	94.19	0.75	0.63	1.33
10	0.62	1.52	0.10	2.11	3.91	1.38	133.89	84.10	2.20	0.69	2.89
11	0.0	1.06	0.58	0.89	2.41	1.22	130.10	67.56	0.19	0.32	0.51
12	0.57	0.22	0.60	0.44	0.10	0.91	97.02	44.23	1.27	0.09	1.36
Ave	0.40	0.66	0.32	0.58	1.10	0.53	95.10	39.89	0.47	0.22	0.69

Figure 12

(Monthly Densities in Tarangire N.P. Transects, 1961)