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Lion and livestock conflict in the Amboseli region of Kenya

Gabriela Schieve Fleury
James Madison University

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Lion and Livestock Conflict in the Amboseli Region of Kenya

A Project Presented to
the Faculty of the Undergraduate
College of Integrated Science and Technology
James Madison University

in Partial Fulfillment of the Requirements
for the Degree of Bachelor of Science

by Gabriela Schieve Fleury

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Accepted by the faculty of the Department of Integrated Science and Technology, James Madison University, in partial fulfillment of the requirements for the Degree of Bachelor of Science.

FACULTY COMMITTEE:

HONORS PROGRAM APPROVAL:

Project Advisor: Jennifer E. Coffman, PhD.,
Associate Professor, ISAT

Barry Falk, Ph.D.,
Director, Honors Program

Reader: Amy R. Goodall, PhD.,
Associate Professor, ISAT

Reader: Michael L. Deaton, PhD.,
Professor, ISAT

Reader: Jacob Mayiani Loorimirim, M.S.,
Research Analyst, Office of Institutional Research

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Abstract

African lion populations are in decline through much of Africa, however the problem is particularly acute in Kenyan Maasailand where local Maasai are spearing and poisoning lions at a rate that is unprecedented. The struggle to find a common ground for humans and lions are ongoing. Many rural communities in Kenya are almost completely dependent upon livestock farming for their livelihoods and pastoralists often resort to killing big cats and other predators in order to protect their livestock. In order to fully understand the phenomenon of big cat and livestock conflict, it is also important to recognize the foundations embedded in the local perception of livestock depredation by predators such as lions, as well as the socio-cultural, historical and economic factors that affect the complex human-predator relationship. All of these factors deeply affect pastoralist views towards current conservation and compensation activities and their tolerance of livestock predation. It is to this end that I am undertaking a partially interview-based Senior Honors Thesis that examines the phenomenon of big cat and livestock conflict in the Amboseli Region of Kenya concerning multiple Maasai communities as well as local perceptions of big cat and livestock conflict in Kenya with a particular focus on the lion. I am specifically interested in how pastoralists regard large carnivores, and how that affects their attitudes towards current conservation activities. The future of carnivore conservation in the area depends on an improved understanding of human-wildlife conflict and an effort to address community-level appropriate institutions by if possible providing economic incentives to local individuals who engage in positive conservation activities.

Chapter I: Lion and Livestock Conflict in the Amboseli Region of Kenya

1.1. Introduction to Thesis

The decline of overall lion populations in Africa has been noted but the problem is significantly more severe in the area of Maasailand, hence this thesis' focus mainly on Kenya and comparatively on Tanzania. The rates of retributive lion killing in response to livestock depredation are affected by many things, such as socio-economic factors and Maasai cultural perceptions of lions well as well as livestock depredation, and the historical factors that have helped create the complicated Maasai-conservation relationship. This thesis, through article research as well as personal interviews with conservation scientists and members of multiple Maasai communities also focuses significantly on the private compensation policy that was set in place in 2003 in an attempt to discourage retributive killings of lions and to offer some compensation for predator-killed livestock. This topic is important in many ways, as lions are not the only large predators being affected by livestock conflict with humans. Many of the same issues that will be explored in this thesis, such as the encroachment of large predators into more settled and human populated areas because of land use change and an expanding population, can be seen in the United States.

For instance, the grey wolf (*Canis lupus*) in such US States such as Minnesota, have been involved in predation events on livestock, and many of the conflict mitigation strategies, such as compensation policies, to deal with lion and livestock conflict that will be discussed later in this thesis are transferable to a problem with a species much closer to home. Substantial economic losses drive livestock owners to retaliate against large predator species, and the goal is,

of course, find a way to protect livestock owners' income without jeopardizing the survival of large carnivore species who are important to the ecosystem and intrinsically.

Ecosystem wise, top predators are vital to the functioning of a healthy ecosystem. Large predators, including lions, have the ability to exert strong ecological effects despite existing at low densities. Large predators have the roles of limiting large herbivores through predation and lesser carnivores through interspecies competition. The trophic cascade concept states that the removal or addition of top predators would trigger massive changes in the populations of other predator and prey species, causing in turn massive ecosystem changes. The removal of lions from the ecosystem would have drastic results on the ecosystem in turn. Large carnivores also may help reduce disease prevalence among ungulate populations and thus reduce spillover of diseases onto livestock populations (Ripple 152).

In Kenya especially, lions are considered of major economic importance. Much of Kenya's money comes from tourism, and lions are one of the first on many tourists' lists to see. The elimination of lions would not only damage the ecosystem but damage the country economically through the loss of tourism dollars. Lions are considered in many ways to be a flagship species, they are beautiful, charismatic animals that are well known outside their native habitat. That is one of the reasons that I personally as a researcher was drawn to these particular animals. Lions are important in that they draw the attention of people to the issue of predator and livestock conflict and impart the importance of this issue, which will hopefully have a radiative effect for lesser-known predator species.

1.2 Introduction to Human-Wildlife Conflict

It is important to clarify what one means when one speaks of human and wildlife conflict. Wildlife is often defined to mean the plants and animals of a particular area, but in colloquial speech, the idea of animals is considered at the expense of plants and is used to draw attention to the plight of endangered species and the problem of a reduction of biodiversity by conservation organizations (Coffman). Human-wildlife conflict, in this meaning, wild as living in a state that is undomesticated, has increased to the point of becoming a serious threat to many species. It is not only present in certain geographical areas but occurs in all areas where human populations and wildlife populations interact and share resources that are limited, particularly in biodiversity hotspots and around national parks and reserves. Conflicts become more intense where ownership of livestock is an important part of rural livelihoods. Some areas of the world have less conflict, as whole populations of wildlife have been eradicated, but considering the rate at which human populations and their increased demand for land and other resources are increasing, which increases the demand for resources and access of land, it is clear that human-wildlife conflict will continue to occur around the world. Therefore, an understanding of conflict management options is vitally important for the well-being of wild species (Distefano 1).

Human and wildlife conflict can take multiple forms. Crop raiding species such as African elephants (*Loxodonta africana*) are a particular concern. Attacks on human lives are also of concern, and often involve large carnivores. Carnivore and livestock conflict is what this thesis focuses on, and is an example of the overall phenomena of human and wildlife conflict. Carnivore and livestock conflict is of particular importance in that it is a not well-tolerated type of conflict and is a major reason for the decline in predator numbers in many areas of the world (Woodroffe 2127).

1.3. Human-Carnivore Conflict

Many species of out of the total 245 terrestrial species of carnivores have been lost during the last 200 years. Tigers (*Panthera tigris*) have been eliminated from a great deal of their range, as have lions (*P.leo*), leopards (*P. pardus*), and cheetahs (*Acinonyx jubatus*). Humans have a history of and continue to be the cause of most carnivore losses. Human impacts have been documented extensively (e.g. IUCN Cat Specialist Group; IUCN Canid Specialist Group). Carnivores are killed both legally and illegally for a multitude of reasons, including the fact that they prey on livestock and wild game. They are also killed for their pelts, for other valued body parts, for respect and prestige, and because of intolerance. Yet carnivores are also often revered and are widely represented in art, stories, and religion. Even animals such as lions and wolves have their human enthusiasts, perhaps in numbers greater worldwide than those who dislike them. (Mattson 151) This thesis in particular will focus on lions, which one of 31 species of large carnivores, which tend to have the largest impacts on livestock and an enormous impact on ecosystems if they are removed. Large carnivores have low population densities but range widely in the search for prey and require a great deal of energy. This wide-ranging behavior leads them often into conflict with humans and livestock (Ripple 153).

Human-carnivore conflicts create challenges worldwide because often these conflicts create problems and tensions between communities and conservationists who seek to protect wildlife populations. Kenya is a country known to be a biodiversity hotspot with a great deal of its money coming from wildlife tourism, here, meaning wild animals, which is one of the reasons that this thesis focuses on Kenya. Because of the importance of wildlife economically to the country, there has been a great deal of conservation efforts in order to protect this resource that is quickly dwindling. Kenya Wildlife Service estimates that 70% of wildlife in Kenya live outside

of protected areas. However, Kenya has lost over 50% of its wildlife in the last 25 years and is continuing at this pace. The 50% loss of wildlife can be attributed to many factors but most of this loss results from habitat destruction and loss, the growth of human populations, and the movement of local people into protected areas, all of which lead to conflict between people and wildlife (Hazzah 39).

Humans have clearly impacted some carnivores more than others. This begs a number of questions such as what human perspectives and behaviors allow some individuals or even societies to exist with carnivores? Do humans create negative impacts for carnivores that cannot be reversed? What landscape features worsen human-wildlife conflict? Answering these questions will be important to gaining the insight we need to coexist with carnivores as human populations expand and bring us into further contact and conflict with animals (Mattson 152).

1.4. Livestock Depredation: Causes and Factors Affecting Retaliation

Livestock depredation control has had an effect and even threatened populations of species as varied as snow leopards in India, pumas (*Puma concolor*) in the United States, jackals in the Middle East, and lynx and wolverine (*Gulo gulo*) in Scandinavia. Depredation is usually the outcome of a situation involving elimination of native prey and introduction of vulnerable livestock. The densities and relative proportions of native prey and livestock as well as the density of human numbers have major effects on depredation. A higher population of humans requires more resources, and leads to human numbers encroaching on predator territory. Less wild prey and more livestock also leads to a higher chance that a predator will attack livestock. (Mattson 13).

An important factor affecting human-carnivore conflict is the influence of human populations and 'hot-spot' conflict areas. A 'hot-spot' can be defined as an area with low levels

of wild prey and lots of livestock alongside an area that contains abundant wildlife, as well as free ranging predators. Highly populated human settlements usually experience less conflict with wildlife than more widely distributed communities. Communities that have continual conflict with wildlife are often in more remote regions and have a 'hard edge' boundary next to protected areas (Hazzah 29).

The most common response to depredation of livestock has been overall persecution of predators, including such things as retaliatory killings. Obviously, if carried on over a large enough area, employing enough resources, and for a long enough time, all carnivores that potentially eat livestock can be eradicated. Such a solution has been achieved without direct intent or by design in many areas and threatens carnivore species with extinction as well as often damaging the complex ecosystem through the removal of top predators. Killing predators in retaliation for depredations only works in the short term. Solutions with better long-term prospects include improving livestock husbandry in order to preemptively reduce killings of livestock by predators (Mattson 155).

1.5. Conservation Status of *Panthera leo* in Africa

Lions are the top predator in the Maasailand ecosystem and as such are important to conserve, especially since their numbers are dwindling. Lions (*Panthera leo*) once inhabited large parts of Africa, Europe, the Middle East, and Asia, but their range has been increasingly lessened since the first century AD because of contact and conflict with ever-growing populations of humans. Lions are found in savannah habitats across Sub-Saharan Africa (Bauer, 2004:30). The African lion population has been estimated at between 23,000 and 39,000 individuals and this classifies them as Vulnerable, an alarming number of major lion populations declining. Genetic population models show that large populations are needed to promote genetic

diversity and avoid inbreeding, which increases when populations fall below 10 prides. These conditions are often not met, although there are at least 17 lion strongholds greater than 50,000 square kilometers. African lion populations have been declining for several reasons but the major threat facing lions is conflict with local people over livestock, which is why that is the focus of this thesis. Conservation is aided by money from safari hunting and tourism within areas such as National Parks, ideally allowing conservation in lands outside National Parks and private lands (Macdonald 19).

1.6. Wildlife Policy in Kenya

The Wildlife Bill of 2012 applies to all wildlife on private, public and community lands, and in Kenya under the Bill, the African Lion is listed as Endangered. Vulnerable, which is what lions are listed as in many other parts of Africa, means that a species is considered to be facing a high risk of extinction in the wild, while endangered means that a species is considered to be facing a very high chance of extinction in the wild. The Bill allows for the killing by officers of the Wildlife Service or private individuals of animals deemed as “problem animals”, provided that the animal is a potential danger to human life, which is often a point of contention. The Bill does not allow the use of poison for this purpose, nor does it condone retributive killings. It enforces the protection of wildlife through organizations such as the Kenya Wildlife Service, and retributive killings can carry a hefty fine or result in jail time.

Hunting is not permitted in Kenya as further detailed below. Offenses of sport hunting is punishable by a three million shilling fine (\$34,923 USD) as of 2012 or imprisonment of five years. Even subsistence hunting is not permitted and is punishable by a fine of thirty thousand shillings (\$349 USD) or an imprisonment term of six months or more. These fines would produce an enormous amount of financial strain on many Kenyans.

The 2012 and the newest 2013 Wildlife Compensation policy finances wildlife compensation for human death and injury as well as property and crop damage. False claims results in six months imprisonment or a one hundred thousand shillings (\$1164 USD) fine. The lack of a national compensation policy before this for loss of livestock had led in the past to the creation of privately funded compensation policies such as the Predator Compensation Fund in the Amboseli region of Kenya. As of 2012, however, any person who suffers loss or damage to crops, livestock or other property to wildlife specified including lions may submit a claim to the County Wildlife Conservation and Committee who will verify the claim and make recommendations. This national policy attempts to serve a similar purpose as the privately funded compensation policies served (2012 Draft Wildlife Management Bill 2012).

In Tanzania, by contrast with Kenya, lion hunting is allowed legally outside national parks if the hunter has a sports hunting permit issued by the Director of Wildlife for a certain location. The Wildlife Act of 2009 allows traditional groups to gain hunting rights and for game scouts to kill ‘problem-animals’ as long as they receive the approval of the game department at the district level. Conversely, in Kenya, all hunting including lions was banned in 1977. The killing of lions is legal only if the person who committed the killing can prove it was in defense of life or livestock (Goldman 492).

1.7. Lion and Livestock Conflict in Kenyan Maasailand

Lion researcher Laurance Frank describes the decimation of lion population over large areas of Kenyan Maasailand. Kenyan Maasailand is in the south of the country, bordering Tanzania. Maasai livelihoods and lifestyles are changing in southern Kenya in response to economic pressures,



Map 1: Location of Maasailand (Map Credit: Penn Museum)

land tenure and wildlife issues. Maasailand is characterized as an area with low precipitation and highly variable rainfall patterns and droughts. There are two rainy seasons throughout the year: short rains (from November-December) and the long rains (from April-June). Rainfall generally varies from 300mm to 900mm per year. Rainfall is the most important factor influencing land-use practices for both livestock and cultivation in Maasailand. In addition to the variance in rainfall, economic, social, and political factors have resulted in a major shift in Maasai livelihood patterns as which will be discussed briefly in the second section (Frank 2429, “Lions and Warriors”).

According to a personal interview with Esianoi Pashile, a young woman and recent graduate of George Washington University Master of Public Health’s program and originally from the Kitengela area of Kajiado County outside Nairobi National Park, lions are important to Kenya in general and by extension to Maasai because of tourism and maintaining the ecosystem. However, since much of the tourism money does not benefit Maasai directly, lions are seen as a curse because they kill their livelihoods. She believes that conflict is increasing partially because of human settlement in the animal migration corridors (Esianoi Pashile.)

Laurence Frank seems to agree with this notion. Increasingly negative attitudes towards wild predators in Maasailand are least partially due to livestock depredation, but the increase of lion killing over a period of time points to a much larger issue. However, limited involvement by local people, tourism and lack of access to the money generated, combined with easy access to agricultural poisons such as carbofuran, may also be motivations behind increasing levels of illegal predator control. In Kenya today, the use of the agricultural insecticide Furadan (carbofuran) to kill predators is probably the single greatest source of lion mortality. When lions or hyenas kill a large animal like a cow, they often eat part of it and return the next night to finish

it. Livestock owners have learned that the agricultural pesticide carbofuran is lethal to predators, and it takes only a few cents worth of carbofuran placed on a carcass to kill a predator such as a lion (Frank 2429).

American-manufactured carbofuran is banned in the US and Europe because of its terrible effects on wildlife and has been removed from the market in Kenya, but illegal stocks still exist and are being used to poison predators. It is still universally available in shops throughout Uganda and Tanzania where \$1.50 buys enough Furadan to kill dozens of predators, including lions and hyenas (2429).

Africa's large carnivore populations in general have decreased substantially over the past 30 years. There are no reliable data from earlier periods, but scientists estimate that Africa's lion population prior to colonization had been falling steadily to perhaps 500,000 by 1950, about 2000,000 by 1975. and less than 100,000 by the early 1990s. The most recent, and likely most accurate estimate is 29,665 over the entire continent. Historically lions occupied a range in Africa over 22,211,900 km². Their range is now less than 3,802,873 km², a reduction of 83%. Human-carnivore conflict over livestock depredation is the most important reason for lion population decline, followed by habitat loss and interspecies conflict over resources (2429).

Historically, lions and other wildlife were first eliminated in heavily agricultural areas, persisting in areas suited only for pastoralism. However, firearms and the resulting armed conflict among different socio-linguistic groups, poaching, and British and Kenyan military training have largely eliminated wildlife from Kenya's northern rangelands and an apparent loss of tolerance for predators in Maasailand of southern Kenya had resulted in a notable drop in lion numbers there. The current resentment towards lions in pastoral areas suggest that conflict is rooted not only in actual losses of livestock, but in actual and perceived vulnerability linked to

land use changes and lost territory as well as the use of conservation methods suggested by others working in these ecosystems. More of this information will be expanded upon in the second chapter of this thesis regarding the historical context of human-wildlife conflict in Maasailand (2429).

1.8. Cultural Context for Lion and Livestock Conflict in Maasailand

Maasai and other pastoralists have lived in the same areas as large carnivores for centuries, and have a history of hunting lions. Historically, Maasai speared lions for cultural reasons and to protect themselves and their livestock. Recent availability of cheap poison as detailed above has improved pastoralists' ability to eliminate predators without getting injured or having it be traceable. Maa speakers recognize two types of lion hunting: Olamayio and Olkiyioi. Olamayio is a warrior manhood ritual that brings prestige to the warrior (murrān) who first spears the lion. Culturally, as related by Jacob Mayiani, a Maasai student at James Madison University, lions are one of the most respected animals in Maasai culture. Traditional lion killing is said to bring honor, but much of traditional lion killing, or Olamayio, is suppressed in modern times because of conservation efforts (Jacob Mayiani).

Dr. Steven Kiruswa, a Maasai from an older generation from Jacob and Director for the Heartland Steppe Program of the African Wildlife Foundation, remembers going on group hunts and three retaliatory hunt expeditions when he was younger. In traditional hunting, he says, Maasai never killed lionesses or young lions, only adult males. He grew up on stories about lions, remembering these stories from when he was less than ten years old. Lions were a competitor with the Maasai as top predator, and a source of cultural pride (Dr. Steven Kiruswa, 2013). By contrast to traditional killings, Olkiyioi killings are carried out by anyone in the community in response to a lion attack on livestock, particularly on cattle because of the worth

of cattle in Maasai culture. Today the distinction between these types of killings are often increasingly blurred. (Frank 2429).

1.9. Study Regarding Propensity to Retaliate Against Lions

A 2009 study done by Hazzah and Frank, two well-regarded researchers of lion and livestock depredation, showed that reported likelihood to kill lions may not necessarily reflect actual behavior in terms of lion killing. However, it is a relevant indicator of resentment against lions and the risk people pose to them. The results indicate that the most important predictor of whether Maasai kill lions is the percentage of livestock mortality due to predators, rather than how often livestock are lost to them. Consistent with other studies, their findings implied that a single depredation event is particularly devastating for someone who owns only a few livestock, perhaps making them more likely to retaliate against predators.

In this study respondents who raised livestock for sale have a high reported likelihood of retaliating against predators compared to those who did not raise livestock for sale. Some Maasai on Mbirikani Group Ranch, an example of a shared land system in the Amboseli region of Kenya, in the study eliminated the easiest controlled factor that threatened their livestock, the carnivores that attacked their livestock. Killing carnivores is simpler and cheaper than preventing disease, which accounts for the majority of livestock mortality and drought, and is often beyond pastoralists' control. According to a personal interview with Dr. Leela Hazzah, lions kill a smaller percentage of livestock than other predators, such as hyenas, but Maasai remove more lions than any other predator in retaliation. Compensation records showed that lions were responsible for only 62 out of 1141 (5%) of all livestock attacked between May 2005 and May 2006 in the area of southern Kenya studied (2430).

According to Jacob Mayiani, there is a strong cultural component that cannot be overlooked when studying livestock depredation. Hyenas disproportionately kill livestock when compared to other predators, and Maasai dislike them. Most Maasai grow up hearing that a lion is not malicious, that it kills to eat, while a hyena might just maim an animal leaving it to die slowly and painfully (Jacob Mayiani). However, lions are killed in disproportion to their levels of livestock depredation. Lions are the most vulnerable because they are the easiest carnivore to kill using traditional methods (spearing) while other predators, such as hyenas, are harder to kill. Spearing a lion provides immense prestige within Maasai society, but killing other predators does not, and although lions kill fewer livestock than other predators, they predominately attack cattle, which are of such great cultural significance to Maasai. This loss creates greater resentment than killing sheep or goats.

There are many factors that point to an increase in lions attacking livestock. In her April 2013 interview, Esiano Pashile believes lion and livestock conflict is most rampant during the rainy season. Other animals, she says, leave the parks and reserves and go to the plains which forces the lions to leave the parks as well to search for food, leading to a higher instance of lion and livestock conflict in areas near the parks. (Esiano Pashile) According to Frank, 65% of depredation losses occur when livestock are left outside of enclosures (bomas) at night and could be substantially reduced by better herding practices, while losses from bomas could be essentially eliminated through more effective building materials. Further, more effective law enforcement is required; killing lions is illegal, but few offenders are arrested and even fewer are charged. Though compensation does not appear to “buy” tolerance of carnivores in areas of high-conflict, it is believed to be a useful tool that opens dialogue between pastoralists and conservationists (Frank 2430).

1.10. Contemporary Problems Contributing to Conflict

While livestock herding people have coexisted with wildlife for hundreds of years the potential for conflict over land use has increased in recent decades, due to land changes and increased human population, which necessitates a greater demand for resources. Some biologists and conservationists have concluded that pastoralists now compete severely with wildlife for food, water, and living space. They advocate the reduction of perceived conflicts by the exclusion of livestock and settlement from contested areas. Certain wildlife populations have been protected in this way in the short term but this enforced exclusion can create hardships for local herdsman and new conflicts with conservation interests.

In the Amboseli region of southern Kenya, efforts to resolve conflicts between Maasai pastoralists and wildlife have been made by conservationists and government authorities since the 1950s. In 1977, a new program was initiated to involve Maasai pastoralists in direct benefits from a National Park that was created in their grazing lands. It was predicted that the Maasai of Amboseli would come to view the wildlife and their habitats as a local resource. Successful results had been reported and the Amboseli Park program had been proposed as a general model for the integration of conservation and development (Lindsay 149).

The pattern of lion killing in the Amboseli-Tsavo ecosystem in recent times is as follows. Between the years of 1998 and 2004, KWS biologists reported 87 lions killed in and around Nairobi National Park and Kitengela Plains, allegedly in response to depredation of livestock. A similar outbreak in lion killings occurred in the region between Amboseli and Tsavo West National Parks. Due to a lack of effective land-use planning around the National Park, fencing and development reduced natural prey in the area. One of the major reports written by Woodroffe about lion killings in this region concerns the 1990 elimination of the lion population

in Amboseli National Park, when local Maasai communities were reported to have poisoned lions in response to livestock predation and loss of habit and resources, leaving only two lions in the reserve. Richard Bonham, who spearheaded the Predator Compensation Fund's compensation program documented a significant decline of lion sightings around Mbirikani Group Ranch. Through efforts by an NGO called the Lion Guardians and the private compensation fund, lion numbers have been increasing in the area (Woodroffe 2127).

The almost universal difficulties of designing, funding, and implementing compensation schemes are exemplified in East Africa, where human and livestock populations are dense (human populations in Kenya have almost doubled over the past 20 years). Protected areas are unfenced and difficulties with the implementation of compensation schemes is still a major problem. In the Amboseli ecosystem of southern Maasailand, Kenya, a privately funded livestock compensation scheme since 2003 has contributed towards a reduction in the rate of lion killing. This method, as well as further methods to reduce conflict, will be discussed further in the third section (Macdonald 67).

The second chapter of this thesis, now that the problem of lion and livestock conflict has been addressed, will delve further into the possible historical and cultural reasons behind lion and livestock conflict as well as describe the shaping of modern Maasailand and the land use changes that have worsened the situation of livestock depredation by lions as well as effected attitudes of Maasai towards conservation initiatives.

Chapter II: Historical Context of Human-Wildlife Conflict in Maasailand

2.1 Introduction to Second Chapter

This second chapter of the thesis will focus on the Maasai people because of their proximity to wildlife, the lore of lion hunts connected to them, and because they are part of what many tourists wish to see when they go on safari. The purpose of this chapter is to look at the historical context of human and wildlife conflict in Maasailand with a particular focus on British rule in Kenya and the creation of modern Maasailand, the creation of the National Parks and Reserves focusing on Amboseli National Park, and the land-use changes exemplified by the Group Ranch Scheme in the 1960s.

2.2 Maasai Historical Background

Today, Maasai inhabit a mere fraction of their former range with many settling in the savannas of southern Kenya and northern Tanzania. The ancestors of the Maasai, or Maa-speakers, came to East Africa as Nilotic agropastoralists from what is now southern Sudan around the first millennium A.D. (Hughes 7, "Moving the Maasai"). From 0 BC to 1500 A.D., multiple agropastoralist groups across East Africa interacted with Bantu speakers and adopted iron production. The emergence of pastoralism, as opposed to a mixed farming and herding economy, happened around 1500 as well, with Maasai spreading southwards throughout Kenya from 1000-1500 A.D. During the 1700s Maa speaking groups extended from Lake Turkana in Northern Kenya, throughout the Rift Valley, and to the present day Maasai steppe in East-Central Tanzania (Homewood 5).

Maasai have dominated the pastoral niche in East Africa for four centuries for several reasons. A prolonged dry season and inappropriate soils for growing crops have long meant

agriculture in the area has been at best unreliable, making pastoralism the most logical land use for its human inhabitants. However, prior to the pastoral revolution of the 18th and 19th centuries, many Maasai practiced a mixed agro-pastoral economy in order to supplement their pastoralism (Spear 131). Rotating animals between rangelands and rearing Zebu or Sanga cattle, which are better adapted for the semi-arid environment, they adopted adaptable methods to ensure long term and reliable use of their environment. Maasai occupied much of Kenya's Rift Valley, a stretch of low elevation savanna and acacia woodland scattered with alkaline lakes, but their territory would change with the introduction of British in the 19th century (Hazzah 34).

2.3. Increasing Vulnerability to British Rule in Kenya

There were several events in the 1800s that weakened Maasai pastoralist communities and left them more vulnerable to outside influences. In the mid-nineteenth century, the pastoralist Maasai may have been at the height of their power, however, many Maasai underwent dramatic fluctuations in their political and economic well being in the late nineteenth century and at the onset of British colonial rule. The only Maa-speakers that practiced agriculture had been driven to the edges of the plains by the dominant pastoralists during the wars of the nineteenth century. Having defeated their neighbors a group of semi-pastoral Maasai, known as the Iloikop, held sway in the Rift Valley where they were prosperous (Tignor 13). The Iloikop Wars of the 1820s-1870s, a conflict between multiple sections or groups of Maa-speakers over control of the Rift Valley for water resources and pasture, weakened Maasai. The losers of the conflict, the Laikipiak Maasai, were forced to abandon pastoralism and to increase usage of production systems such as agriculture. Even the victorious Maasai sections were weakened by the long years of warfare and unable to effectively protect their territory from British incursion (Hazzah 35-36).

As much as 90-95% cattle in the region that is now Kajiado's county were killed by a Rinderpest epidemic in the 1880s. Rinderpest, coming from a German word that means "plague of cattle" is a viral disease that is related to measles. It kills animals within days of infection and strongly damaged the economic well-being of cattle owners. Rinderpest entered into Africa for the first time probably from Arabia or India and was carried southward by Italian armies in 1889. It swept through East Africa with astonishing virulence around 1890 causing Maasai to suffer greatly. Many families were forced to seek refuge among Kikuyu and Kamba communities, and a large contingent threw themselves upon the mercy of the entering British colonialists (Tignor 14). Early colonialists found East African populations in shambles and misunderstood it to be the status quo, which led to a feeling of superiority over the existing East African populations and legitimized colonization. Misfortunes such as warfare and diseases, like the example above, weakened Maasai populations and allowed the British to penetrate into Maasailand (Hazzah 36).

The arrival in East Africa of an increasing number of Europeans in the late 19th century brought a significantly negative effect on wildlife, as hunters killed a huge number of animals. In contrast to these newcomers, Maasai had lived with game and many had tolerated wildlife for years, as their livestock competed with wildlife over resources. Despite these setbacks, Maasai hardly ever killed large mammals except to defend their livestock against predators such as lions (Rutten 2).

The interest in the official protection of Kenya's wilderness and its resources went hand in hand with the British imperial rule in the 1890s. British colonial power brought conservation to Kenya early with a concern for rapid loss of game through hunting pressures. Hunting without a license became illegal shortly after the turn of the century, although funds were very limited for the enforcement of rules created by the Britain-based Society for the Preservation of the Fauna of

the Empire. After the formal declaration of the British East Africa Protectorate in 1896, the colonial government issued a declaration to set up wildlife game reserves and western travelers arrived in the Protectorate to undertake hunting safaris (Chongwa 40).

2.4. Land Alienation in Maasailand

British incursion brought many changes to Maasai communities. Maasai socio-spatial organizations were composed of the household, the boma (a collection of households in the same compound) the neighborhood (a cluster of bomas) and the section (a group of neighborhoods in the same area). Grazing and water resources were controlled at the neighborhood and section levels. Maasai lost much of their land through a series of colonial-era treaties as detailed below as well as due to the addition of National Parks, such as the Nairobi National Park in 1946, Tsavo National Park in 1948, and Amboseli National Park in 1974 (Kimani 204).

The section of Kenya today known as Kenyan Maasailand rose out of the Southern Maasai Reserve as a result of movement of many Maasai by the British into reserves in 1904 and 1911. Marginalization and impoverishment, as well as pressures upon land and resources, are often attributed by some Maasai and scholars as an effect of the process of land alienation which began in 1904. British governance relieved the Maasai of an estimate of 50-70% of the land that they had previously inhabited and grazed their cattle. Colonial settlement into the central uplands of Kenya, so called the 'white highlands' because of the amount of European settlers who occupied them, further shrunk Maasai territory. (Hughes 207, "Malice in Maasailand"). Today, Maasai point to the fact that many Kenyan place names, including Nairobi, are derived from the Maa language as proof that certain lands were once inhabited by them. This injustice can be seen as having repercussions to the present day. A combination of factors, driven by the mass moves and by colonial intervention have led to increased population pressure. In addition these factors

led to a high total fertility rate, resulting in the erosion of livelihoods and land degradation, as well as increased vulnerability to drought.

Increased migration to the area that would become Kenyan Maasailand followed two important treaties made with Maasai in 1904 and 1911. In the first move in 1904 thousands of Maasai were moved by force from the Rift Valley and Laikipia to a Southern Reserve. This Southern Reserve was inferior to the lands they had utilized before. In its western section in particular it lacked sufficient permanent water sources and drought refuges (Hughes 207-208). Under the 1904 Maasai Agreement or treaty, this territory was promised to Maasai for ‘as long as the Masai as a race shall exist.’ This second move was completed on March 26, 1913 (Hughes 9). In the 1911-1913 migration an estimated 10,000 people were evicted from parts of Laikipia and moved into the southern Maasai reserve, which only added to the population living there. Overpopulation from in-migration emerged, compounded by the high total fertility rate. Much of the reserves could not be utilized as they were too arid for grazing or allotted as wildlife reserves. (Hazzah 39).

The second forced migration in 1911 was contested with no success by Maasai with the assistance of British lawyers in 1913. This group of young Maasai men, who took the government to High Court, did so to argue against the legality of the 1911 forced migration, as well as to request compensation for loss of livestock as a result of the move. They also tried to regain Laikipia county, as they claimed in court that the agreement in 1911 was not binding upon themselves and other Maasai in the north who had not agreed to the arrangement. This legal action was one of the first of its kind brought by indigenous people against colonial rulers in East Africa. Led by senior warriors, the Maasai were at a major disadvantage in the court case due to their illiteracy (Hughes 10-11, “Moving the Maasai”).

Many Maasai experienced increased vulnerability due to land use change which was mainly driven by European needs, and later driven further as a result of wildlife conservation efforts in the form of protected areas. Wildlife became an economic commodity to the Kenyan government with the onset of sport hunting upon British settlers' arrival. Many Maasai felt that wildlife was seen as more important to both colonialist and post-independence government than their own well-being. Pastoralists in general were seen as a major threat to conservation because of their land and water needs. The alienation of Maasai land for sole use by wildlife created a variety of problems, particularly increased human and wildlife conflict and eventually Maasai resentment of initiatives for wildlife conservation (Hazzah 34).

2.5. History of Wildlife Conservation in Maasailand (1930-1945)

A game department was created by the colonial government in 1906, and by the late 1930s efforts were made to establish national parks in earnest. In 1930 suggestions were made that the Southern Game Reserve established in 1906 should be classified as a park and water sources offered to Maasai who lived there in compensation for any damage sustained in the name of conservation of wildlife. The North Game Reserve was also established along with the Southern Game Reserve. In the 1940s as game viewing grew more popular the calls for protection for wildlife became more insistent. In 1945, the British Protectorate passed the National Parks Ordinance that paved the way for the establishment of several more protected areas. Nairobi Royal Park was created the following year (Chongwa 40). There were many reasons for conservation of wildlife, such as the preservation of natural heritage, aesthetic appeal, scientific and educational values, the preservation of the variety of wildlife and the economic potential of the parks (Western 303).

Most land now protected was designated between 1945 and 1960, in areas then deemed low in economic potential. National parks came under the authority of the National Park Service. National reserves, in areas where human presence could not be excluded, came under control of the Forest Department. Kenyan parks were created by the government with little regard for local need. Early conservation policy saw Maasai as somewhat compatible with wildlife, reflected in that they were not excluded from game reserves but removed from national parks. (Rutten 3).

British colonial power segregated populations and displayed a paternalistic attitude through conservation. With the first outlawing of hunting without a permit and the designation of reserves for wildlife only, Kenyans were given no cause to value protected areas and were put into direct competition with wildlife for resources, except for those employed by the Game Department, for example (Cheeseman).

2.6. Later Governmental Programs and Their Impact on the Maasai

The early 1950s marked a change of view point by the government regarding their previous regulations and they once again attempted to improve services and conditions for Maasai. In the 1950s the African Land Development Program established by the colonial government was introduced and focused mainly on limiting herds to the carrying capacity of the land. Despite this, livestock numbers continued to rise, continuing to degrade the land. Much of the source of land degradation in Maasailand was a direct cause of reserve restrictions that were exacerbated by failed developmental programs, the loss of trade markets monopolized by Europeans, and a high total fertility rate. During the implementation of all the above programs, no Maasai representatives were consulted in anything regarding the propositions. These failures caused more mistrust between Maasai and governmental policy makers as well as later conservationists (Hazzah 39-42).

2.7 History of National Parks in Kenya (1963-Present)

The birth of Kenya's protected areas did not bode well for the local communities immediately faced with challenges of displacement and human-wildlife conflict. Upon attainment of Kenya's independence from colonial rule in 1963, there was a strong move to establish national parks and reserves and to promote wildlife safaris and recreation, as Kenyan communities became increasingly engaged in ecotourism and wildlife conservation. Independence began to change the segregated and paternalistic attitude of the government, but the national parks especially maintained a protectionist approach with European game wardens and military trained Kenyan staff. By the time compensation for wildlife damages and the idea of revenue sharing finally took hold, Maasai were well acquainted with broken promises and less willing to work with attempts at conservation.

Since the 1980s many individuals and diverse community groups have demonstrated a willingness to conserve wildlife as part of a move towards community-based conservation. The Wildlife Conservation and Management Act recognizes the state as the sole regulator of matters related to wildlife, a position perceived as restrictive, particularly to the potential involvement of local people. In order to address this gap the Kenya Wildlife Service (KWS) was created through subsidiary legislation that allows private individuals to participate in wildlife conservation. (Chongwa 40-41).

2.8. An Example of Conflict: Creation and History of Amboseli National Park

The Greater Amboseli ecosystem extends from the base of Mount Kilimanjaro in Tanzania northward into Kenya and includes the Amboseli basin, swamp wetlands at the base of the mountain, as well as neighboring rangelands. The ecological center of this system is Amboseli National Park in Southern Kenya. Amboseli National Park, a savanna ecosystem,

epitomizes the problems of conserving the large mammals communities found there. Amboseli is named after a dry lake basin of some 1000 square kilometers situated directly north of Kilimanjaro along the Tanzania-Kenya border. The area has a rainfall of less than 400 mm annually and is dominated by open savanna. The basin is the only permanent source of water in the region, attracting many wildlife species into the park seasonally.

In addition to its high biological diversity, the Amboseli ecosystem is known as the birthplace of “community-based conservation.” In the case of Amboseli, this meant a focus on making wildlife “pay its way,” recognizing that wildlife is a source of major tourist revenues. Amboseli was considered one of the prime areas in the late 1930s when efforts were made throughout East Africa to establish national parks as a way of protecting wildlife. National reserves were established in anticipation that they would soon become parks. The difference between the two categories are that in parks there is the ideal goal of total protection of natural resources with the only activities allowed in them being tourism and research, while in reserves human activities are allowed under specific conditions, such as firewood collection and grazing. The Amboseli National Reserve was created in 1947 and was intended to defend migratory wildlife from hunting. As it did not have any fixed boundaries, it allowed Maasai to move freely with their animals. Maasai were allowed to use this area but not live inside the reserve as the government policy at the time was not to interfere with the indigenous population. By July 1950, Maasai agreed to rent 50 acres of land at Amboseli to the Kenya National Parks for safari camps in the area. By December 1950, the National Park built a semi-permanent camp for visitors.

During the 1950s, the number of visitors to the Amboseli Game Reserve rose dramatically. From the early stages of planning regarding the Reserve, hopes had been put forward by the Amboseli National Reserve administrators that Maasai could be moved away

from the Ol Tukai swamps of Amboseli. To accomplish this end, an alternate water source had to be created by the Game Policy Committee. Sensing an end to their rule in Kenya, this project to create an alternate water source was halted by British authorities in March 1957 (Rutten 4-5).

Before Amboseli National Reserve was created, both disease and lack of water had limited Maasai stock, but better veterinary medicine allowed the rapid increase of cattle, which had a negative impact on wildlife populations (Rutten 4). Restrictions were imposed on Maasai livestock. A section of central Amboseli was demarcated as a “livestock free zone” and murrans (warrior) activities were controlled by game officials, which included the banning of cattle raids. Historians and conservationists concur that up to this time period Maasai rarely killed wildlife malevolently, but out of the interest of protecting their livestock (Hazzah 43). As time passed, this would be seen to change. With independence quickly approaching, the colonial government handed over the administration of Amboseli to the Kajiado County Council.

By the late 1960s conflicting claims on Amboseli and its ecological deterioration created pressure on the Council and the government to resolve the issues, but little was known about the ecosystem itself. In 1967, more information came to light that both wildlife and livestock migrated in what was essentially the same fashion and for the same reasons between wet and dry ranges as permanent water restricted the dry season range of the migrants. By 1968 tourism amounted to a full 75% of Kajiado County’s yearly income and was causing ecological changes in the area, and although the money it brought in was important for the Kenyan economy, the national parks were not prepared to deal with the management issues that arose. Heavy visitor traffic, fragile terrain and poor planning by the Council heavily affected Amboseli (Western 304).

In 1968 as well, the Kajiado County Council proposed a plan to carve out slightly more than 500 square kilometers from the Amboseli Game Reserve for the exclusive use of wildlife and for tourism. This was in response to the popularity of the Reserve which had caught the interest of the Kenyan government and international and national conservation lobby groups. Many Maasai in the area protested in vain as the boundaries of the new sanctuary were laid out and the area gazetted as governmental land. In retaliation, and over time during the late 1960s, Maasai began to kill rhinos and other wildlife as a form of political protest and in fear that Amboseli would be gazetted as a National Park. In an effort to appease Maasai protesters, the area of the sanctuary was reduced to 388 square kilometers by the Kajiado County Council (Rutten 5).

The creation of Amboseli National Park in 1974 was dramatic, politically charged, and controversial and it challenged both Maasai and conservation stakeholders to identify potential solutions to the problem of wildlife conservation over the long term as well as sharing wildlife benefits with local communities. Realizing that past conservation schemes failed, the 1977 Park agreement offered certain benefits for the Maasai that were willing to move, including: access to water supplies, compensation for tolerating wildlife, increased infrastructure such as schools and clinics, and direct benefits for tourism. In June 1977, Maasai agreed to leave Amboseli in return for the benefits, but did not sign an agreement, instead insisting on a verbal agreement.

The government failed to provide Maasai from the area the long-term benefits promised. The pipeline worked for only a few years, wildlife fees were not to be counted on and stopped completely after 1981, and there were no direct benefits. Because of feeling betrayed by the government, Maasai had little reason or incentive to stay out of the Park. A particular point of contention was the before mentioned water sources. Agreements in the early period of the

Park development called for a water distribution system to be set up to compensate the Maasai (Homewood 165). In October 1974, Amboseli National Park was gazetted, but the alternate water source for Maasai cattle that was promised was not completed until 1977. Therefore, many Maasai had to re-enter the park for water on a regular basis. The most important incentive to gain the support of locals failed (Rutten 4-5).

The government and conservation community have flip-flopped numerous times in Kenya over whether or not Maasai were compatible with wildlife and therefore can be allowed in reserves. National parks have always been closed to Maasai, with the occasional exception of access to watering holes and forage in times of drought (Cheeseman). The creation of Amboseli as a National Park did not have totally negative affects, however. When it was gazetted into a National Park, wildlife numbers were seen to increase along with a reduction in poaching. Agriculture expanded as pastoralism decreased, which alleviated competition between livestock and wild herbivores, but this was complicated by issues such as fencing, increased permanent settlements and pollution, as well as others (Hazzah 44).

2.9. Group Ranches and Subdivision in Kajiado County

The focus of this thesis is on Kajiado County, which was altered by major land use changes in the 1960s that still have dramatic repercussions today, especially when related to the interactions of humans and wildlife. Kajiado County is located in the Rift Valley Province of Kenya, covering an area of 21,105 square kilometers. Because of low and erratic rainfall, only eight percent of Kajiado has some potential for rain-fed cropping. Generally, lack of water in Kajiado made the county not well suited to agriculture. The economy of Kajiado is dominated by Maasai pastoral livestock production, as well as rain-fed agriculture in higher potential areas. Maasai in Kajiado County moved with their livestock from place to place, depending on the

availability of water and pasture as well as any incidence of diseases. Land was held communally, and all Maasai had a right to pasture, but livestock was individually owned. Maasai traditional livestock production is characterized by and dependent on flexibility of livestock movement (Grandin 10). A lack of flexibility of livestock movement effects the use of resources and exacerbates predator and livestock conflict.

Changes in livelihood patterns and land-use practices in Maasailand have predominantly resulted from the establishment of group ranches and the process of subdivision. The Group Ranch Scheme (GRS) launched in the late 1960s was part of a modernization scheme to revise Maasai pastoralism and was initiated in 1968 under a FAO Kenya Livestock Development Program funded by the World Bank (Rutten 5). This was instrumented in the hopes of changing the orientation of production of livestock from subsistence to commercial. The idea of a group ranch meant setting aside a certain piece of land, communally owned by a group of people recorded and registered as the legal owners through membership of the particular ranch. Group ranches are parcels of land, jointly owned between 30 and 900 men as heads of families and managed by an elected committee (Kimani 202-204).

The Kenyan Government introduced the concept of group ranches with the overall aim of addressing the issues of land degradation and overgrazing, resulting in part from the 1904 and 1911 moves, by encouraging pastoral Maasai to graze only within the group ranch boundaries, which governmental officials hoped would encourage them to reduce their livestock numbers. Most Maasai did not have a clear understanding of all the consequences of the group ranches. They accepted group ranches to secure exclusive rights to grazing land and to minimize encroachment by other people in response to a perceived threat to their land because of an increasing growth of immigration to the area. However, according to government reports, group

ranches were unsuccessful and pastoralists did not restrict their livestock within the group ranch boundaries, nor did they reduce their stock holdings. Presently, grazing in National Parks is still commonplace, especially during dry seasons. Generally, group ranches failed because of inherent difficulties within the group ranch concept and the differences between Maasai objectives in keeping livestock and governmental objectives. While Maasai kept livestock for subsistence, the Government expected the group ranches to produce beef commercially as part of a major attempt on the Government's part to move Maasai towards modernization. It was a new approach to pastoralism in that it wished to change a nomadic subsistence production of livestock into a sedentary and commercial system. (Kimani 202-204).

Initially foreign to most Maasai, privatization, that is, the individual titling of land, received a major boost through the Lawrence Report in 1966, a government assessment of the potential of privatization and also through the World Bank funding of water supply facilities. The World Bank encouraged secure land title as a basis for development credit. Maasai ran into trouble once more as they pursued gains in their security and standard of living primarily through informal political means. Many Maasai viewed the individual titling of land as something secure. Meanwhile, the World Bank and international development agencies pursued privatization of Maasai land, intent on Maasai then producing cattle for the market economy as part of a bigger modernization agenda. Hopes of economic growth collided with a lack of cultural and ecological understanding, in that it is not a simple thing to dismantle an entire way of life to suit 'modern' economic needs.

As a result of frustration caused by the loss of grazing areas, Maasai began demanding the subdivision of group ranches in the late 1970s. Their primary motivation for subdivision was the security of land tenure and to acquire loans available only to individuals owning land.

Increasingly, group ranches in Kajiado are taking part in subdivision; from only seven ranches in 1984 subdividing to twenty-two in 1996 (Grandin 11). Subdivision has increased in a higher number of fenced properties which decreases herd mobility and as a result interferes with wet and dry season traditional grazing regimes for livestock which leads to overgrazing and effects wild herbivores. Less wild prey results in higher levels of depredation of livestock by predators.

Cultivators in Kajiado tend to occupy the most fertile land and this has removed the highest potential land as a resource for grazing and has subsequently pushed many Maasai into more and more marginalized land. Forcing Maasai into more and more marginalized land brings them into higher chance of conflict with wildlife. High potential areas in the group ranches are important as dry season pastures, and as subdivision increases, their loss will only serve to lower the carrying capacity of the land further.

There is also a high impact on wildlife because of increasing subdivision, given that 65-80 percent of wildlife in Kenya live outside designated areas for conservation. This is particularly important in Kajiado as Kajiado contains Amboseli National Park within its boundaries and Nairobi National Park upon its border. A major consequence that comes from this is conflict between farming and wildlife. Wildlife can destroy crops, transmit diseases and kill or injure livestock. The more people move into the area, the less likely these impacts by wildlife will most likely be tolerated. The increase of fencing restricts movement of wildlife and has the potential to isolate populations and interfere with migration patterns, causing impacts such as lion and livestock conflict because of a change in the migration of natural prey (Kimani 209).

As a result of changes in livelihood, social structure and pressure to subdivide, many Maasai have in turn shifted away from traditional communal livestock husbandry and land

management to individualized livestock practices, such as less cooperation in animal production. The increase of sedentarization in Maasailand is causing rapid changes in the ecosystem and within Maasai culture. Land privatization spurred Maasai to cease the large-scale rotational grazing scheme that suited the area best as opportunistic herd mobility across varying ecological zones allowed for a higher carrying capacity of the land than what would be afforded when these migrations ceased. By ceasing their migrations, they were formed into an unsustainable ecosystem, and the carrying capacity of the land reduced for Maasai and their livestock, as well as wildlife. More ramifications run deeper, as Maasai lost their best dry season range shortly after colonization.

A variety of factors in the political, social, and economic spheres are causing major shifts in Maasai livelihood patterns. Cultivation is increasing as a form of diversification to reduce risk of famine and as a response to increased risk of drought, but lack of rain in the area affects crop production. The economy of the Amboseli ecosystem is changing from what was once a wildlife-livestock system to a diversified agricultural-based system, and the proximity of wildlife to areas of cultivation may spur increasing instances of human and wildlife conflict. Many fear that the implications of subdivision may only exacerbate the situation for Maasai as they could lose their best land to be pushed into drier, more marginalized areas. Moreover, the current breakdown of group ranches into privatized lands is a result of fear that can be ascribed to the pressures of modernization and highly correlated to a shift towards individualization rather than traditional communal ownership of natural resources. With each group further fragmented and restricted to grazing their own parcel, it is an unsustainable situation. An increasing number of other ethnic groups immigrating into the area has resulted in ethnic heterogeneity which has exposed Maasai to a wide variety of possibilities regarding economic diversification, such as

wildlife tourism agricultural activities. A common string of events is for younger Maasai to receive land title, sell the land, and move to Nairobi to find jobs, or to find self-employment in the tourist trade (Hazzah 67-68).

All of these myriad ramifications, such as increased sedentarization leading to overgrazing, an increased use of fencing that disruptions natural migration patterns and an increased population moving into wildlife areas, will likely increase human-wildlife conflict, including predator and livestock conflict, and displace much of the wildlife on communal lands.

Chapter III: Conflict Prevention and Mitigation Strategies and Case Studies Related to Lion and Livestock Conflict in the Amboseli Region of Kenya

3.1. Introduction to Third Chapter

Now that the overall problem of lion and livestock conflict has been stated, as well as the historical and cultural reasons that affect the phenomenon and conservation efforts, it is important to state particular conflict prevention and mitigation strategies that are in use in Kenya today, particularly in the Amboseli region. Each of these strategies will be examined briefly in the form of general information and specific case studies to determine the pros and cons of each conflict reduction plan. A major focus in this chapter will be on private compensation policies, such as the Predator Compensation Fund begun on the Mbirikani Group Ranch in 2003 and introduced in the first chapter, as well as community conservation initiatives. Examining these conflict reduction strategies is vitally important, as these strategies may, in conjunction with each other, help prevent or mitigate the problem of lion and livestock conflict in Kenya, as well as prove transferable to the reduction of conflict with predator species closer to home.

3.2. Conflict Prevention and Mitigation Strategies to Conserve Carnivores

There are many strategies in place to either prevent predator and livestock conflict, or to mitigate it. Mitigation, as it is put into place after a problem is already occurring is less preferable than prevention. Whatever the human and biological factors, the identification of threats and the creation of potentially useful tactics and strategies are initial steps in carnivore conservation (Mattson 18). Causes of carnivore and livestock conflict mainly stem from lack of a country land use policy, which leads to incompatible land uses, as well as an increase in human population into wildlife areas. According to the Kenya Wildlife Service, a combination of

prevention and reduction strategies including such things as: community education, land-use planning, fencing, compensation and benefit sharing might be the best way to manage human and wildlife conflict in the long term (“Wildlife-human conflicts, sources, solutions and issues.”).

3.3. Artificial and Natural Barriers as Conflict Prevention and Mitigation Strategy

The function of barriers is the reduction of the overlap between wild animals and the communities that coexist with them. Physical barriers are an option to reduce human and livestock conflict. The Kenya Wildlife Service has made use of them along the perimeter of certain parks and reserves to minimize human wildlife conflicts. KWS encourages communities to employ alternative and less expensive methods of preventing human wildlife conflict through the digging of moats, creation of trenches, and the use of natural fencing (“Wildlife-human conflicts, sources, solutions and issues.”).

A 2003 study undertaken by Ogada looked at Eastern African traditional systems of livestock husbandry and explored the effectiveness of various types of fencing. Most pastoralists often gather their herds and keep them inside enclosures for the night, as that is the time when most carnivore attacks take place. Different traditional techniques currently are used and are popular among Maasai and Samburu local communities. The enclosures can be made of stone or wooden posts, Acacia brush, branches woven around poles or made from wire mesh. Structures vary in size and sturdiness depending on the permanence of the settlement and available resources.

The effectiveness of the different types of enclosures at defending livestock from predators were tested in the Ogada study. The study discovered that domestic animals suffered a lower depredation rate when they were penned in corrals over night, and that the type of pen was

also a significant factor, with wire enclosures being the most effective, as well as the most expensive and non-biodegradable, and solid and wooden enclosures being the least effective. Good husbandry practices based on traditional approaches as shown in the study, such as keeping cattle contained in bomas, can lower the rate of depredation of livestock by carnivores (Distefano 15). Active defense is also an important preventative measure to keep livestock safe from predators. The presence of human guards, human activity, and dogs have been shown in Ogada's 2003 study to lessen the rate of livestock attacks by wildlife in Northern Kenya (Distefano 22).

3.4. Lion Lights

The use of "Lion Lights" may deter lions from attacking livestock and in turn reduce the numbers of lions killed by retaliatory action. Lion Lights, used by such NGOS as Lion Guardians, are an automated lighting system designed to discourage large predators from killing livestock held in enclosures. The system invented by Richard Turere, a 13 year old boy who was dealing with the problem of lion and livestock depredation affecting his family in Kitengela, Kenya. The device itself is a system of flashlights that flash intermittently and so simulate the movement of a person around the livestock enclosure. A useful aspect of Lion Lights is that they can be moved from one enclosure to another as the pastoralists move. In June of 2013, the NGO Lion Guardians installed these lights in nine bomas in Eselenkei, Mbirikani and Olgulului group ranches. All bomas fitted with Lion Lights did not experience further carnivore incursions since the installation (Lion Guardians, "Lighting it Up").

3.5. Case Study: Livestock Husbandry Effects on Predator and Livestock Conflict

Ogada, Woodroffe and Frank, three biologists with an interest in conflict mitigation between humans and African predator species, undertook a study in the Laikipia County area,

then Laikipia District of northern Kenya. Laurence Frank gathered baseline data rates of predation from 1995-1996 through examining ranch records as well as conducting interviews with ranch managers. The study, looking at the effects of livestock husbandry on conflict levels was carried out on 10 ranches, monitoring each property for 2-17 months between January 1999 and May 2000, with data collected each month on the number of livestock killed by wild predators. This study showed by that livestock that was closely herded by day and kept in bomas by night with high levels of human activity were much less likely to be killed by wild predators. Good husbandry may have the effect of reducing livestock losses which in turn would have conservation benefits, as this would reduce the numbers of predators killed by pastoralists (Ogada 1527).

3.6. Introduction to Compensation Funds as Conflict Mitigation Strategy

Human-wildlife conflict often carries significant costs economically to humans. Compensation programs attempt to correct that and minimize conflict by compensating people financially for their losses. Compensation programs rely on monetary payments, and financial compensation can often be difficult to administer because of inefficiency and low rate of reimbursement. As of 2012, the 2012 Wildlife Bill created a compensation system that includes property such as livestock. There are some concerns about improving and enforcing the system as it a well-developed compensation scheme has resulted in inflated claims. Because of a variety of problems with compensatory schemes, some private, rather than governmental compensation funds and emerged, and researchers are analyzing the potential costs and benefits of this kind of mitigation strategy (Distefano 19).

3.7. Case Study of a Compensation Fund: Mbirikani Predator Compensation Fund

In order to stop the killings of large predators such as lions on the Mbirikani Group Ranch (MGR), in 2003 an Mbirikani Predator Compensation Fund (MPCF) was instrumented to remunerate individuals who lost livestock to predator depredation, but carried an overall and larger goal of promoting predator tolerance. The Predator Compensation Fund attempts to encourage better livestock husbandry practices but also punishes the killing of carnivores such as lions through the imposition of fines. Through MPCF records it has been concluded that in descending order of importance, spotted hyena (*Crocuta crocuta*), lion, cheetah (*Acinonyx jubatus*) and leopard (*Panthera pardus*) caused the greatest number of cattle losses in the areas. (Frank 2422, "Evaluation of a compensation scheme").

The opening stages of the Mbirikani Predator Compensation Fund began when Richard Bonham, who was a white Kenyan living on Mbirikani Group Ranch and operating Ol Donyo Wuas Safari Lodge discovered that predator numbers were dropping noticeably around the ranch. This drop in predator numbers were occurring even though there were Kenyan laws in place to protect wildlife in the area and a significant presence of the Kenya Wildlife Service around the ranch. This decline of lions and other predators encouraged Richard to create the Ol Donyo Wuas Preservation Trust (formerly the Maasailand Preservation Trust) in 1991 in order to protect predators and other wildlife. Five years after the creation of ODWPT, Richard found a partner in Tom Hill, an American entrepreneur, who raised funds with him in order to start a game scout program. The purpose of game scouts were to survey the areas covered by the ranch to check to see if there were any wildlife killings, and if so, to report these wildlife killings to the Kenya Wildlife Service in the area. (Rodriguez 6).

Despite these strong efforts to reduce the amount of predator killings, there were twenty-two lion killings reported between September 2001 and March 2003 on Mbirikani Group Ranch sending a clear a message to Richard and Tom that these efforts were not enough to protect the predators in the area. In order to rectify this, Richard Bonham and Tom Hill contacted Laurence Frank, a predator biologist associated with the Laikipia Predator Project who were also concerned about these issues. After discussing their concerns with Laurence, it was mutually agreed upon that ODWPT would instrument a new project to compensate the Mbirikani Group Ranch community for losses of livestock due to predators in exchange for an agreement for tolerance of predators in the area. After Tom Hill found funding from international individual donors, the Predator Compensation Fund was put into action in April 2003 (6).

Mbirikani Group Ranch is a communally owned Maasai group ranch 60km northeast of Mt. Kilimanjaro and is within the Tsavo-Amboseli ecosystem, an area that is particularly known for its high amounts of biodiversity and high populations of endemic species. The group ranch is approximately 1,139 square miles and is home to 11,000 members. Chyulu Hills National Park is found to the north and east of MGR, while Amboseli National Park is west, with the two separated by Olgulului group ranch. Three other Maasai group ranches also border MGR, Murrueshi group ranch to the north and the Kuku and Kimana group ranches to the south.

At a cost of US\$44,201 per year, MPCF has conserved multiple lions per year, during 2004-2006 using program rules and national laws that were enforced with the help of other organizations. A Lion Guardians program was set up in addition to the PCF, employing young would-be lion killers to monitor lions instead and to assist in preventing depredation (Macdonald 165).

The Predator Compensation Fund works by dividing Mbirikani into seven zones for the purpose of this monitoring. If a member's livestock is injured or killed by a predator, the person making the claim has four options: 1) to go directly to the ODWPT headquarters office in Mbirikani town, 2) go to the Ol Donyo Wuas Safari lodge where a permanent radio is available and the verification officer is on call, 3) locate an assigned PCF reporter to the zone in which the attack took place, or 4) send word to the PCF reporter through a third party. No matter what method is used to support the incident, the incident has to be reported within 24 hours for the claim to be taken. This is so evidence of an attack or killing, such as predator tracks, are still visible. If the option of a zone reporter is used, that reporter radios the headquarters of ODWPT to tell them the details of the incident, the name of the livestock owner, and the location where it takes place. A verification officer (VO), an Mbirikani Group Ranch resident employed by the PCF, receives the information from HQ and visits the site, ideally, within a few hours after receiving the report. The PCF agreement states that the carcass of any livestock believed to have been attacked/killed by a predator, as well as any potential predator tracks, must be protected from further damage prior to inspection by the VO. Any carcass that has been butchered for its meat or left unprotected to scavenger damage will be ineligible for payment (Rodriguez 7).

Upon arrival, the VO listens to the owner's account of the attack and asks for other details regarding eyewitnesses to the attack, the predator witnessed, the time of the attack, and so on. The VO then examines the livestock for evidence of which predator was responsible for the attack and whether the attack was pre-or post mortem (thus attempting to rule out payment for false claims). Attacks by lion (*Panthera leo*), cheetah (*Acinonyx jubatus*), leopard (*Panthera pardus*), spotted hyena (*Crocuta crocuta*) and striped hyena (*Hyaena hyaena*) are covered under the PCF agreement (8).

A fixed rate is paid per head of each species of livestock tying to fair market values as of 2006 (US\$192.86 per cow, US\$28,57 per goat and US\$85.71 per donkey) and each claim against the scheme is verified by a representative of MPCF. If anyone in the community kills a predator, then the entire community loses its payments. This promotes self monitoring and ideally, reduces fraud. Fraud is a problem in many compensation schemes, and particularly challenging to moderate. Not surprisingly, many tensions existed in the first years of MPCF, which had to be shut down on several occasions for up to several months at a time, in response to fraud or non-adherence to the rules of the program. Interestingly, most kills of livestock, 43% of claims were made by hyenas, with lions only accounting for 7% of stock killing. Many animals claimed as depredated were strays that were left outside in the bush (10).

This project demonstrated that bringing all livestock at night to a well-secured enclosure could reduce animal losses and therefore reduce retaliatory killings of large predators such as lions. The number of lions killed since implementation of the program decreased, but overall lion numbers did not increase because people on neighboring properties continued to kill them. Because of the obvious benefits of the program however, it was extended to other properties as well such as Olgulului group ranch (10).

Esiano Pashile, who is Maasai and grew up near Nairobi National Park believes that compensation programs, though not proportional to the loss, are somewhat effective in lion protection of lions and better community approach towards solving livestock-lion conflict (Esiano Pashile). Jacob Mayiani, however, would argue that compensation doesn't work in the long term. Compensation programs are difficult to run, as human beings are always trying to trick the system, and there is the concern that the compensation program may lead to bad husbandry practices. The only thing that may work in the long term is hard benefits, such as

people getting money from the wildlife, potentially in the form of tourism. He argues that people can see incentives going into the community, people will be more tolerant of wildlife. As long as the government and the tourism and conservation agencies ignore the people who are living with these animals, people will always find a way to undermine the system (Jacob Mayiani).

Conservationist Kelly Stoner who lived and worked in the Shorobe area of Botswana on predator and livestock conflict issues, would tend to agree with Jacob. In her March 2013 interview, she said that she adamantly believes that compensation does not reduce conflict with predators, and she does not restrict that statement to Botswana's compensation program. Compensation, she believes, is a reactive solution to a conflict rather than a proactive one. The goal of compensation is to reduce the economic impact of depredation not to reduce the frequency of depredation. When a conservationist makes claims that compensation reduces conflict, what they mean, she states, is that compensation reduces negative attitudes but not necessarily retaliatory actions towards carnivores by pastoralists (Kelly Stoner).

I believe personally that compensation programs, despite the fact that they are difficult to enforce efficiently, and may cause additional problems with things such as fraud, are a step in the right direction towards reducing retributive killings focused on predators. However, as it is mitigation rather than prevention, obviously preventing the problem of livestock killing in the first place through fencing or through guarding practices is preferable.

3.8. Conservation Education for Local Populations

Education and training activities at different levels has the objective of teaching techniques to reduce conflict and building local capacity in conflict resolution as well as increasing public understanding of human wildlife conflict. There are many approaches adopted by Kenya Wildlife Service to try to get local people to participate and benefit from wildlife

conservation. This can include short training courses or workshops to sensitize and educate local people, organizing exchange visits of target groups to wildlife areas, and building capacity of local communities to create a sense of ownership and a responsibility for wildlife resources.

(KWS) In the best possible scenario, education would promote commitment towards conservation, raise awareness of the function of wildlife in the ecosystem as well as its ethical and economic value (Distefano 23).

3.9. Case Study: Community Involvement, Lion Guardians

Community participation in conservation programs can be considered beneficial for long term success. Esiano Pashile believes that conflict can best be reduced if the community leads and owns the initiative. An example of something like this could be seen in the Lion Guardians Program. A well planned and organized ecotourism and marketing of the community initiatives would yield some results in areas that are group ranches (Esiano Pashile).

It is important that members of a community receive benefits from living with wildlife, and murrans (warriors) in Maasai culture, the age-set most likely to kill lions, were also noted by conservationists as the most skilled trackers of lions. Having the murrans help conservationists monitor lions would not only benefit the conservationists in tracking lions, but provide employment to murrans as well, a direct benefit from wildlife. Lion Guardians is an organization of Maasai warriors who are responsible for conserving lions through monitoring lions and other carnivores as well as educating their communities about effective livestock management practices and the economic use of wildlife (Hazzah 117).

Mbirikani Group Ranch, as discussed before, has over two decades of experience with conservation measures on its land. In 1992, the Maasailand Preservation Trust (MPT) began its work on the ranch in providing wildlife scholarships and building schools. In April 2003, it

implemented the detailed above Predator Compensation Fund (PCF) as described above which resulted in a decrease in lion killing where the PCF is in place. These foundations allowed for the creation of further conservation efforts on the ranch. The Lion Guardians program was initiated in January 2007 to complement the previous conservation efforts of MPT and to provide employment and training to the murran (warrior) age group, who were the age group most likely to kill lions. The Lion Guardians complement the PCF in order to prevent conflict before it occurs (Hazzah, "Lion Guardians Report 2008").

If lions are to persist in the ecosystem of Kajiado County, it is vital to increase tolerance of local communities by getting them involved in conservation so they no longer see lions and other wildlife as an unmitigated program. A program such as Lion Guardians also doesn't follow foreign framework and rules, working with the role of warriors in Maasai culture and based on communication with Maasai communities, further, it involves local communities and gives them benefits for aiding in conserving wildlife. Taught to read and write in Swahili and trained in wildlife management and conflict mitigation techniques, Lion Guardians monitor lion movements, warn pastoralists that there are lions in the areas, recover lost livestock, reinforce protective fencing and intervene to stop lion hunting parties (Hazzah 117).

Lion Guardians incorporate five mechanisms to benefit local people: 1) Employment as well as the status that results from it, 2) cash in the form of salary paid to warriors which trickles down to other members in the community, 3) monitoring movement and populations of lions, 4) educating and reducing livestock depredation by carnivores, 5) community involvement (117).

In the latest 2012 Lion Guardians Report, the program seems to have been doing well. Currently 40 warriors are employed as Lion Guardians covering areas of the Amboseli Kilimanjaro ecosystems in southern Kenya and northern Tanzania. Since the program's

inception, lion killings in response to livestock depredation or as rite-of-passage have decreased substantially where the program is in place and there has been a rebound of lion population numbers. In 2012, each adult lioness in the Lion Guardian areas had a new litter of cubs, showing the increasing stability of the lion population and the increase of the Amboseli lion population. In December of 2012, construction was started on the new Lion Guardians Training Center in Amboseli which will serve several functions, for instance, to show community members the program and to be a place where Lion Guardians can train new Lion Guardians on the ground (Hazzah, "Lion Guardians Report 2012").

According to Jacob Mayiani, in Kenya all the money from the parks go to areas that are not directly competing with wildlife. With all the tourism dollars going to the central government where there is no wildlife, this benefits people disconnected from wildlife, leaving the people suffering from predator and livestock conflict with no benefits. Programs such as Lion Guardians are trying to address these issues through paying individuals to track lions, for example. The only thing that works in the long term, he believes, are hard benefits rather than things such as compensation programs, for the reasons listed above (Jacob Mayiani).

3.10. Conclusion

There are a lot of factors that drive conflict, some ecological, like the loss of prey, some cultural, like livestock husbandry practices, and some socio-political, such as the history in an area known for high levels of conflict, and we have explored each of these in turn. It is important to understand all these different factors that drive conflict in order to begin to think about possible solutions. It is not enough to understand the natural history of the animal, one must also look at human-caused and influenced factors such as the economic behind livestock loss.

As the causes are multifaceted, the solution must also be multifaceted and flexible.

First, the likelihood for a predator attacking livestock has to be reduced. This can be done through a variety of ways, such as managing for high prey populations and protecting livestock through livestock husbandry techniques. Following that, people need to have a particular reason to care about wildlife conservation, or conservation will be seen as an intrusion on their rights.

To do that, they need to believe that their livelihoods are tied into wildlife conservation.

Programs such as the Lion Guardians have been attempting to accomplish this.

Finally, conservation programs need to specifically understand what they are trying to accomplish in terms of conflict mitigation. Reducing depredation and alleviating the financial burden of living alongside carnivores each require different actions and a program must be clear about their specific goals in order to avoid failure in the future.

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