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ASSESSING MAASAI ATTITUDES AND PERCEPTIONS TOWARD VULTURES: A CASE STUDY OF RESIDENT MAASAI AROUND MAASAI MARA NATIONAL RESERVE, KENYA.

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ASSESSING MAASAI ATTITUDES AND PERCEPTIONS TOWARD VULTURES:
A CASE STUDY OF RESIDENT MAASAI AROUND MAASAI MARA NATIONAL
RESERVE, KENYA

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science
Wildlife and Fisheries Biology

by
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ABSTRACT

The vulture population is declining globally, a situation that is more acute in the Maasai Mara region of Kenya where studies report over 60% decline in the last few years, resulting primarily from loss of habitat and poisoning by the Maasai pastoralist. This rate of decline is devastating and will result in the extinction of vultures in the region. Given that the causes of the decline are as a result of detrimental human activities, it is important to understand the Maasai attitude and perception toward vultures, particularly factors that determine their behavior to favor or oppose vulture conservation. In this study which was conducted in two group ranches, Siana and Koyiaki in Maasai Mara region, we used a survey instrument involving closed-ended statements, open-ended interview questions and observation to address our objectives, which included understanding the attitudes and perceptions of the Maasai toward vultures, the importance attributed to vultures, their knowledge of vulture ecology and their management proposals to address this situation. The results suggest that the Maasai favor vulture conservation. However, their activities are detrimental to vulture conservation, due to their poor attitudes toward carnivores, local wildlife authorities, and conservancies in the area, which result in poisoning, leasing land for wheat farming and opposing the creation of new conservancies.

DEDICATION

This manuscript is dedicated to my late father, Murasimi Ole Reson, whose love and inspiration continue to strengthen me to achieve my desired goal in life.

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CHAPTER ONE

INTRODUCTION AND LITERATURE REVIEW

Vultures have long been recognized as key environmental components, performing a variety of roles of ecological, cultural and economic importance. Unfortunately, over the last three decades, they have suffered dramatic population declines (Beest et al., 2008; Prakash, 1999; Baral & Gautam, 2007; Thiollay, 2007; Virani et al., 2010; Ogada et al., 2011) particularly in such countries as France, Greece, Portugal, the Indian Sub-continent, Cameroon, Sierra Leone, Burkina Faso, South Africa, Uganda, Tanzania and Kenya (Tucker & Heath 1994; Beest et al., 2008; Birdlife International, 2007; Migozzi & Esteve, 1997; Thiollay, 2007; Virani et al., 2010).

In Asia for example, *Gyps* vultures have declined by >95% due to poisoning caused by the veterinary drug diclofenac (Green et al., 2006; Green et al., 2004; Prakash et al., 2003; Oaks et al., 2004). As a result, these species are listed on the Red List in India as critically endangered due to the efforts of researchers hoping to spur interventions to mediate the situation (Green et al., 2004 & IUCN, 2004).

In the Western Alps (France-Italy) around the mid19th century, direct human persecution has been the primary cause of vulture decline in this area, research attributing it to the practice of taxidermy and pest control both of which were widespread in the area as a means of game management (Mingozzi & Esteve, 1996). According to Mingozzi & Esteve (1997), the Bearded vulture (*Gypaetus barbatus*) is now locally extinct in this area. In addition, this vulture, which has been significantly affected in most of its global habitats, (Xirouchakis et al., 2001; Mingozzi & Esteve, 1997), began declining in the first

half of the 19th century. A similar situation is attributed to the decline of the Egyptian vulture (*Neophron percnopterus*) in Italy. According to Liberatori and Pentariani (2001), the decline of the Egyptian vulture is as a result of human persecution. Even though its population became stabilized due to the creation of artificial feeding sites, this is not the ultimate remedy as there is evidence of a continued decline in the neighboring areas (Liberatori & Pentariani 2001).

In Spain, an oscillatory population of the Griffon vulture (*Gyps fulvus*) was reported between 1950 and 1960. Despite its legal protection initiated in 1973, this does not provide a solution to this decline (Donazar & Fernandez 1990). Further, human persecution and the use of poisons such as strychnine still claim a significant number of carrion-eating birds in the region (Donazar & Fernandez, 1990).

Studies conducted in Greece between 1995 and 2000 found a population of 25 breeding pairs of the Bearded vulture in the mid-1980s (Xirouchakis et al., 2001), this population is a direct result of the implementation of the Bird Directive Law (Carrete et al., 2006). However, Carrete et al. (2006) maintain that this population was restricted to only some ranges and therefore was not sustainable for a long period (Xirouchakis et al., 2001 & Carrete et al., 2006). They consequently contested that there is a decline in this species population of 84% with a corresponding habitat loss estimated at 74%.

The evidence of a decline in the populations of Gyps vultures can be found across their historic range. Thiollay (2007) found that there was a reduction in the number of scavenging raptors in the West African Savannas. This study, conducted in south east Burkina Faso, traced this decline to 1970, a strong indication that this reduction begun

four decades ago with an overall vulture decline of 67% in Cameroon (Thiollay 2001). There is also evidence that the vulture decline is species specific (Sekercioglu et al., 2004), suggesting that some are more vulnerable than others. Thiollay (2001) found that the hooded vulture (*Necrosyrtes monachus*), African white-backed vulture (*Gyps africanus*) and Ruppell's Griffon (*Gyps rueppellii*) declined by 67%, 60% and 87% respectively.

East Africa, and particularly the Maasai Mara area, is no different (Virani et al., 2010). Although a general decline of wildlife is documented in the Maasai Mara region (Ottichillo et al., 2000; Griffith, 1995; Gulland & Mace, 1998), vultures are particularly affected (Virani et al., 2010). Maasai Mara is known to be an important foraging area for vultures in East Africa due to the large migratory herds that frequent the area from July to October providing plenty of forage to the scavenging raptors (Ottichilo et al., 2000; Virani et al., 2010). In fact, six of eight vulture species present in Kenya are found in the Mara. Studies indicate a decline of 60% in the Mara area (Virani et al., 2010). A decade ago, none of the eight species was listed on the IUCN Red List; however six of the eight species in Kenya are now threatened with extinction (Birdlife International, 2011). Declines are particularly grave for such species as the Egyptian vulture (*Neophrone percnopterus*) which appear to have been locally extirpated in the Mara (Kendall unpublished). The Bearded vulture is now only available in captivity (Thomsett, pers. comm., Sept 2011).

Causes of Vulture Decline

More recent research suggests change in land use, habitat fragmentation, poisoning and human persecution as the potential causes of the global decline in the vulture population (Thiollay 2007; Virani et al., 2010; Ogada & Keeising, 2010; Baral & Gautam, 2007). The changes in land cover in the Maasai Mara area and the larger Narok District (Serneels & Lambin, 2001) have significantly led to habitat loss and fragmentation (Sitati, 1997; Lamprey & Reid, 2004). The trend in land use change may have far reaching implications for the wildlife population (Ottichillo et al., 2000). However, the significant herbivore decline in this area has perhaps significantly contributed to the shortage in food for vultures as witnessed in other regions, for example West Africa (Virani et al., 2010; Thiollay, 2007). In addition, breeding habitats for vulture species have also been severely affected by changes in land use which has resulted in the clearing of vegetation for settlement and cultivation (Virani et al., 2010; Thiollay, 2007).

Poisoning and Human Persecution

Unintentional and intentional poisoning resulting from the use of poisonous baits in an attempt to eradicate carnivores, which are a threat to livestock, is also responsible for the loss of a number of vulture species in East Africa (Otieno et al., 2009; Maina, 2007). In Spain, scavenging raptors have been poisoned through consumption of prey with lead shot embedded in their tissues (Pattee & Hennes, 1983) and the population of the two largest sea eagles in the world, the white tailed sea eagle (*Haliaeetus albicilla*) and steller's sea eagle (*Haliaeetus pelagicus*) are declining in Japan due to ingestion of

lead from prey (Kim et al., 1999). Similarly, in Swaziland, studies have shown that food availability, poisoning and electrocution are the driving force behind the decline of three species of vultures, the African white-backed, the Lappet-faced (*Targos tracheliotus*) and the White headed vulture (*Trigonoceps occipitalis*) (Monadjem & Garcelon, 2005).

The decline of the Eurasian black vulture (*Aegypius monachus*) in Greece is attributed to poisoning (Skartsi et al., 2008), a situation that was partially resolved in 2005 after an intense program to regenerate this species. Poisoned bait aimed at eliminating pests has also been reported as a major cause of the decline in the griffon vulture population in the region (Arroyo, 1994, Tucker & Heath, 1994). According to Handrinos and Kastritis (2009), this vulture is now listed in the Greek Red Data Book as endangered. Moreover, in Croatia, rural communities use poison to prevent livestock and poultry predation by carnivores (Muzinic, 2007). According to Muzinic (2007), this practice has adversely affected eagles and ravens. This is specifically attributed to the use of strychnine and cyanide which are used to eliminate wolves in the area. While studies suggest lead poisoning as the most common cause of California condor (*Gymnogyps californianus*) decline in North America (Meretsky et al., 2000), others conducted in such countries in West Africa as Cameroon and Burkina Faso indicate a severe decline of raptors as a result of habitat loss, human persecution and deliberate poisoning (Thiollay, 2001, Thiollay, 2006; Thiollay, 2007). In addition, indiscriminate use of poison in South Africa is potentially the primary cause of raptor decline in this region (Anderson et al., 1999; Anderson, 2000; Ledger & Annegarn, 1981).

More relevant to the research reported here, studies conducted in Kenya indicate a wide use of carbofurans in the country (Otieno et al., 2009), a situation implicated in the decline of scavenging raptors in the region (Ogada & Keeising, 2010; Virani et al., 2010; Ogada et al., 2011). A similar situation may be found in neighboring countries in the region, for example Uganda and Tanzania, areas with a wide use of furadan for agricultural purposes (Otieno et al., 2009).

Thus, such studies argue that the decline in the number of vultures in northern Kenya may perhaps be a result of poisoning (Ogada & Keeising, 2010), with a comparable situation occurring in Maasai Mara because of the similarity of the two pastoral areas (Virani et al., 2010). The commonly available carbofurans throughout the country (Maina, 2007; Otieno et al., 2010) may perhaps accelerate the decline as vulture home range's overlap within protected and outside protected areas as they navigate long distances in search of food (Ogada & Keeising, 2010; Thiollay, 2007). Some breeding colonies nest as far away as Kwenia near Magadi, approximately 300km away from Maasai Mara (Virani et al., 2012) and some radio collared in the Mara are reportedly seen in Laikipia and Nairobi (Kendall & Virani, 2012). This movement coupled with their excellent vision enabling them to detect carcass from a long distance makes them vulnerable to persecution and poisoning (Otieno et al., 2010).

Human-Carnivore Conflicts

One of the objectives of this study is to provide recommendations on how vulture conservation can effectively be achieved. However, these interventions are largely dependent on efforts to address the human-carnivore conflict, specifically the Maasai

conflicts with carnivores, an interaction which is important because according to the literature, vultures die as a result of secondary poisoning (Otieno et al., 2009). One of the goals of this study is to explore the relationship between depredation, retaliation and the decline of vultures due to poisoning in Maasailand. Fundamentally, this conflict is key in determining attitudes toward vultures and developing conservation interventions to address their decline.

Populations of lions (*Panthera leo*), jaguars (*Panthera onca*) (Zimmermann et al., 2005), tigers (*Panther tigris*) (Dinerstein et al., 2007), Eurasian lynx (*Lynx lynx*) (Andren et al., 2006), Iberian lynx (*Lynx pardinus*) (Pertoldi et al., 2005), snow leopards (*Uncia uncia*) (Jackson, 1979; Schaller et al. 1987; Fox et al. 1991; Nowell & Jackson 1996), cheetah (*Acinonyx jubatus*) (Marcella & Durnt, 2006) and several other carnivore species continue to decline at least in part or globally due to conflicts with people (IUCN, 2003; Nowell & Jackson, 1996). The human-carnivore conflict is a global concern which has led to a decline in carnivores and other species, for example scavenging raptors in the world (Woodroffe et al., 2005). Wildlife living and roaming around settlement areas and the proximity of the human settlements to protected areas have led to increased human deaths, crop damage and loss of livestock (Ogutu et al., 2005; Sitati et al., 2003; Ogutu & Dublin, 2002). One of the areas of concern is the attack of livestock resulting in the loss of an important source of income (Kolowski & Holekamp, 2006; Goldman et al., 2010). According to the literature, this livestock loss is as a result of increasing carnivores living near settlement areas (Nyhus & Tilson, 2004; Patterson et al., 2004), potentially causing severe damage to communities and, therefore, leading to retaliation and persecution of

these species (Woodroffe & Ginsberg, 1998). According to Hussain (2003), this constant and persistent loss of livestock may also generate negative attitudes toward carnivores.

This human-carnivore conflict is attributed primarily to the movement of carnivores outside protected areas in search of prey (Stander, 1990, 1997). As studies indicate, livestock are potentially an easy prey for carnivores and, therefore, are likely to facilitate or accelerate the increase in the number of rogue carnivores prowling settlement areas and causing havoc (Madhusudan & Mishra, 2003). More recent analysis suggests the rise of rogue carnivores outside protected areas (Ogada et al., 2010) due to the unprecedented decline in herbivores in most of the country's rangelands (Ottichillo et al., 2000). Some scholars, for example Baldus (1998), Balakrishnan & Ndhlovu (1992), Pitkin (1995), Stander (1990), argue that conflict may have increased in the recent past due the population increase and settling close to protected areas, leading to constant and persistent friction with carnivores. However, Neuman (1998) disagrees, arguing that insecurity in land tenure and the historical policies of management are fundamental to the resentment and conflict. He further maintains out that human losses due to carnivores are likely to create more resentment, eventually resulting in a lack of support of wildlife conservation interventions in the long run.

Some literature has attributed the decline of carnivores to killing by local communities due to livestock predation globally (Nowell & Jackson, 1996; Woodroffe & Ginsberg, 1998; Linell et al., 1999). For instance, Jaguars are persecuted by ranchers in Brazil as a result of livestock attacks (Zimmermann et al., 2005). It is estimated that wolves cause a mean of 12.6 depredations in Wisconsin and 96.2 in Minnesota annually

(Paul, 2001; Treves et al., 2002). This depredation rate has led to various techniques in an attempt to prevent further losses of livestock from predation. According to Sacks et al. (1999) and Treves et al. (2004), for example, people have eliminated carnivores through shooting, poisoning and trapping in North America.

In India, killing wolves is celebrated by local communities, with festivities being organized to honor those involved. According to Mishra (1997), residents who capture wolves alive especially pups from dens were rewarded in India. Wolves are especially known to have been in conflict with humans since prehistoric times as they were believed to attack them especially children (Jhala & Sharma, 1997; Rajpurohit, 1999). There is a severe decline of carnivores in Spain due to hunting by local people and management control systems (Mech, 1995). According to Linnell et al. (2000), this rapid decline prompted the government to develop programs to manage the population.

In an attempt to address human-carnivores conflict, many governments and conservation bodies have adopted several methods of management. Translocation is widely used as a potential mechanism of managing problem animals (Nowell & Jackson, 1996; Linnell et al., 1997). However, other studies, for example, Letty et al. (2007), have criticized this approach as causing severe damage to the population including high mortality rates, low breeding success and abnormal behavior, suggesting that managing human-carnivore conflict depends on the support of the local people.

Historically, the Maasai coexisted with wildlife and accepted losses associated with them. It is believed by the Maasai that when a leopard kills many sheep, one is encouraged because more sheep are coming his way (Personal Observation). This thought

process is reflected in their morning prayer, “God give me more cows, to feed people, to feed wild carnivores and some for myself” (Personal Observation), indicating that they not only tolerate carnivores but also see them as God’s creatures which must be fed. However, recent studies indicate that the Maasai are increasingly becoming less tolerant of livestock lost due to predation (Mishra, 1997).

This change may be because livestock production has moved from being a traditional practice to a livelihood and commercial venture due to community diversification (Galvin et al., 2006), meaning that the Maasai are likely to adopt different strategies for eliminating carnivores to protect their livelihood, one being the use of lethal methods. According to Ogada et al. (2003), pastoralists in northern Kenya use guns and poison to eliminate carnivores, lethal methods having far-reaching implications for other species such as scavenging raptors (Ogada et al., 2011).

Land Use Change and Land Tenure in the Area.

Various studies have argued that the human-wildlife conflict and resentment are attributed to local people perceiving insecurity in land tenure and to their historical land experiences (Neuman, 1998). It is important to understand the Maasai historical land issues as they may be a strong factor in shaping their attitudes toward conservation.

At the advent of the colonial period, the Maasai were expanding their control over the pastoral resources in the Rift Valley before the invasion of the British (Waller, 1986; Spear & Waller, 1993). In the 1900s, the British took control of East Africa (Spear & Waller, 1993). According to Waller (1986) this period began the strict rules enforced by the colonial government concerning access to the resources in the Rift Valley, a situation

which was detrimental to most communities in Kenya, especially the Maasai, because it was followed by forceful eviction and land alienation (Waller, 1976). Most parts of the Rift Valley were occupied by the Maasai whom the colonial government regarded as a fierce people (Lovat Smith, 1997). Some of the statements that were often used by the colonial administration to refer to the Maasai demonstrate its fear of being challenged by them. For example the Colonial Government referred to the Maasai as “wandering tribes occupying land that they do not utilize” (Halderman, 1987). Halderman (1987) further argued that the British used excessive force to drive the Maasai to the southern reserve to create room for the white settlers to maximize land use.

Scholars such as Sindiga (1984) argued that this massive eviction continued in 1911 when the British displaced additional Maasai from adjacent areas relocating them to designated reserves at the extreme south of the Rift Valley. As estimated by Sanford (1919), approximately 10,000 people, 200,000 cattle and 550,000 sheep and goats were forced to the southern Maasai reserves. This influx of people and livestock combined with the population already living there created pressure on the land, beginning the degradation and the change in its use. The resulting overgrazing and soil erosion were not the only factor contributing this degradation; cultivation by the colonialist had more impact as a result of clearing it for cash crops (Halderman, 1987).

In 1963, Kenya achieved its independence from the British. However, the successive governments, including the current one, have consistently enacted policies that have marginalized the Maasai further (Hughes, 2005). The Maasai reserves have been occupied by other countrymen who practice cultivation either through land leasing,

purchasing or deception (Hughes, 2006). Over the years, the Maasai resource utilization and management were based on an elaborate communal integrated with the clan structure (Seno & Shaw, 2002). However, this system is rapidly declining as a result of the Maasai diversification (Galvin et al., 2006), a situation that has led to different land use practices challenging wildlife conservation.

The Maasai Mara ecosystem covers an area of 6000km² with the formal designated conservation area covering 1510km² (Serneels & Lambin, 2001), held under the management of Narok County Council (NCC). The remaining area, currently rangeland occupied by community group ranches (Lamprey & Reid 2004) was also held under the management of the NCC as trust land until the Land Adjudication and Group Ranch Act was enacted in 1968 (Serneels & Lambin, 2001; Lamprey & Reid, 2004). This act facilitated the demarcation of land into individual parcels in Kajiado (Campbell et al., 2000) and Narok districts (Serneels & Lambin, 2001). The provisions of this act were hastened by the Maasai diversification in an attempt to maximize income from other sources, for example cereal farming, tourism (Thomson & Homewood, 2002) and leasing of land for private conservancies to establish community conservation programs (Adams & Hulme, 2001). In their research on community conservation, Adams & Hulme (2001) found a growing concern involving local communities on conservation interventions including empower them to run these programs.

Since the initiation of wildlife conservation, the land use system has remained the focus of interventions for convincing local communities to support conservation (Lamprey & Reid, 2004). However obtaining this support has remained a challenge due

to lack of government control over individual land parcels, giving people a right to decide the uses of their land. The land policy has promoted privatization of communally owned land (Thomson, 2002; Thomson & Homewood, 2002). From the informal and traditional land ownership in the Maasai community, a more formal one developed, establishing group ranches in an attempt to provide social services to the Maasai (Galaty, 1992; Lamprey & Reid, 2004). The subdivision of these group ranches into individual parcel (Thomson & Homewood, 2002) resulted from the growing mistrust and suspicion of Maasai that more land would be taken by the government in the name of conservation (Hughes, 2005). They came to realize that this land use system has potentially contributed to the loss of their ancestral grazing lands, and, therefore, subdivision began which eventually led to change in land use. For example, Karime (1990) argued that an area of 4875 ha in the northern part of the Loita eco-unit was cultivated in 1975 while according to Serneels et al. (2001) a total of 44,000 ha was turned into large cereal fields between 1975 and 1995. The concern is that this trend reduces wildlife habitat in the Mara ecosystem (Norton-Griffiths, 1996), leading to a drastic decline in grazing resources for wildlife and livestock (Ottichillo et al., 2000). These reduced wildlife resources are a potential cause of vulture decline in the area due to the lack of both forage and habitat (Virani et al., 2010; Kendall unpublished).

Much research on this topic has emphasized the need to win the support of communities living adjacent to protected areas; otherwise, conservation is likely to face significant challenges in Sub-Saharan Africa (Thomson & Homewood, 2002; Kideghesho & Kalternborn, 2007 and Adam & Hulme, 2001). However, scholars such as Kideghesho

and Kalternborn (2007) argue that winning community support is difficult in situations where people's interests and livelihoods are threatened. Thus, researchers argue that studies should be directed explicitly toward determining the perceptions and attitudes of the local communities toward conservation and that unless local inhabitants are contacted, conservation interventions may not be successful.

Historic Background of the Maasai People

The Maasai are an ethnic people occupying the northern parts of Tanzania and Kenya's southwestern reserves (Galaty, 1986). Scholars and anthropologists view the Maasai as a strongly established, powerful and autonomous community that occupied the reserves of Eastern Africa until the 19th century when the British invaded their territory (Spear & Waller, 1993). Since they predominantly kept livestock, being referred to by some scholars as "people of cattle" (Spear & Waller, 1993), the Maasai economy is traditionally heavily dependent on livestock production (Muchiru et al., 2009). Their society and economy revolved around livestock, with cattle being particularly highly valued as a source of wealth, a medium of exchange and marriage, a source of food and a symbol of relationships (Hughes, 2006). They are easily identifiable, and as some scholars such as Galaty (1982) argue, it is pretty easy to recognize who is not Maasai. They have well-organized social, political and cultural structures that have allowed them to resist change over time. However, more recently, outside influences have significantly affected the Maasai socio-economic lifestyle. British rule in the early 1900 began the destabilization of this well-known community that had maintained superiority in the East African territory especially in the Rift Valley (Waller, 1979). Although the Maasai had

used various tactics to safeguard themselves, their military power was weakened as a result of several issues, making them vulnerable to British rule (Waller, 1976). Civil wars erupted in the Maasai kingdom, which led to subsequent conflicts resulting in the eradication of some clans, for example the *Ilaikipiak* (Waller, 1976). The few remaining *Ilaikipiak* were forced to abandon pastoralism and practice agriculture. Conflicts over limited pasture and water continued to lead to intense wars between the Maasai clans and their other countrymen (Galaty, 1993).

In addition, the Maasai suffered catastrophic droughts and epidemics between 1884-1893. According to Waller (1976), this period, which the Maasai refer to as “*enkidaaroto*, the disaster” reduced the Maasai population by half and is estimated to have killed a significant number of cattle (Adam & McShane, 1996). Homewood & Rodgers (1991) argue that approximately 90% of livestock died due to a strange outbreak of rinderpest in 1891. Though the Maasai slowly recovered their livestock through raids, they had difficulty regaining power because of the concurrent smallpox disease that weakened them further (Adam & McShane, 1996).

Thus, by the end of the 1800s, the Maasai were too weak to resist the British (Waller, 1976), leading to their submission. According to the literature (Waller, 1976; Sindiga, 1984), the Maasai entered into a harmonious working relation with the British in order to raid other communities, for example the Nandi. Because the Maasai were able to conquer other tribes with the British, they raided livestock to re-build their weakened economy (Lovatt Smith, 1997).

However, the Maasai were forced to leave their land in 1905 after the British conquered other communities in the Rift Valley (Anderson & Grove, 1987). According to Anderson and Grove (1987), the Maasai were forced to abandon their ancestral grazing areas in Nakuru, Naivasha and Escarpment and driven south to the remote tsetse-fly infected reserves. Scholars such as Cranworth (1919) in Anderson & Grove (1987) argued that this eviction was the inception not only of land alienation but it also marked the beginning of the habitat loss and degradation by the colonial government as it opened up land for agriculture. The white settlers formed the white highlands and various zones, dividing land according to its use. By early 1900, the British colonial government was fully established in East Africa (Waller, 1976), and in 1905, the Commissioner of East Africa Protectorate wrote, "...there are at the present time certain animals, such as elands, buffalos which are under taint of suspicion of bringing their train tsetse fly or other obnoxious parasites, and therefore are inimical to stock rearing. Should this suspicion develop into a certainty, these species must disappear from all settled land..." (Cranworth, 1919: 139 in Anderson & Grove, 1987). As a result of the inception of mixed agriculture (livestock ranching and cultivation), wildlife began to face the pressure of displacement due to the loss of their critical refuge areas. Moreover, shooting of wildlife for game meat and sporting activities began (Anderson & Grove, 1987).

Scholars such as Goldman (2006) argue that the Maasai pastoral life began to decline in 1900 when the British arrived in Kenya. Their grazing land was restructured, making it difficult for them to continue their nomadic lifestyle (Goldman, 2006). However, their situation did not improve when the country acquired its independence

although they eagerly waited for the return of their land which was forcefully taken away by the British (Hughes, 2005). To their surprise, the new government later subdivided it giving it to the other tribes, specifically those related to the officials in power. The later creation of protected areas reduced the Maasai homeland still further (Anderson & Grove, 1987).

The Maasai's increasing vulnerability to change from outsiders resulted in extensive change in land use, resulting in large-scale farming and urban development across Maasailand. Moreover, wildlife conservation efforts in the form of protected areas saw the creation of national parks and game reserves, ultimately reducing Maasai land further (Anderson & Grove, 1987). The establishment of Nairobi National Park, Nakuru, Amboseli, Hellsgate, Tsavo, Chyulu and Oldoinyo Sabuk all involved some degree of violent eviction or suspicious agreements which the elders signed without having a clear understanding of the consequences. The names of the national parks mentioned above are all derived from the Maasai native language, a strong indication that these areas were occupied by the Maasai. According to the literature, the Maasai have been politically marginalized and physically displaced by both a colonial power and their own countrymen (Berger, 1993; Lovatt Smith, 1997).

Throughout all this turmoil the Maasai maintained being respectful and passionate toward wildlife. In fact, those who killed wildlife for food were regarded as poor, cowardly, offensive and mean (Galaty, 1982) and, therefore, were viewed as outcasts and only called upon to perform undignified duties (menial jobs) in the community for example, fencing the land and slaughtering during ceremonies. Birds in particular played

an important role in their aesthetic lives, and the Maasai thanked God not only for their cows and children but also for them. For example, somebody would say “*Kirropil pooki, nkishu, oltung’ana, naa nejia sii etui ntariti enkai*”, meaning we are all blessed and happy this day: cows, people and other God’s creatures such as birds (Personal Observation).

Birds, to the Maasai, have value and use depending on the species. An Augur buzzard (*Buteo augur*), for example, is significant in such cultural ceremonies as *Olng’eshar*, a ceremony to legally transform warriors into junior elders. In this ritual, a white substance (maa. *enturoto*) is smeared on all the graduates from their necks to their legs, representing the whiteness on the front of an Augur buzzard, signifying its importance to the Maasai community (Personal Cultural Knowledge). On the other hand, ostrich feathers are used in making singing ornaments and arrow ends (Personal Observation). The Maasai rite of passage involves a stage referred to as the “stage of birds”, and people in this stage are regarded as sacred: no one is to fight or insult ‘*Ilaibartak*’ (plural) or “*nkera oomotonyi*” meaning kids of birds. It is regarded as a sacred stage in a rite of passage where the young boys kill birds prior to initiation to make headgears (Personal Observation). For this activity, some birds were treasured more than others; for example Ross’s Turaco (*Musophaga rossae*) is highly valued. Birds of prey were not used for these purposes, in some instances, some for example the eastern pale chanting goshawk (*Melierax poliopterus*) was perceived as an enemy because it competed with the boys for birds.

The Maasai Attitudes Toward Vultures and Vulture Conservation

To establish practical conservation strategies to help address the problem of vulture decline in the Maasai Mara region of Kenya, it is important to understand the attitudes, needs and aspiration of the Maasai people living in this area. Much research provides strong evidence of vulture decline including its causes (Virani et al., 2010; Otieno et al., 2009). The majority of these causes are related to human activities and their interactions with species. The aim of this study is explore the Maasai attitudes and perceptions toward vultures and vulture conservation programs.

Over the past two decades, there has been a growing body of research focused on understanding local communities as a means for ensuring the success of conservation interventions (Baldus et al., 2003; Barrows & Fabricius, 2002; Hackel, 1999; Western, 2001). Adams and Hulms (2001), for example, recognized that community conservation is a fundamental component of a successful program for managing natural resources. They argued that conservation intervention should not be pursued against the interest and wishes of local people if it is to be successful. According to Kidegesho & Kaltenborn (2007), many factors affect conservation either positively or negatively, arguing that the positive will promote conservation objectives and the negative will likely hinder any such intervention. Current research focuses on the use of attitudinal studies as a tool to determine the success and effects of conservation interventions on local people living near protected areas (Kidegesho & Kaltenborn, 2007; Gillingham & Lee, 1999; Baral & Gautum, 2007; Holmes, 2003; Infield, 1988; Kalternborn et al., 1999; McClanahan et al., 2006; Parry & Campbell, 1992; Songorwa, 1999).

However, few if any of the studies focused on the attitudes of local people toward vultures in the East African region. Maasai Mara is an important vulture refuge and foraging area in the region (Virani et al., 2010). In addition, the inhabitants of this area are a pastoral society who interacts with wildlife daily. Therefore, the success of vulture conservation is heavily dependent on their goodwill and support. As discussed, the causes of the vulture decline attributes are the most prevalent in this area, ranging from the human-carnivore conflict (Kolowski & Holekamp, 2006) through poisoning, land use change and the loss of wildlife habitat (Serneels et al., 2001; Ottichillo et al., 2000).

Importance of Vultures to the Maasai People

Vultures are valued by local communities around the world because of their economic, cultural, ecological, medicinal and spiritual importance (Ogada et al., 2011; Baral & Gautam, 2007. Mander et al. (2007) argued that vultures and their parts contribute significantly to traditional medicine trade in South Africa, while in West Africa, especially in Mali, stalls in the market sell desiccated vulture parts including heads, talons, feathers, eyes, and hearts for traditional medicines or fetishes (www.sciencemag.org). In addition, as a result of their ability to locate and search for forage over an expansive home range, vultures are associated with powerful eyesight, some communities believing that these species are clairvoyant (Mundy et al., 1992; Smith, 2009). According to Pollard (1977), vultures followed warriors or armies to the battle fields in ancient Greek. In the Maasai community, even today there are specific songs warriors sing to vultures as they prepare to attack and raid their enemies (Personal Observation).

Vultures play a critical environmental role by consuming carcasses. Ogada et al. (2011) argue that vultures potentially consume more carcasses than all other scavengers combined, while studies conducted in the 1970s suggest that vultures clear up to 70% of carcasses in the Mara Serengeti ecosystem (Houston, 1974). It can, therefore, be argued that vultures play a critical role by assisting land owners in disposing of these carcasses that may harbor diseases (Ogada et al., 2011)

In addition, according to Becker et al. (2005), vultures are important sources of revenue. The potential annual economic benefits in the Gamla Nature Reserve, Israel, is USD 1.1–1.2 million, resulting from the 85% of the visitors to this Nature Reserve who are attracted by its vultures. According to Kenya Tourism Board reports, this country witnessed a 15% tourism growth in 2010, resulting in approximately USD 9.21 billion in the same year (Tourism Performance Overview Report 2010), with the Maasai Mara an area known for its raptor habitat being one of the most frequently visited destinations in the country (Virani et al., 2010).

Problem Statement

There is a general consensus about a rapid decline in Gyps vulture populations globally (Beest et al., 2008; Prakash, 1999; Baral & Gautam, 2007; Thiollay, 2007; Virani et al., 2010; Ogada et al., 2011), the rate of which is species and habitat specific (Thiollay, 2006). This loss has both environmental and economic impacts. Unfortunately, in some countries in Sub-Saharan Africa, especially Kenya, there are few efforts to establish measures to protect these important species. (Ogada et al., 2011).

Maasai Mara is an important foraging area for vultures in East Africa due to the large migratory herds that frequent the area from July to October (Ottichilo et al., 2000; Virani et al., 2010). Of the eight species of vultures occurring in Kenya, six are present in the Mara. However, studies indicate a drastic decline of over 60% of their population in the Mara. However, studies indicate a drastic decline of over 60% of their population in the Mara region (Virani et al., 2010). Moreover, it is argued that their decline is more pronounced outside protected areas (Virani et al., 2010). A decade ago, none of the eight species was listed on the IUCN Red List, but currently, six of the eight in Kenya are threatened with extinction (Kendall & Thomsett Personal Communication). Decimation is likely for some species, for example the Egyptian vulture, for which studies indicate a likelihood of extinction in the area (Kendall unpublished). Others such as the bearded vulture had been under captive breeding in the country, but population could not be re-established due conflicts with local communities (Thomsett Personal Communication).

Studies attribute this decline to a number of factors including change in land use, human persecution and deliberate poisoning by pastoralists and farmers using readily available pesticides. In 2009, 187 African white-backed vultures and several other scavengers were reported poisoned near the Athi River (KWS, 2009; Otieno et al., 2009), and in the Maasai Mara region, the Kenya Wildlife Service reports poisoning of 1 lion and 36 vultures around Oloolaimutia area (KWS, 2009). These are likely representative of many that go unreported. Other studies conducted in northern Kenya report an increase in other scavengers, for example hyena and jackals, attributed to the vulture decline in the area and therefore abundant forage for other scavenging species (Ogada & Keeising, 2010).

Research Purpose / Justification

Despite the abundance of research on the status and trend of the vulture species, there is little focus on human attitudes and perceptions toward vultures in East Africa. Determining this is important due to the general acceptance that the survival of vultures in East Africa depends on pastoralists and farmers who need to stop deliberate poisoning and instead support conservation interventions.

To address this issue, this study explores factors that influence the Maasai to favor or oppose vulture conservation in the area. In addition, the study aims at providing suggestions for successful models of conservation advising on a new policy.

Objectives of the Study

The specific objectives of this study are:

1. To assess the attitudes and perceptions of the Maasai toward vultures, the Narok County Council, Conservancies and Carnivores.
2. To evaluate the importance of vultures to the Maasai people.
3. To determine the level of Maasai understanding and knowledge of vulture ecology.
4. To provide recommendations on how best to encourage the Maasai to conserve and manage vultures in the Maasai Mara region of Kenya.

Research Questions

The research questions informing this study were:

1. How does human demography and socio-economic factors influence Maasai attitudes toward vultures?

2. Is there a relationship between knowledge/understanding and attitudes toward vultures in the area?

3. How does the human-carnivore conflict impact the Maasai attitudes toward vulture conservation and influence the rate of poisoning in the Maasai Mara region?

4. How does the management of the reserve, (i.e., the Narok County Council), influence the Maasai attitudes toward vulture conservation in the area?

The Variables of Interest to the Study.

Attitudes

According to Ajzen and Fishbeins (1980) theory of reasoned action and its application in Allendorf et al. (2006), attitudes are defined as human psychological tendencies expressed by evaluating a particular entity, called the attitude object, with some degree of favor or disfavor. It consists of perceptions, which are associations that people establish between the attitude object and various attributes. Acek Ajzen (2005) argued that to determine the attitude of an individual toward the attitude object, one would sum both the items that a respondent responds to positively and the negative ones, comparing the two totals to determine the degree of favor or disfavor for the object.

LaHart (1978), in his attempt to define attitude, indicated that attitude encompasses both effective and cognitive components, defining cognitive components as those things an individual remembers, learns or thinks about in relation to an attitude object. Kellert (1980) described attitude as like or dislike, developing categories such as

naturalistic, utilitarian, humanistic, dominionistic, ecologicistic, negativistic, neutralistic, moralistic, scientific and aesthetic, suggesting that some categories are held more than others depending on the society.

Perceptions

Perception is how one perceives the world (how it is seen) while attitude is how one acts toward it. Is a process by which an individual selects, organizes and interprets stimuli into a meaningful and coherent picture of the world (Schiffman & Kanuk, 1991, p. 174).

Definition of Key Words

Respondents- are people who provide information about themselves allowing the researcher to construct a composite picture of the group those respondents represent (Babbie, 1999).

Limitation of the Study

This study has several limitations; one being that it relies on data obtained using a questionnaire. According to the literature, studies involving the use of such an instrument have the possibility of misunderstanding (Polivka & Rothgeb, 1993; Babbie, 1999). In addition, Ott & Longnecker (2003) argue that surveys have problems with certainty, emphasizing the need to distrust surveys to a certain extent even when the samples were properly selected for two reasons, nonresponse and measurement problems.

Secondly, this study employs a mixed method in the analysis process. Its limitation that has been commonly voiced by researchers is a concern for loss of depth and flexibility when qualitative data are quantitized. According to Bazeley (2004),

qualitative codes are multidimensional, meaning they attempt to provide insights into several interrelated conceptual themes or issues during analysis. Thus, a mixed method may reduce rich qualitative data, creating dichotomous variables which then are reduced into a single dimension and absolute.

The third limitation is the potential for bias because the researcher is a Maasai. Though not specifically from the study area, the area of interest of this study cuts across the entire Maasailand, and, therefore, he has experienced the challenges regarding human-carnivore conflicts. Thus, even though the researcher does not come from the study area, this does not eliminate the possibility of bias in the interpretation of qualitative results.

Finally, convincing the Maasai to talk about vultures was a challenge. The community preferred at times to discuss their perceived threats from other charismatic species, for example elephants. In most cases, respondents asked the researcher to stop asking about vultures because they were insignificant to them. Because the researcher was from this local community, they perceived the study as a solution to the many complicated problems associated with wildlife in the area. To address this challenge, he first had to allow the respondents to explain the perceived threats to their livelihood and return to the study questions later.

Cognitive Dissonance Theory

According to Wood (2000), there are three central motives that generate attitude change and resistance. The involvement of the attitude object with the individual self, concern with others and its relationship including rewards/punishments it provides, and a

valid understanding of the reality of the attitude object. For purposes of this study, the researcher tried to probe the concerns of the Maasai toward vultures, their importance and the rewards or punishment associated with them. According to Wood (2000), a clear understanding of the attitude object (vultures) is instrumental in shaping an individual attitude toward the object.

Validity and Reliability

The mixed method approach as a data collection strategy has been employed to validate one form of data with the other in order to transform the data for comparison or to address different types of questions (Creswell & Plano Clark, 2008).

The researcher is a Maasai, this is important because of his knowledge of the cultural practices of the community and because respondents felt comfortable to share their opinions with him as they perceived him as one of them. This openness was especially important as it reduced their level of suspicion on contentious issues, for example poisoning.

The researcher conducted face-to-face interviews himself, a situation that decreases the number of don't knows and no answers as described by Babbie (1999), who suggested that face-to-face interviews can act as a guard against questionnaire items that are confusing to the respondents. In addition, the researcher can observe respondents as well as ask questions which will help in clarifying their reactions to the study.

Further, prior to conducting interviews a protocol was established to define the procedure to be used (See appendix 2), one that ensured the respondents of confidentiality of their information, benefits and risks associated with their participation,

a situation that further built confidence between the researcher and the respondents. This protocol was approved by the Clemson University Institutional Review Board (IRB).

CHAPTER TWO

METHODS

In order to best understand the Maasai attitudes related to vultures, a mixed method approach to research was employed. The data were collected simultaneously making this a nested study. This was done in order to build generalizable information regarding local knowledge on vultures as well as attitudes. This data was complemented by qualitative data in the form of stories and perceptions that gave an added dimension to the survey data. Collecting both at the same time led to a more wholistic approach to research appropriate for understanding cultural connections to wildlife at multiple scales. This section provides a brief introduction of the area and the sample including the selection method and the survey instrument used in this study.

Study Area

Maasai Mara National Reserve (MMNR) is located 168km south of the equator, approximately 247 km southwest of Nairobi (Figure 2.1). Vested under the management of the Narok County Council (NCC), it lies within the greater Mara ecosystem, which covers an area of approximately 6000 km² including the neighboring group ranches (Figure 2.3). As shown in Figure 2.2 the reserve is occupied primarily by the Maasai people who practice pastoralism (Sinclair & Griffiths, 1979). The non-Maasai population in this area, who are primarily attracted by the tourism industry, are concentrated in the small mushrooming urban settings around the reserve and are not the target of this study (Sinclair & Arcese, 1995). Specifically, this study focuses on two group ranches, Siana and Koyiaki, selected as a result of their proximity to the reserve

and their size, to generate diverse responses because of their varied income sources, one of which is tourism. The members of each group ranch owns a parcel of land ranging from 5 to several thousand acres depending on social status and the ability to influence the group ranch officials (Personal Observation). In addition, the Koyiaki group ranch includes established conservancies, which are managed by private organizations, while Siana is still undergoing this development under the facilitation of the African Conservation Centre (ACC).



Figure 2.1: Map of Kenya showing the location of Maasai Mara National Reserve

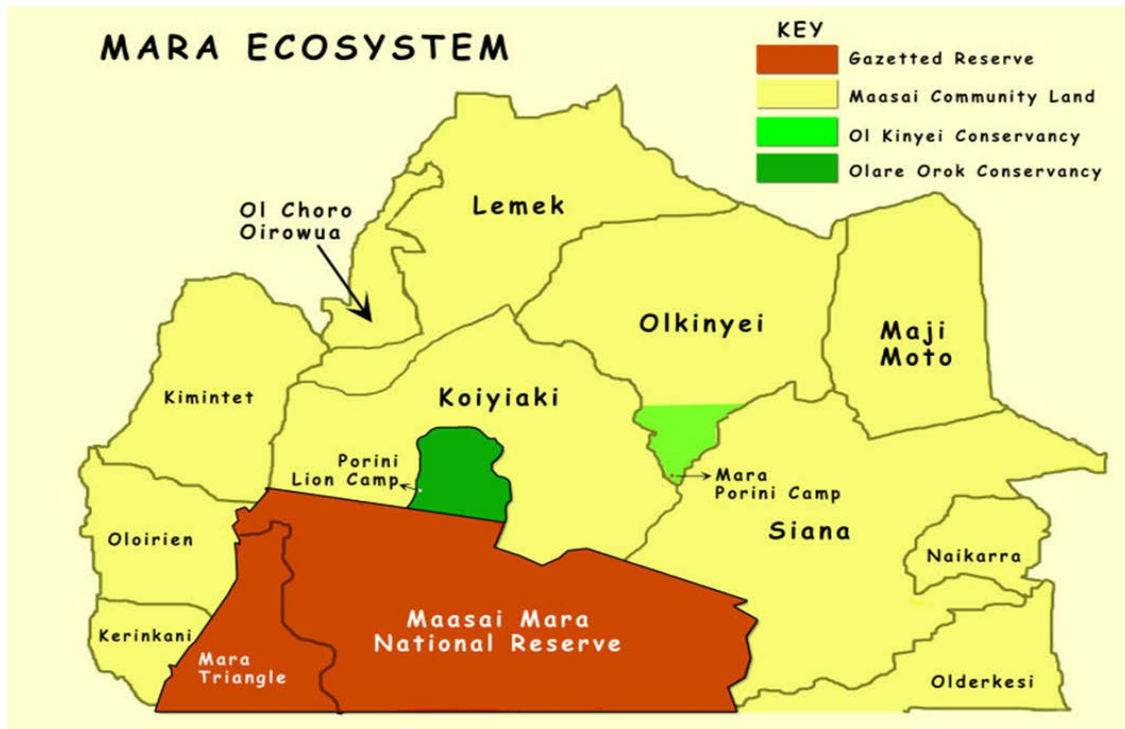


Figure 2.3: Map showing the Mara Ecosystem and the Reserve.

Due to the Maasai diversification, the pastoral grazing lands are being converted into agricultural fields to increase revenue for the local residents. The establishment of conservancies in the area is driven by an attempt to prevent increasing land conversion into wheat farming, a practice that is rapidly eliminating the wildlife habitats in the Narok District.

Sample Size

A total of 16 local villages were sampled from the two group ranches, each providing 8 villages with a total of 10 respondents per village. The sample size was determined by the availability of resources because of the size of the area. For example, one group ranch may cover approximately 100km. In addition, the researcher ensured

that respondents came from different households. For the purpose of this study, a household was defined as one or more persons living together under the same roof or eating from the same pot.

Sample Selection

This study employed both stratified random and purposive sampling. Purposive sampling is defined by Babbie as “a type of non-probability sampling in which the respondents to be interviewed are selected on the basis of our (research team) judgment about which ones will be the most useful or representative to provide required information for this study” (Babbie, 1999 p. 207). In the socio-political context of the Maasai, there is an asymmetrical distribution of decision making power; men generally are the heads of the household deciding all affairs regarding the family unit. In addition, the governance and political structure is a hierarchical one in which the elders are the supreme decision makers in the community (Personal Observation). Taking care of the livestock is a responsibility of the men while women are primarily concerned with such household activities as cooking, house building, collecting firewood and child care. In addition, women are not allowed to speak on behalf of the family. To ensure that women were sampled in this study, we synchronized our interviews with the activities of the women, for example, conducting interviews while they were collecting firewood or at the watering points. Because our main interest was focused on attitudes toward vultures, which are affected by such activities as livestock depredation, relationship with the reserve authority and the establishment of conservancies, all of which are male responsibilities in the Maasai community, we purposely interviewed more men than

women. Additionally, some individuals, for example local leaders were selected because of their ability to influence the community to oppose or agree with the initiation of new programs. To improve representativeness, stratified random sampling based on gender was also employed, one that ensured a ration of 3:2 for male and female respectively in every village. This method has been recommended by Babbie (1999) as one that obtains a greater degree of representativeness by decreasing the probable sampling error, suggesting that an appropriate number of elements are drawn from a homogeneous subset of the population rather than sampling from the total population.

Survey Instruments

Data were collected using face-to-face interviews, observation and a questionnaire composed of closed-ended statements ranked on a three-point Likert scale. This scale was used rather than the typical seven-point Likert scale (Sivacek & Cronon 1982) because of the community understanding, culture and practice. The modification of the scale was instrumental for purposes of translation and interpretation of the statements. In the Maasai community, when one is in agreement, he/ she strongly supports the statement; therefore multiple levels of agreement do not exist.

The survey tool (Appendix 2) included four sections each comprised of closed and open-ended statements running concurrently. The first section asked for demographic characteristics using seven questions, while the second included three open-ended questions on vulture knowledge, a matrix on the identification of individual vulture species by vernacular language (Maasai) using pictures and 14 statements testing attitudes toward vultures. The third section focused on attitudes toward the Narok County

Council, the authority managing the protected area as well as attitudes on the conservancies in the area. Section four included both closed-ended statements on attitudes toward carnivores and interview questions exploring opinions on human-carnivore conflict. All the respondents interviewed were visited in their respective villages to ensure that they come from the study area. Prior arrangements were made through pre-visits and appointments to ensure the cooperation of the respondents. This study was conducted between August and December 2011.

Data Analysis

Data analysis involved a mixed method approach, both qualitative and quantitative, one that has been widely used (Creswell et al., 2004; Data, 2001; Johnson & Christensen, 2004; Tashakkori & Teddlie, 2003) but not without criticism (Johnson & Onwuegbuzie, 2004). However, scholars recommend this approach for determining links between human activities and their physical environments (Mackey et al., 2004; Schimidt, 2005). In addition, Creswell and Clark (2007) argue that the mixed method is an effective validation tool in that information from one method is supplemented by information from another.

Data were summarized using descriptive statistics; for example, all socio-demographic variables were summarized in tables and histograms to provide a general picture of the sample characteristics. Closed-ended statements from all four sections were separately coded with one, two and three representing agree, neutral and disagree respectively. These totals regarding vultures, carnivores, Narok County Council and

conservancies were combined into a single additive score (Mehta & Kellert, 1998; Walpole & Goodwin, 2001).

Interview statements were read and classified into categories based on their similarities as interpreted by the researcher, a method referred to as open coding which involves looking at the data multiple times for key words, phrases, similarities and dissimilarities (Alber and James, 1988). This Qualitative Data Analysis (QDA) approach is inductive where themes or categories are generated from the rich qualitative text for interpretation (Glaser & Strauss, 1967). Common words or similar phrases were then identified from the recorded interviews; a codebook structure used by Babbie (1999) was adapted to visually display the results. This method is exemplified in the table below showing respondents' stories related to vultures.

Table 2.1. Respondent stories related to vultures

Statements	War	Direction	Ceremonies	Superstition	Medicinal	Spiritual
Killing vulture for entitlement			X			
Decoration feathers			X			
Vultures kill warriors during raids	X					
Direct people to dead cows (lost)		X				
Treat disease (<i>Enemotonyi</i>)					X	
Hides for making ropes by women		X				
Biblically vultures fed on people						X
Raid songs to vultures	X					
Symbolize death of animals when seen around villages				X		
Slaughter points		X				
Vulture preying on children				X		
Attracting girls for a dance			X			
Determine proximity of enemies	X					

Key qualitative statements were also recorded to determine the implications of the attitudes articulated and to provide supplementary explanations for the patterns found for the quantitative variables. These statements not only answered how but also why and what next because respondents provided their opinions on what happened, why it happened and what should be done to address this issue. In addition, the qualitative statements provided an in-depth understanding of the respondents' feelings and arguments, both of which were instrumental in drawing conclusions on possible patterns of behavior. Personal observations also provided supplementary information to the open-ended and closed-ended answers.

Relationships between variables of interests in the study were determined using contingency analysis and one way analysis of variance, for example correlations between attitude scores by respondent demographic characteristics such as age, gender and education. Other statistical methods including t-test, chi-square and multiple stepwise regressions were also used depending on which would provide accurate results. All calculations were conducted using *JMP.9*.

CHAPTER III

RESULTS

This section details the findings of the study based on the themes determined by the initial analysis, specifically issues related to the vultures including knowledge and attitudes; and the relationships between the Maasai and the NCC, and the issues related to conservancies and human-carnivore conflict explored through attitudes and livestock depredation. These results are supported by statistical data, key respondent statements, and personal observations and experiences.

Demographics

Gender: Of the 160 respondents interviewed 89 (56%) were male and 71 (44%) were female.

Age: Approximately 39% belonged to Ilmeshuki age group (18-32), 26% Ilkisaruni age group between 33-45, 19% to the Ilkitoip (46-55) and 5% belonged to Ilnyankusi age group above 70 years (Table 3.1)

Table 3.1: Age groups

Age	Frequency	Percent
Ilmeshuki (18-32)	63	39
Ilkisaruni (33-45)	42	26
Ilkitoip (46-55)	30	19
Iseuri (56-70)	17	11
Ilnyankusi (above 70)	8	5
Total	160	100

Table 3.2: Level of education

Level of education	Frequency	Percent
None (Illiterate)	119	74
Primary/elementary	9	6
Secondary/High school	17	11
College/University	15	9
Total	160	100

Table 3.3: Religion

Religion	Frequency	Percent
Christian	59	37
None Christian (do not attend church)	100	63
Total	159	100

Table 3.4: House roof material

House roof material	Frequency	Percent
Aluminum	41	26
Thatched	119	74
Total	160	100

The Maasai Knowledge of Vultures

The Maasai knowledge of vultures was explored using pictorial identifications; interviews including narratives and stories related to vultures, their uses and importance to the Maasai community; and observations of respondents' reactions to the interview questions. In addition, contingency analysis was used to correlate vulture knowledge by such respondent demographic characteristics as age, gender and education.

Using labeled pictures (See Appendix 3), respondents were asked to identify by giving the correct Maasai (vernacular) names and stories associated with six species of vultures and one eagle. Educated respondents were also requested to give the common names of the species if possible. The results of the vulture identification are shown in Figure 3.1 below:

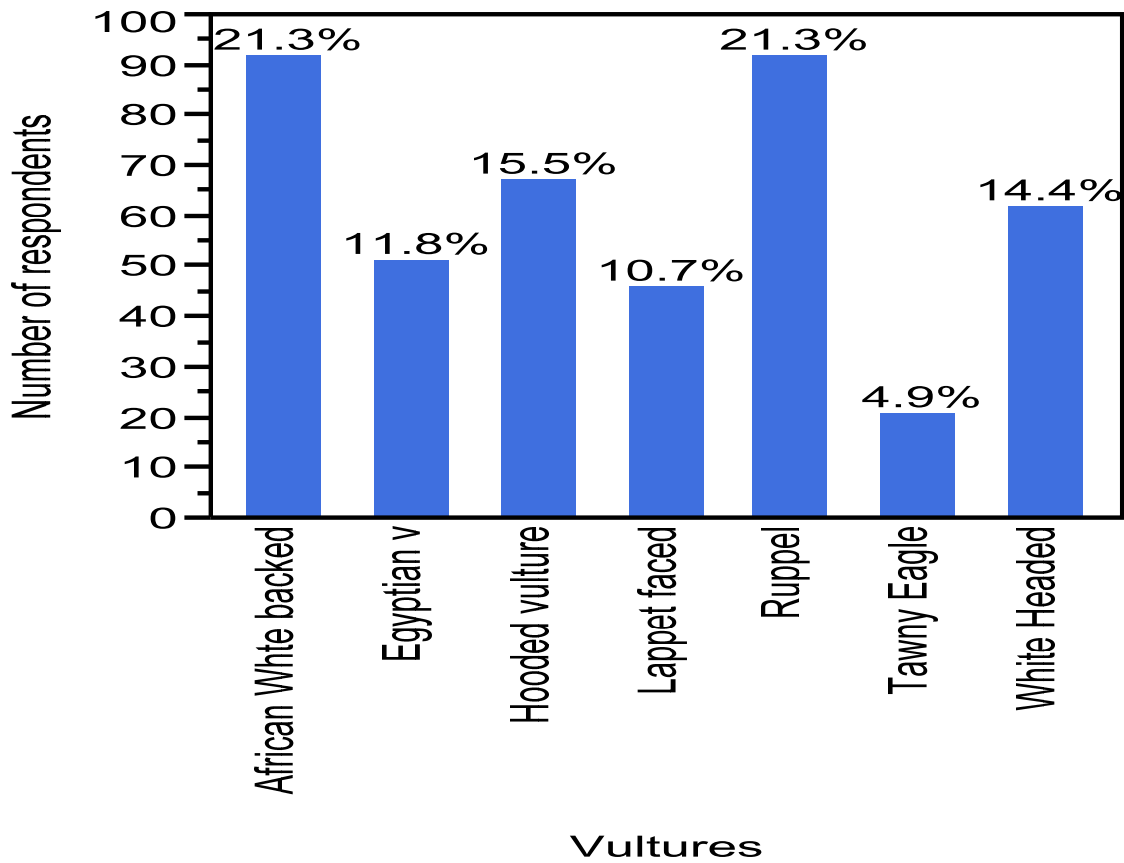


Figure 3.1: Correct identification of each vulture species by respondents.

We observed that young Maasai warriors employed as tour guides were able to give common names of some vultures, but not the correct vernacular names. In addition, respondents had difficulty differentiating between the ruppel and the African white-backed vultures. Both of these are commonly referred to *orkurragos*, meaning one with a long slender neck. In an attempt to explore these findings, observation was fundamental,

and as suggested by the statements below, respondents had various reactions to the vulture pictures.

Qualitative Observation

The researcher intently observed the reactions or the first impression of each respondent when handed the picture. Those who identified the Egyptian vulture either struggled taking time to remember it or identified it quickly commenting on its rapid disappearance. Their statements included “Where did this vulture go? I have not seen it for over a decade now.” “They were generally few compared to other vulture species; you only see a maximum of two individuals hanging around a large crowd of other vulture species”. As these statements indicate, the respondents were aware of the decline of this species.

The pictures of the vultures created mixed reactions in respondents. The Lappet-faced vulture for example, invoked fear among the majority of the respondents, especially the women and young people ages 18-32. This fear was caused by the fact that the respondents had never encountered this vulture before at close proximity, had never seen it before, or were frightened by its appearance. Statements included “*Look at this bare head! “The beak is too huge; it can swallow a small animal whole”*”. Some expressed fear because of previous encounters with it; including stories about how Lappet-faced vultures are dangerous especially when they have broken wings and stories about how this species killed weak warriors during wars. The Maasai refer to this vulture as *Partakulen* meaning one with huge thighs illustrating its strength and might. It is also referred to as *Ormotonyi loormurran*, meaning vulture of the warriors. When asked about the origin of this name,

respondents gave two reasons: one based on incidents of the Lappet-faced killing weak or injured warriors during raids and the second because warriors use their feathers for cultural reasons.

Other vulture species were perceived differently; with a hooded vulture being perceived negatively. The name *enkinyia nkik* meaning one that feeds on fecal matter is an indication of this situation. Among all the vulture species, hooded vulture was undignified presumably because of its feeding habit. Although the White-headed vulture was also negatively perceived as an enemy because it kills lambs, it did not warrant much attention from the local people who indicate that its threat to livestock is minimal. An Egyptian vulture was perceived as a patient bird and one that does not scramble with other vulture species for a meal. The Maasai refer to it as *kilerua* but sometime known as *oloomudong'o* meaning one that feeds on placenta. This vulture species is known to patiently wait for a cow to give birth by sitting and staring to feed on the placenta and presumably the reason why it is referred as a patient bird.

In addition, knowledge of and interaction with vultures was found through community cultural songs. As the Maasai are a pastoral community as discussed across the literature, one of their fundamental practices is livestock rearing, which were acquired through raiding other communities. Therefore, raids were a daily activity which involved warriors singing to encourage others and family members as they embarked on this activity. Of importance, the warriors sung songs to encourage others and family members as they undergo this activity. There are several raid songs, two specifically involving vultures.

First song by respondent, age (Iseuri)

*“Papa, papalai tenikinyor, yieyio, yieyiolai tenikinyor, tipika osoit ogol
enkoshoke,
amu ataa duo enang’elu pee epuo iloo meng’elu ng’elaro, iyiolo ng’elaro
melelek,
iyiolo ajo kipiki orinka elukunya, iyiolo kipiki ilalema irng’arpushi, niking’uari
mikinguranie partakulen enkuram oloikulu!!”*

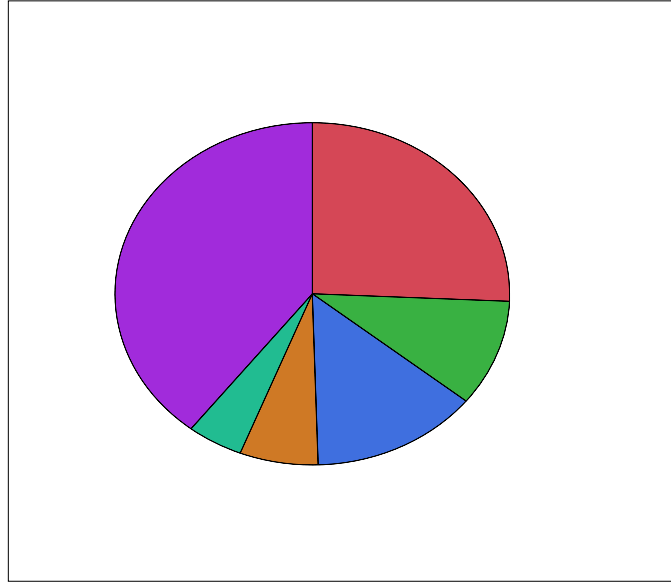
Translation: Father, mother if you love me, be courageous and strong because we are just about to go on offensive raids. And you know this is not an easy task because spears and swords may fall over our heads and we may be left as a celebration for the vultures that will be jumping and pecking in celebration on top of our chests.

Second song by respondent, age (Ilnyankusi)

*“ormotonyi lenkai lido olo, tirrida enkola maape irng’amari oikirikira lesinko,
amu teneitu aari naarisho, nemeeta ake kata niminyia yie nekiri!!!”*

Translation: You, the flying vulture, pack up your arms and follow me to the battle field because you will be lucky today as I will either kill or be killed and either way you will find food to eat.

The songs are reflected in the respondents’ statements in Figure 3.2 below about vultures, supporting that the Maasai associate them with war.



Types of stories



Figure 3.2: Traditional stories related to vultures

Vulture knowledge was further explored by finding a correlation between the correct identification of vulture species by age, gender and education. Other demographic variables did not show a positive relationship with vulture identification. The tables below present the findings of the relationships between vulture knowledge and the socio-demographic factors.

Table 3.5: An analysis of the identification of the Egyptian vulture by respondent age.

Age	No. of respondents	No. of respondents	Total
	who identified correctly	who identified incorrectly	
Ilmeshuki/Ilmerues (18-32)	9	54	63
Ilkisaruni (33-45)	12	30	42
Irkitoi (46-55)	14	16	30
Iseuri (56-70)	10	7	17
Ilnyankusi (Above 70)	6	2	8
Total	51	109	160

These results suggest a positive relationship between the identification of the Egyptian vulture and respondent age, $\chi^2 = 24.879$, $P < 0.0001$, meaning correct identification increased as age increased. Older people have a higher percentage of correct identification than the younger people. These findings are supported by

correlating the identification of the Lappet-faced vulture by the respondents' age (see Table 3.6)

Table 3.6: An analysis of the identification of the Lappet-faced vulture by respondent age.

Age	No. of respondents	No. of respondents	Total
	who identified correctly	who identified incorrectly	
Ilmeshuki/Ilmerues (18-33)	10	53	63
Ilkisaruni (33-45)	12	30	42
Irkitoiip (46-55)	11	19	30
Iseuri (56-70)	7	10	17
Ilnyankusi (Above 70)	5	3	8
Total	45	115	160

These results also suggest a relationship between the identification of the Lappet-faced vulture and respondent age, $\chi^2 = 11.685$, $P < 0.0199$.

In addition, the results of the identification correlated with gender, as shown in Table 3.7 below suggest a positive relationship, $\chi^2 = 20.116$, $P < 0.0001$, indicating that male respondents had a higher percentage of identification than female.

Table 3.7: A correlation between the identification of the Ruppel vulture by respondents' gender.

Gender	No. of respondents	No. of respondents	Total
	who identified correctly	who identified incorrectly	
Male	65	24	89
Female	27	44	71
Total	92	68	160

To determine the relationship, if any, between education and the identification of vultures, we correlated the identification of the African white-backed vulture and the respondents' education. As shown in Table 3.8, the results predict a relationship, $\chi^2 = 19.331$, $P < 0.0002$, suggesting as the level of education increased, the identification of vultures decreased.

Table 3.8: An analysis of the identification of African white-backed vulture by level of education.

Education	No. of respondents	No of respondents	Total
	who identified	who identified	
	correctly	incorrectly	
Illiterate	80	39	119
Primary	4	5	9
Secondary/High school	4	13	17
Tertiary	4	11	15
Total	92	68	160

Attitudes Toward Vultures and Vulture Conservation

The attitudes of the Maasai toward vultures were explored using a set of attitude statements, qualitative interviews and personal observations. Descriptive statistics derived from *JMP.9* were used to summarize these quantitative statements. The resulting percentage of agreement and disagreement to these statements are shown in Table 3.9 below. In addition, the importance of vultures to the Maasai was explored through two interview questions, one on the importance of vultures and the second on the use of vulture parts by the community. These responses were coded resulting in categories. The results are shown in Figure 3.3 below.

As suggested by the results, feathers are the most useful part of a vulture for the Maasai. Specifically, and as suggested by the results in Figure 3.4, the majority of the

respondents valued vulture feathers for making arrows and for cultural ceremonies. Some respondents, particularly the older, mentioned feathers were important for medicinal purposes to the community.

In addition, attitude scores were correlated with the respondents' demographic characteristics by using one way analysis of variance. The results are shown in subsequent figures below. Qualitative statements were sampled and recorded to provide an in-depth understanding of the respondents' attitudes, or perceptions, toward vultures.

Table 3.9: Summary of the results of the attitude statements.

	Agreement rate
Attitude statement on vultures and vulture conservation	(%)*
Vultures prevent the spread of diseases among other types of wild animals.	73
Sometimes, some vulture species kill livestock (e.g. lambs and calves) in this area.	87
Vultures sometimes compete with dogs and other scavengers for carcasses and eventually get killed.	40
I have seen large numbers of dead vultures in this area.	42
Vultures in this area sometimes feed on poisoned carcasses.	72
Sometimes people in this area poison carcasses to target vultures.	6
Poisoning is causing the vulture decline in Maasai Mara Region.	52
Vegetation cover around this area has decreased in recent years.	57
We should conserve vultures for our future generations.	99
I participated in the previous vulture awareness day.	15
I would participate in any other event of vulture awareness in the future.	96
It is important to protect breeding habitats of vultures	98
It is important to educate the Maasai about vultures in this area.	100
Vultures are generally declining in this area.	83

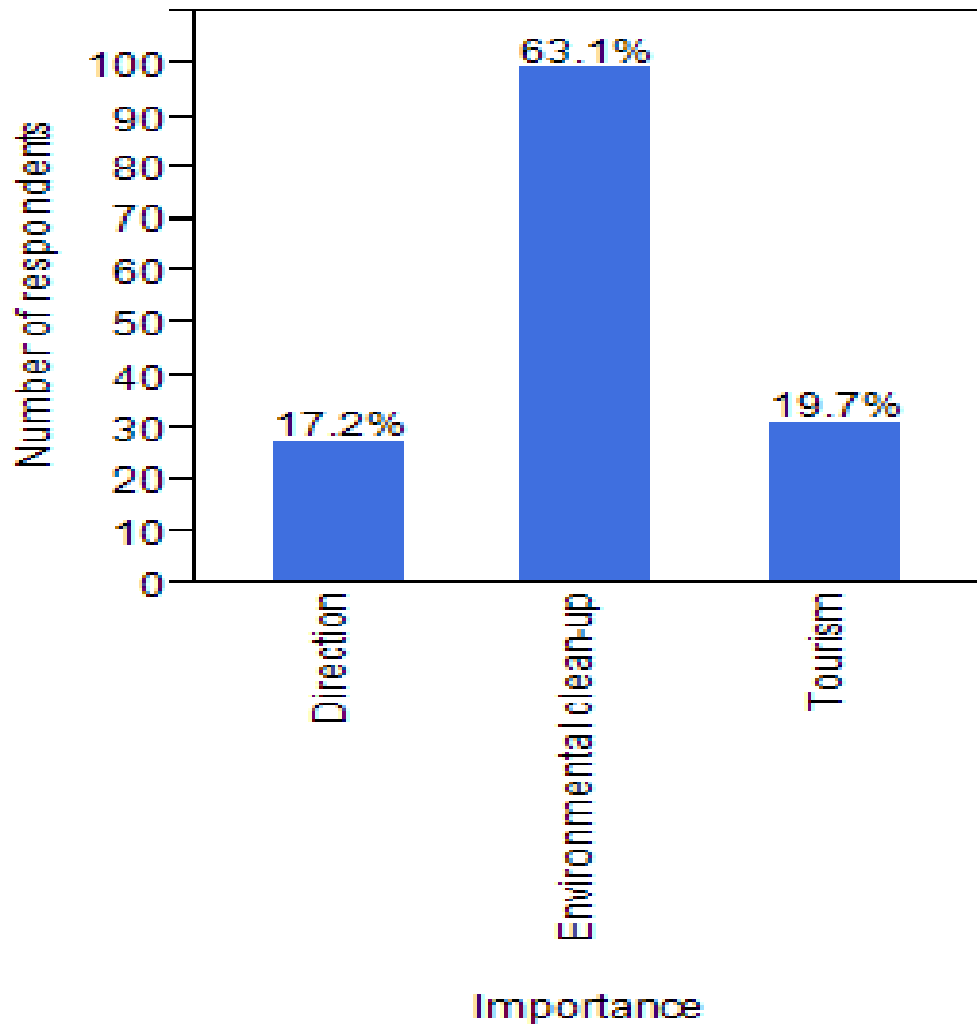


Figure 3.3: Importance of vultures to the Maasai people

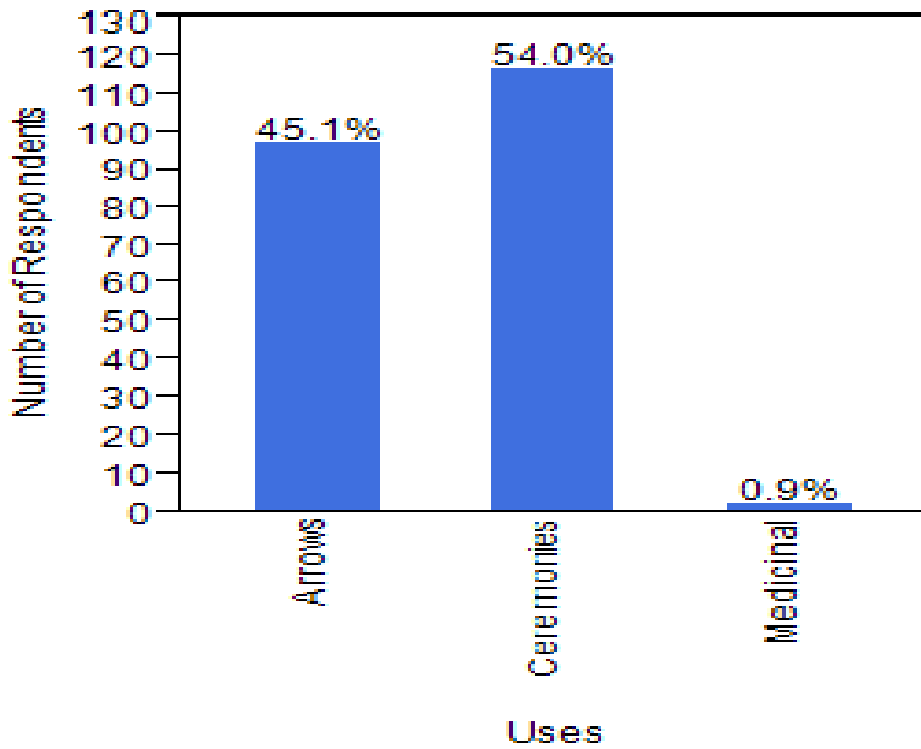


Figure 3.4: Uses of vulture feathers by the Maasai people

No significant relationship with regard to attitudes toward vultures was found for the level of education, age and respondent income. However, gender and attendance at the International Vulture Awareness Day (IVAD) indicated a positive relationship.

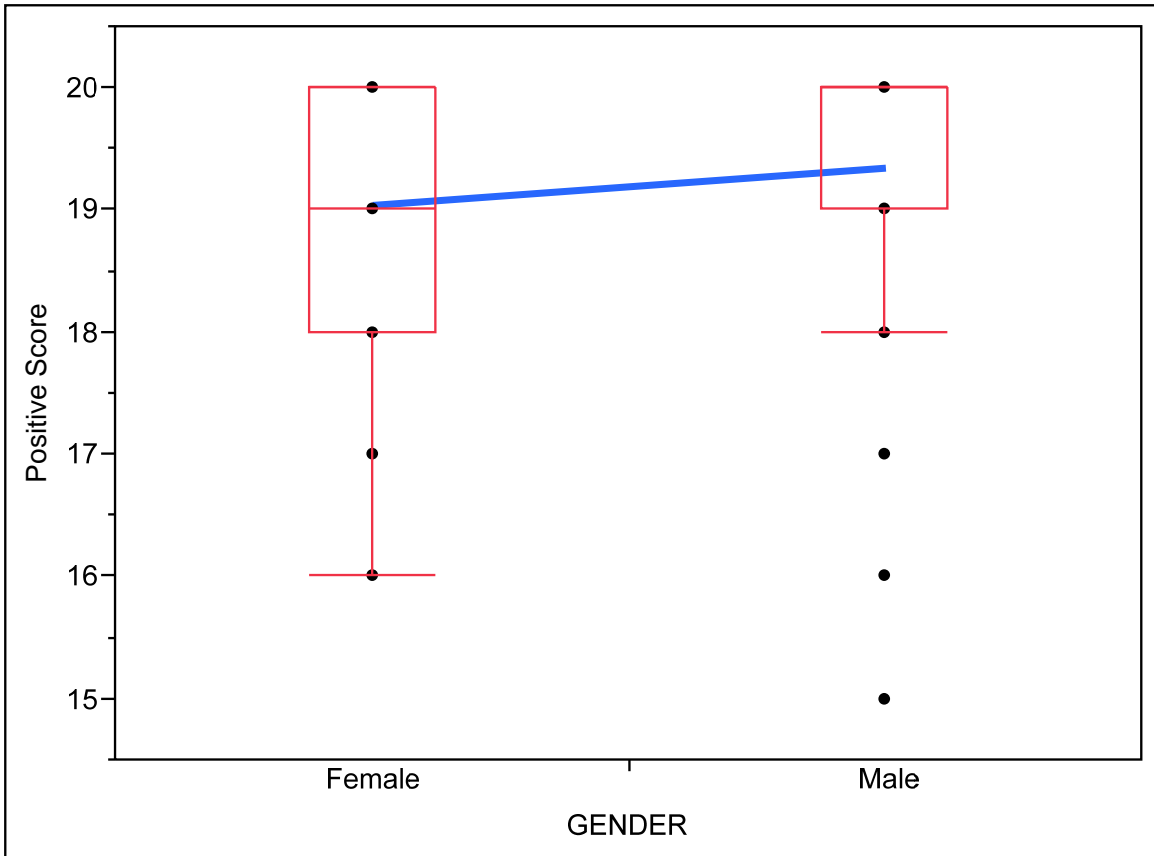


Figure 3.5: One-way Analysis of Vulture Positive Score by gender

These results suggest a significant relationship between gender and the attitudes toward vultures, with male respondents supporting vulture conservation more than female, $t_{147} = 0.95$, $P < 0.0494$. In addition, the chi-square test suggests a strong relationship between agreement that poisoning is causing the vulture decline in the area and interest in establishing a compensation program to help address this situation after adjusting for participation in the previous International Vulture Awareness Day (IVAD), $X^2 = 7.5469$, $P < 0.0230$.

Moreover, attitudes were explored by the use of qualitative statements; an example reflecting a majority of the respondents' comments is seen below: "*Vultures are harmless to people and to our livestock. Then why should they be killed if they do not affect either us or our livelihood? I support any intervention to conserve vultures.*" This statement suggests that the Maasai favor vulture conservation because the birds are harmless to them and their livelihood. In addition, it supports the responses to question six in the attitude statement matrix above, which suggests that vultures are not the target of poisoning.

Attitudes Toward the Narok County Council (NCC)

The Maasai Mara National Reserve (MMNR), which is owned by the community, is under the management of NCC. It is among the leading tourist destinations in the country. As such, the revenue collected from it should benefit the communities living around this resource. The community benefits from tourism not only through revenue collected by NCC but also from employment in tourist facilities as tour guides, performers of traditional dances and the sale of cultural artifacts. The researcher was particularly interested in the attitudes of the local people toward the management of the reserve as the relationship between the two stakeholders is instrumental in determining favorable attitudes toward conservation in the area. These community attitudes were explored through a set of statements on the benefits and the relationship with the NCC, interview opinions on the management of the reserve and personal observations. In addition, opinions from the management of the Reserve were also sought in an attempt to fully understand issues in the area.

The results suggest that 77%, of the respondents disagreed with the statement that they receive benefits from the revenue collected from the Maasai Mara National Reserve, and more than half of the sample (60%) disagreed with the statement that they had a good relationship with NCC. The majority (92%) disagreed with the statement that the management of the reserve is attempting to prevent livestock loss through predation, while most (91%) agree that tourism development brings economic benefit to the area, specifically cultural manyattas (villages) fees, revenue from the sale of artifacts by the women and employment for the youth. The respondents did not see benefits from the revenue collected by the reserve authority possibly because of the perceived negative relationship with it. The most common negative issues mentioned concerning the Reserve were the harassment of women and herders by park rangers; the denial of firewood, access to water for livestock and pasture during drought; and discrimination in grant/bursary allocations to students.

An in-depth understanding of the relationship between the NCC and the local community was also explored through interviews which were conducted concurrently with the closed-ended attitude questions. Below are sample statements from the respondents.

Respondent from Koyiaki Group Ranch (Age 46-55)

“There has been an agreement between us (local people) and the county council allowing us to graze our cows at night when the tourists are not in the reserve. Currently, the management does not allow us to access water in that river for our cows. They have initiated very stringent rules and fines. If our cows are found

grazing in the reserve, we are charged Ksh 10,000 (equivalent \$120) per herd, and they have now made it more expensive by charging Ksh 200 (\$2.5) per cow. How do we pay for this? Why are they punishing us for our own resources? They do not want to talk to us; instead they brutally harass our children and deny us access to this resource. *Etejoki apa mmepala ilooboita...* meaning as long as we live together and share resources, there will always be conflict and the only way to address this situation is through dialogue.”

As this statement indicates, there is a misunderstanding between the NCC and the local people over resource utilization. The community suggests that there should be dialogue to reach a mutual understanding on how to utilize the resources, for example grazing.

A quote from an official of the reserve

“We enacted these by-laws to try and address the issue of illegal grazing. These people are very stubborn, and they will always drive their cows into the Reserve both at night and during the day. This paints a terrible picture to our visitors, and most of them complain that they are paying too much money just to come see Maasai cows grazing in the park. We have had several meetings with the civic leaders, but they have proved futile. The more serious problem is that some of our rangers have cows too, and they do not want their cows to starve; therefore, we have a problem of law enforcement. This is an internal problem, and we have nowhere to turn. So the only solution is prayer!”

As this statement implies, there is little dialogue between these two crucial stakeholders. The council accuses the community of illegally grazing in the park, forcing the authority

to develop by-laws involving heavy fines in an attempt to address the situation. More importantly, enforcing these laws is difficult because some law enforcers have an interest in grazing livestock in the Reserve. In addition, the statement suggests that the Reserve's effort to address community issues, for example grazing, is frustrated by political rivalry among the council officials. Based on personal observation, local people have adopted the strategy of grazing in the reserve at night, with cows being enclosed in the boma (enclosure) during the day in most villages.

Quote from an anonymous park official

“The local people have leased all of their grazing land to private conservancies. And because these conservancies are strictly managed, they are forced to relocate and settle near the National Reserve causing havoc. This situation was not like this before the creation of these conservancies. Additionally, most tourists now prefer to do their game viewing in these conservancies, and even the wildlife has migrated to these areas. I am a resident of this area, and our grandfathers were smart to designate this as a community game reserve for conservation and to leave all the other areas for grazing. Why are they converting this grazing land into conservation areas? What will happen to livestock then? You cannot destroy one part of the house to construct or repair the other. The way to go is just to abolish all these conservancies, and the people return to their land, reducing pressure on the Reserve.”

As this statement indicates, creation of the conservancies has resulted in increased human pressure on the protected area because of the displacement of local communities from

their grazing land. In addition, wildlife are migrating to these conservancies because of reduced human interference, for example moving to the Mara North conservancy (Personal Observation), a situation that the council authority complains results in loss of revenue because visitors prefer visiting these conservancies. Moreover, this statement suggests that the conservancies and the Reserve compete with one another for tourists.

Respondent from Oloolaimutia (Siana) (Age 46-55)

“Last year, a group of people was sponsored by a local NGO to visit other parts of Kenya to see how some of these problems are handled. The most interesting case I saw was in Amboseli. The Maasai from this area are allowed by the Kenya Wildlife Service (KWS) to drive cows into the park during designated hours of the day to drink water from the rivers. These people are living harmoniously with the management of the Park because of dialogue and agreements. I think we should emulate this successful case.”

This respondent appreciates that there should be dialogue to address the situation. Additionally, the statement suggests designating some hours of the day for cows to access water or pasture in the reserve when tourists are not in it, a practice that has been successfully employed in other areas.

Respondent from Koyiaki group ranch (Age 18-32)

“The revenue collected from the reserve does not benefit all the people equally. The grant/bursary allocations to students are handled in a very corrupt manner only benefiting those who are allied to the area councilor/civic leader (who is the chair or patron of the kitty). If you opposed him during the last election, your

children will not benefit. In this case, I completely depend on my livestock for food and educating my children. What happens when a lion that does not benefit me in any way kills my livelihood? I will definitely kill it. I know these animals are important but only to the people they benefit!”

The council passed a resolution that 19% of the revenue collected from the Reserve should be allocated to projects prioritized by the community, for example, grant/bursary allocation to students and building schools and health centers. This statement suggests that these benefits are not equally shared among the community members, accusing civic leaders and the park authority of misappropriating the funds intended to benefit them, thereby contributing to the negative attitudes toward conservation.

Attitudes Toward Conservancies in the Area

The creation of conservancies, which is a new development in the area, was aimed at increasing wildlife benefits from tourism-based conservation by local communities, helping to moderate the congestion of the national reserve resulting from heavy visitation, preventing further development of incompatible land uses such as wheat farming and attempting to revive the past cultural grazing system by acting as grass banks for use during dry spells. This study attempts to understand the relationship between conservancies and the local people including the factors that affect their attitudes toward them.

The results suggest that almost half (48%) of the respondents are members of a conservancy, while 52% are not attached to any particular one. Most (51%) disagreed with the statement that the creation of the conservancies improves conservation, and 78%

oppose creation of more in the area. When asked whether conservancies help in reducing livestock predation by carnivores, the majority, 74%, disagreed. Further, information was acquired through interviews, with statements recorded from respondents being exemplified below;

Respondent from Koyiaki (Age 56-70)

“I am a member of a conservancy but not by choice. After many other parcel owners adjacent to mine signed the lease, I was left in the middle of a conservancy. I had to lease my land because the management of the conservancy threatened to deny me access to my home. I knew there was little benefit I would get from a conservancy compared to retaining my land for grazing. I am happy that my colleagues, whom I tried to convince about the future consequences of this idea, are now regretting their decision and are unlikely to sign the second lease.”

This statement suggests that the initial process of establishing some of the conservancies did not fully engage the local people, signifying that there was little education on the long-term impacts, both positive and negative, concerning the conservancies.

Second quote from a respondent at Koyiaki (Age 18-32)

“Conservancies are a boost to conservation and to our economy. The land leased to a conservancy is distant, inaccessible and idle. Therefore, I am happy to put to good use and earn from it.”

Some respondents leased their land to a conservancy because of its inaccessibility and disease to livestock, suggesting that some of the respondents are willingly leasing their land not because of the drive to conserve wildlife but because of the benefits.

Quote from female respondent from Koyiaki (Age- 46-55)

“At the end of the month, men go to Narok town to collect money. They end up drinking all the money, and none is used to pay for school fees or feed the family. We still sell cows to send our kids to school and feed the family regardless of all the money paid by conservancies. Then what is the point of leasing this land for conservation if it does not benefit us?”

Every member of a conservancy receives a specified amount of money at the end of the month, which is paid to the men who own the land. As suggested by this statement above, respondents, especially women, do not see the relevance of establishing conservancies in the area because they do not benefit.

Human-Carnivore Conflicts

Human-carnivore conflict was a contentious issue in this study because it involved questions touching directly on human livelihoods and predation. According to existing literature and as discussed in previous chapters, wildlife-associated costs can potentially impact the positive attitudes of local people toward conservation. In addition, human-carnivore conflict has increased the intolerance of the Maasai toward carnivores, hence leading to retaliation. The retaliatory mechanism employed by these communities, (e.g., poisoned bait) has a broader impact in the ecosystem. According to studies highlighted in the literature review, vultures have suffered a severe decline as a result of

poisoning. Therefore, one of the objectives of this study was to determine the relationship between the human-carnivore conflict and the vulture decline in the area. To determine the impacts of human-carnivore conflict on vulture conservation, thirteen closed-ended statements regarding carnivore attitudes were asked (Table 3.10). In addition, a question specifying for the most problematic animal was also asked. Other information was acquired through interview statements and personal observation. Qualitative statements included the most common causes of livestock deaths in the area.

The results suggest that most, 76%, of the respondents indicate that starvation and old age are the most common causes of livestock deaths in the area, with most respondents, 70%, indicating Nagana as the most common disease. When asked whether there are particular seasons of the year when predation is high in the area, the majority (81%) stated that carnivores are more likely to attack during rainy seasons. In addition, the respondents' opinions on the methods of livestock protection were also sought, the results being presented in Figure 3.6 below. Moreover, to determine which carnivore is the most problematic one in the area, respondents were asked to rank carnivores from the most problematic to the least. Most, (53%) as shown in Figure 3.6, stated that the hyena is the most problematic carnivore.

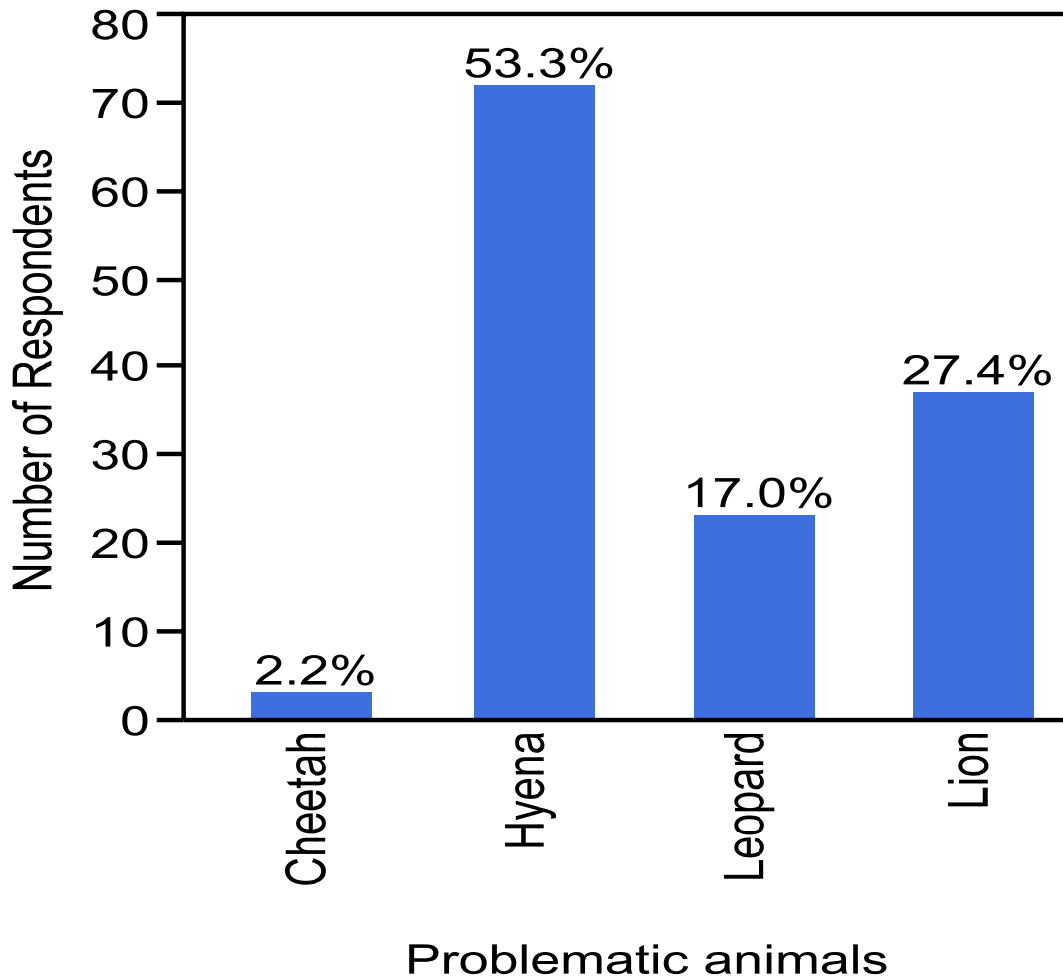


Figure 3.6: Problematic animals for the Maasai people

In addition, a qualitative statement was asked on the methods used by the Maasai to protect their livestock from predation. The results suggest that most of the respondents believe vigilant herding and strong fences around the boma (enclosure) are key to the prevention of predation, suggesting that predation occurs due to weak fences and negligence during herding. These results are presented in Figure 3.7.

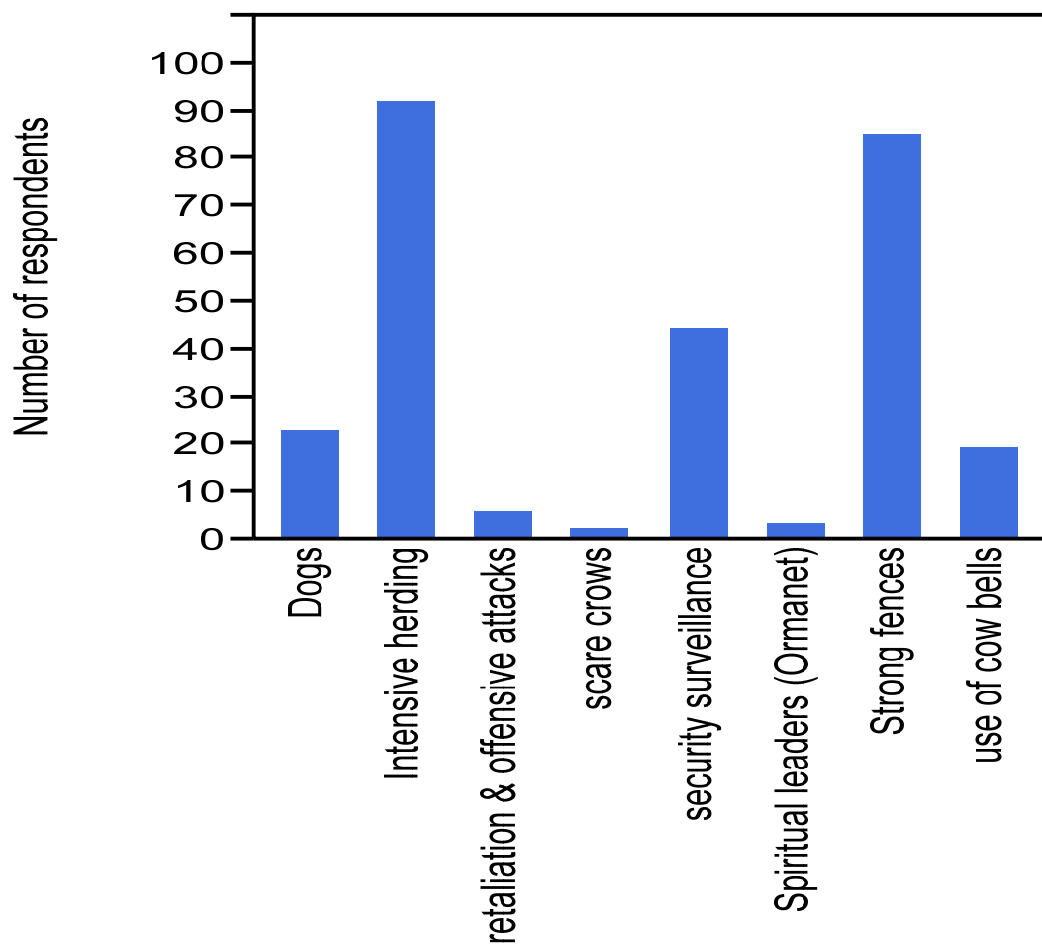


Figure 3.7: Methods for livestock protection used by the Maasai people

In an attempt to understand the Maasai attitudes toward carnivores, thirteen closed-ended questions were used to explore this issue. Additionally, a negative attitude score was developed for each of the respondents' statements using a scale of 1, 2 and 3 representing agree, neutral and disagree, respectively.

Table 3.10: Attitude statements regarding carnivores

Statements	% Agree	%Neutral	% Disagree
Predation by carnivores is the most common cause of livestock death.	17	8	75
I prefer to live in an area free of carnivores.	25	4	70
Lions and other carnivores that kill our livestock should be killed.	66	3	31
Predation has significantly increased in the recent years	22	60	18
There is significant decline of predators in this area.	13	8	78
Warriors kill lions for cultural reasons in this area.	8	3	89
Warriors kill carnivores in retaliation of their livestock being killed.	93	3	4
Agricultural pesticides can be used to poison animals.	48	16	36
Agricultural pesticides are used to target some species of carnivores.	59	11	29
Some people in this area use agricultural pesticides to kill carnivores in retaliation for their livestock lost.	54	10	35
Educational programs should be established to create awareness of the broader impacts of poisoning in Maasai Mara	81	9	9
Programs should be established to compensate for livestock lost due to predation in this area.	98	1	1
In general, it is possible to conclude that carnivore decline in this area is as a result of poisoning.	24	14	61

There was no significant relationship found between the carnivores negative attitude score and the respondents' income, religion and house roof material. However, age (Figure 3.8) and gender (Table 3.11) showed a positive relationship.

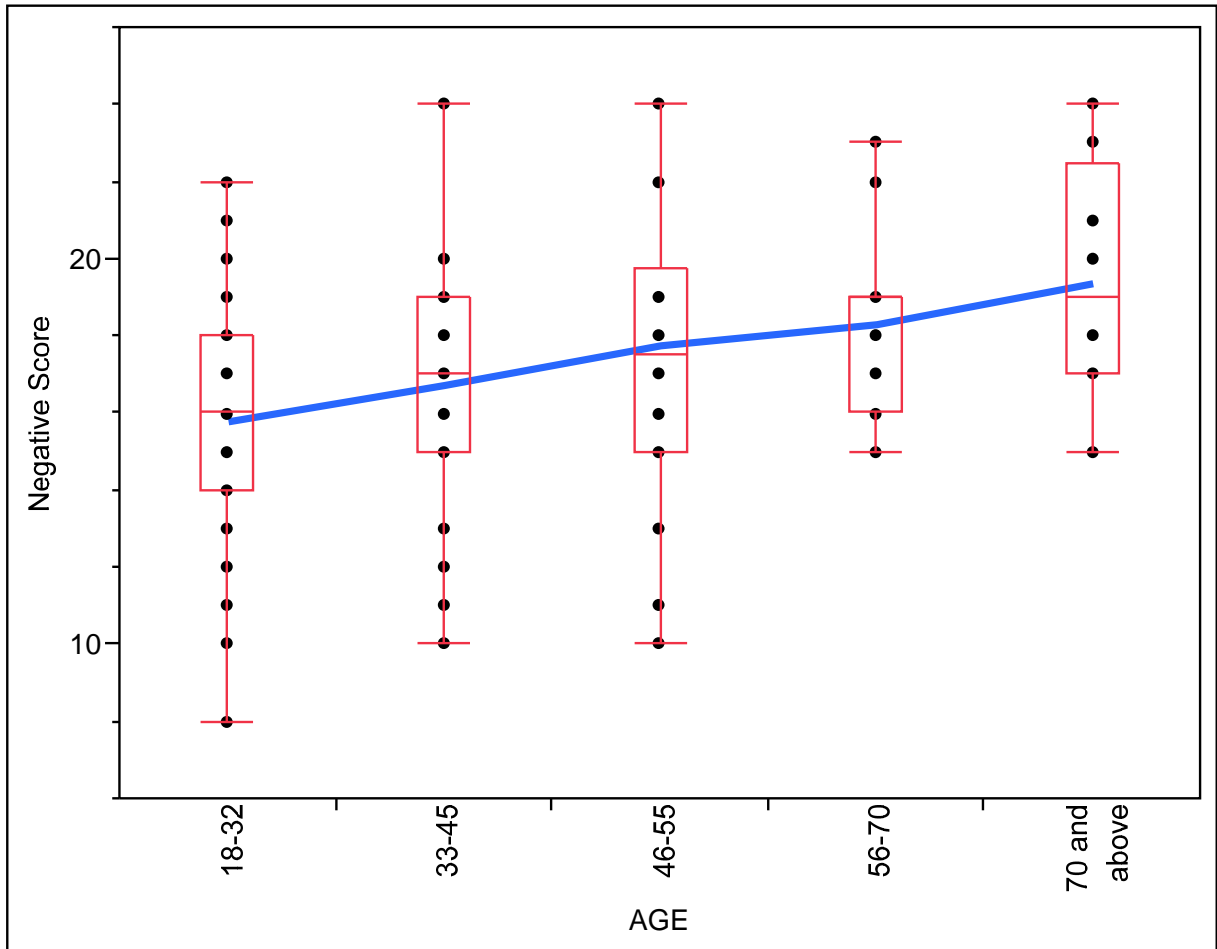


Figure 3.8: One-way Analysis of Carnivore Negative Score by Age

Further analysis using ANOVA indicated a relationship between carnivore attitude score and age. As age increased, $F= 45.3154$, $P< 0.0036$, the attitude score decreased, meaning the attitudes of older people toward carnivores are more negative than those of young people.

Table 3.11: The likelihood of killing carnivores by respondent gender

Gender	Agree	Neutral	Disagree	Total
Male	37	4	48	89
Female	12	1	57	70
Total	49	5	105	159

As these results suggest, there is a relationship between the likelihood of killing carnivores in retaliation to livestock lost and gender, $X^2 = 13.800$, $P < 0.001$, meaning male respondents are more likely to kill carnivores than female.

Further, a correlation between respondent relationship with the NCC and the likelihood of killing carnivores was determined. As the results in Figure 2.2.3 suggest, respondents with poor relationships with the NCC are more likely to kill carnivores in retaliation for livestock depredation, $X^2= 10.431$, $P<0.0338$, than those with better relationships.

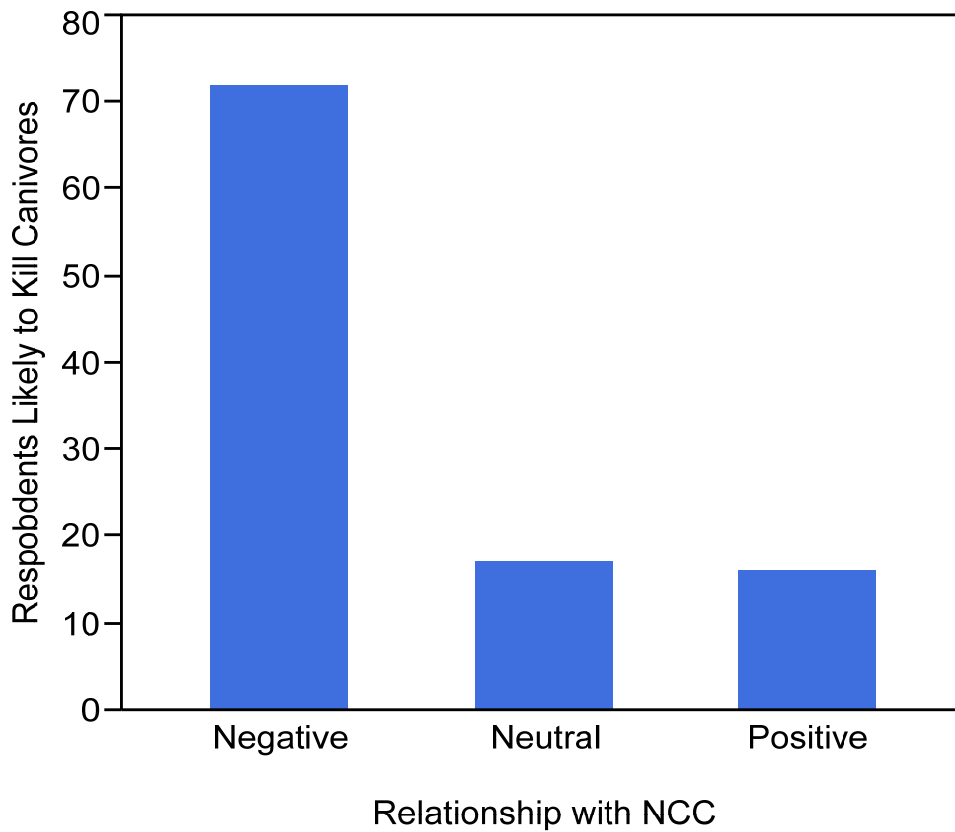


Figure 3.9: Percentage of respondents with poor attitudes toward the Narok County Council and the likelihood of killing carnivores.

To understand respondents’ opinions about the contentious issue of killing carnivores using poisoned baits, we used interviews and attempted to highlight the key issues by sampling some of their responses. Below are sample statements from the respondents regarding poisoning.

A respondent from Sekenani (age 46-55)

“Yes, I saw several lions, other carnivores and very many vultures dead at Oolaimutia some years back. People in that area poison carnivores in retaliation for livestock lost through predation. Nobody uses poison in this area.”

A respondent from Oolaimuti (age 18-32)

“People poison carnivores on Loita Plains. I know of several cases of poisoning in that area. We understand the severity of both the environmental cost of this poison and the legal consequences by the government if anyone is found using it. You need to talk to people from the Loita Plains about this poisoning.”

These statements suggest that the respondents were skeptical about the question of poisoning, admitting that it is occurring in the area but not around their villages. In addition, these statements suggest that the community is aware of the broader impacts of poisoning and the legal consequences associated with it. Based on personal observations, this issue is deep-rooted in the community. However, the Maasai are working in solidarity against the government which is perceived as a common enemy. No one in the community will report that one of their members has poisoned or killed an animal.

A respondent from Oolaimutia (Age 33-45)

“If poisoning is happening, it does not necessarily have to happen here to kill vultures. These birds can be poisoned in Suswa or Magadi depending on where they find poisoned bait. This is a very devastating practice not only to the wildlife population but also to our livestock. Some toxins used are very harmful, and we have seen it affect dogs and cows. *Mgel pere kishu*.... A Maasai saying which means one should not use a spear when settling a dispute because it may be more

harmful to untargeted crowds. Poisoning is, therefore, like using a spear to address conflict.”

Residents state that furadan (a pink substance) is used to prevent fleas in young lambs and calves. In this area lambs are smeared with this pink substance which residents say that they buy from Tanzania (personal Observation). In addition, men disclosed to me that this substance is the cheapest and most effective pesticide for eliminating these pests on lambs, a situation that will make them look for the pesticide anywhere that is available. It is usually kept out of reach of children and women.

CHAPTER IV

DISCUSSION

The Maasai Knowledge of and Attitudes toward Vultures and Their Conservation

This study explored the attitudes and perceptions of the Maasai toward vultures and their conservation. Our findings suggest that the Maasai identification of the seven species used in this study was inconsistent with some being identified by larger percentage of respondents than others. The well-known species are Ruppell's griffon and the African white-backed vulture (Figure 3.4). However, it was observed that these two species were referred to by the same vernacular name *Orkurragos* meaning one with a long slender neck. These species were most frequently identified possibly because they are the most common vulture species in the area. The least known and identified were the Lappet-faced vulture and the Tawny eagle (*Aquila rapax*) which was deliberately used to determine whether the respondents could tell the difference between the eagles and vultures. It was observed that the respondents could not differentiate this species from the vultures.

Based on observations the respondents demonstrated a variety of reactions to the different vulture species. They suggest that the Maasai recognized the decline of vulture species, in particular the Egyptian vulture which most people acknowledged its disappearance. Some species of vultures for example Lappet-faced vulture created fear in the majority of respondents, especially women and young people (18-32yrs). According to personal observation, most respondents were intimidated by its appearance (See Appendix C for picture used). The general perception is that this vulture is dangerous and

can kill people, a perception potentially suggested by the result of stories associated with it. In addition, its name “*partakulen*” suggests strength and might, also suggesting its capabilities of overpowering humans. Hooded vulture was also perceived negatively. The name *enkinyia nkik*, meaning one that feeds on fecal matter is an indication of this situation. Among all the vulture species, hooded vulture was perceived as an undignified species. Although the white-headed vulture was also negatively perceived as an enemy because it kills lambs, it did not warrant much attention from the local people who indicate that its threat to livestock is minimal. This perception could possibly be a result of more serious predation from carnivores, for example, hyenas.

The results of this study suggest a strong relationship between vulture knowledge through identification and the respondents’ age, gender and level of education. Overall, the level of identification was proportional to respondent age, suggesting increasing years led to a higher level of identification. Thus, respondents belonging to age group older than 70 years (*Ilnyankusi*) had a high percentage of accurate identification (Table 3.5). Male respondents had a higher level of identification than to female (Table 3.7). Level of education also had a strong relationship with vulture identification. Respondents who are more educated had lower identification levels compared to the illiterate (Table 3.8), perhaps because most of the educated are the young people (18-32 years) who settle in the cities for employment or school and, thus, have minimal interaction with nature or rural activities such as herding which would expose them to the natural world. They spend less time herding livestock which is an informal classroom for the illiterate people.

The results suggest several stories associated with vultures by the Maasai people (Figure 3.2). Most of the respondents mentioned stories related to war where vultures were known for killing weak warriors during raids or battle. Some songs suggest that vultures are associated with killing people and feasting on them, while others address their importance, for example, the feathers being used in cultural ceremonies, singing and naming. Vultures provided directions to people, their movements in the sky indicating a carcass that the Maasai check to determine if it is lost livestock.

The results suggest vultures are important to the Maasai people environmentally, economically and socio-culturally as shown in Figure 3.3. Vulture parts were also significant, especially feathers which were used in making arrow and for ceremonial and medicinal reasons (Figure 3.4). However, although the results suggest the importance of vultures to the Maasai people, personal observation suggests that there is no direct link that warrants their conservation. This apparent contradiction can potentially be explained by three reasons: 1. The community is diversifying and the strong cultural attachment to vultures is declining with the current generation. 2. The use of feathers for making arrows is done by only a few individuals belonging to one traditionally undignified clan (Iltorobo) who make them to sell to the rest of the community. Therefore, only a marginal population gets direct gains from vulture feathers. 3. Other benefits, for example tourism, are not directly linked to vultures or wildlife in general. Again, these benefits are likely to be eroded by the perceived threats associated with wildlife, especially carnivores. The majority of the respondents often considered vultures as important and innocent species which deserved to be conserved. Statements, for example

“vultures are harmless to people and to our livestock. Then why should they be killed if they do not affect either us or our livelihood? I support any intervention to conserve vultures.” suggest that residents support vulture conservation. This perception is no guarantee, however, that they will conserve vultures. When asked about carnivores that kill livestock, more than half (66%) said they should be killed. Additionally, using poison to kill carnivores was supported by 55% of the respondents.

Overall, respondents exhibit a strong positive attitude toward vultures and their conservation. No significant relationship between vulture positive attitude scores and level of education, age and respondents income was found. However, gender and attendance at IVAD showed some degree of relationship. There is a significant relationship between gender and vulture attitude score, with more male respondents favoring vulture conservation than female. There is also a strong connection between respondents who attended IVAD and their answers to the question about poisoning as a cause of vulture decline. Additionally, the same respondents were likely to support the creation of compensation schemes to help address the problem of vulture decline through poisoning.

Attitudes Toward the Narok County Council

Overall, there was a negative attitude toward the management of the protected area (NCC), with more than half (60%) of the respondents indicating a poor relationship with the management of the reserve. These differences between the community and the NCC were expressed in the form of resource conflicts where some respondents complain about denial of access to the water in the reserve, no access to pasture during drought

when cows are suffering and inadequate or discriminate allocation of benefits, for example student grants/bursaries. Women complained of denial to collect firewood in the reserve and harassment by the council rangers. Numerous counter accusations between the council and the community, exemplified in the respondent statements below, indicate that there is little dialogue between these two crucial stakeholders.

An anonymous quote from one respondent

“There has been an agreement between us (local people) and the county council to graze our cows at night when the tourists are out of the reserve. Currently, the management does not allow us to access water in that river for our cows. They have developed very stringent rules and fines for us. Imagine if your cows are found grazing in the reserve you are charged Ksh 10,000 per herd of cows, and they have now made it more expensive by charging Ksh 200 per cow. How do we pay for this? Why are they punishing us on our own resources? They do not want to talk to us; instead they brutally harass our children and deny us access to this resource. *Etejoki apa mmepala ilooboita...* meaning as long as we live together and share some resource in common, there is always conflict and the only way to address this is through dialogue.”

Second quote from an interview with an official from the reserve

“We enacted these by-laws to try and address the issue of illegal grazing. These people are very stubborn, and they will always drive their cows into the reserve both at night and during the day. This presents a terrible picture to our visitors, and most of them complain that they are paying too much money just to come see

Maasai cows grazing in the park. We have had several meetings with the civic leaders, but this issue has proved futile. The worst problem is that some of our rangers have cows too, and they do not want their cows to starve; therefore, we have a problem with law enforcement. This is an internal problem, and we have nowhere to turn to. So the only solution, if it works, is prayer!”

These statements indicate the strength of the conflict between the local people and the management of the reserve. As they suggest, conservation interventions that do not consider the interest of the local people living around the resource are likely to face resistance as witnessed in this area and supported by past research conducted on global attitudes toward conservation (Pretty & Ward, 2001)

Even though the Maasai appreciate the benefits of tourism in the area, this does not guarantee the conservation of wildlife or support for conservation interventions. The results of this study support previous studies on attitudes toward conservation, suggesting that people attitudes may be more negative toward the management than the resource itself (Infield, 1988; Newmark *et al.*, 1993). The respondents understand that the reserve is their resource which is being denied to them by the management (NCC). Many previous studies have also found that people’s perceptions of management play an important role in people’s attitudes toward protected areas (Parry & Campbell, 1992; Newmark *et al.*, 1993; Fiallo & Jacobson, 1995; Ite, 1996; Infield, 2001; Holmes, 2003; Picard, 2003; McClanahan *et al.*, 2006).

Attitudes Toward Conservancies in the Area.

Less than half (48%) of the respondents are members of a given conservancy. However, there is a general negative attitude toward conservancies in the area with the majority (78%) opposing their establishment. Women were less supportive than men, perhaps because they derive fewer benefits; as one of them said, “...*at the end of the month, men go to Narok town to collect money. They end up drinking all the money, and none is used to pay for school fees or feed the family. We still sell cows to send our kids to school and feed the family regardless of all the money paid by conservancies. Then what is the point of leasing this land for conservation if it does not benefit us?*”

As this statement suggests, some respondents, especially the women, do not see the relevance of establishing conservancies in the area.

Other respondent indicated they felt pressure to join a conservancy one saying;

“I am a member of a conservancy but not by choice. After many other parcel owners adjacent to mine signed the lease, I was left in the middle of a conservancy. I had to lease my land because the management of the conservancy threatened to deny me access to my home which is right in the middle of the already established conservancy. I knew there is little benefit I would get from a conservancy compared to retaining my land for grazing. I am now happy that my colleagues, whom I tried to convince about the consequences of this idea, are now regretting their decision and will likely not sign the second lease”.

As this statement suggests, some are members of conservancies simply because of circumstance. In addition, it appears that people supported the establishment of

conservancies with the anticipation of future benefits without a clear understanding of associated cost. These results support the findings of Doxey (1975) suggesting that positive attitudes are strong during the inception of projects but will likely face negative impacts when benefits fail to meet expectations.

Livestock Depredation

Livestock depredation is a contentious issue because of the questions of retaliatory killing and the use of poison to eliminate problem carnivores. The most significant predictors of the Maasai attitudes toward carnivore were age (Figure 3.8) and level of education. These results suggest that the average negative attitude score toward carnivores is generally low for those respondents having tertiary level of education compared to the illiterate group. Education can, therefore, positively influence conservation attitudes, a conclusion supported by similar studies conducted on human attitudes toward conservation (Infield, 2001; Heinen, 1993; Akama et al., 1995; Fiallo & Jacobson, 1995; Mehta & Heinen, 2001). The majority of the respondents at the tertiary level are employed in the tourism industry in the area, another potential explanation for their responses.

However, a correlation between the question on the likelihood of killing carnivores in retaliation of livestock lost by gender suggest that male respondents' are more likely to kill carnivores in this situation than female (Table 3.11). In the Maasai community, livestock is owned by the man who is the head of the household. Men are, therefore, likely to become more agitated when livestock are killed by carnivores.

Moreover, it is the male role to protect the family and livelihood (Gillingham & Lee, 1999).

The results also suggest a strong relationship between the question asking about the relationship between the respondent and the NCC and the one on the likelihood of killing carnivores. The respondents with a negative relationship with the county council are more likely to kill carnivores in retaliation for their livestock lost.

CHAPTER V

CONCLUSION AND MANAGEMENT PROPOSAL

The overall aim of this study was to explore factors that determine the Maasai attitudes to favor or oppose vulture conservation in an attempt to find appropriate solutions to the problems causing their decline in the Maasai Mara region, a situation that could be representative of other regions in Kenya. According to the findings, the Maasai attitudes toward vultures are complex, heavily dependent on external factors rather than a direct link between them. For instance, although most respondents wanted vultures to be conserved, opinions toward carnivores, conservancies and the NCC were contradictory, suggesting that some respondents have negative attitudes toward these entities, perceptions that are detrimental to vultures. Therefore, as long as the Maasai continue to perceive both carnivores and authority negatively, they will continue to persecute carnivores which, in turn, adversely affect vultures. The attitudes toward the management will also lead to resentment and opposition to conservation interventions.

There is significant knowledge of vultures and their ecology, though varying by age and gender, suggesting that the Maasai are aware of the decline of vultures, particularly the dramatic degeneration of the Egyptian vulture. However, unless education and awareness are initiated, this knowledge is likely to disappear because of the rate of diversification in the area, making it difficult to instill an understanding of vulture ecology in the long run.

Further, the results suggest significant importance of vultures to the Maasai. However, this does not guarantee their conservation in the area, a situation that needs

urgent intervention to create a direct link between vultures and the Maasai. Similar to their knowledge, the importance of vultures particularly cultural attachments are rapidly declining with diversification. Therefore, education and awareness are needed to continue maintaining this importance, which acts as an asset in establishing conservation programs.

Habitat is critical to vulture foraging and nesting. The Mara ecosystem is facing human pressure through settlement and the change in land use, a situation that is detrimental to wildlife conservation. Creation of conservancies in the area was motivated by the urgent need to safeguard this ecosystem. However, this development requires community involvement and a strong collaboration with other conservation agencies to ensure they meet their expected results.

Management Proposals

Although the Maasai are aware of the legal consequences of using poison to eliminate carnivores, they are likely to do so because law enforcement in the area is logistically difficult. Therefore, this study supports other research, for example that conducted by Ogada et al. (2011), which suggests that vulture conservation interventions are more likely to fail in situations lacking government and local support. Based on this research, a system should be initiated involving self-reporting and self-policing within the community to avoid the difficulties associated with reporting offenders. The community does not want to disclose offenders to the law enforcers because they perceive the authority as a common enemy.

The management of the Reserve is ineffective in managing the resource because all the decisions on such issues are made by the Council, most of which are unlikely to be sound or practical because of corruption, the illiteracy of the civic leaders and localized politics. Because managing wildlife continues to remain a sensitive practice that requires expertise, community involvement and financial resources, it is imperative that the Reserve authority be semi-autonomous in managing its financial resources without having to depend on the County Council. This change will enable them to carry out management activities effectively and with minimal political interference. In addition, I recommend the establishment of a strong and vibrant department within the management of the reserve to address community issues. This department should be empowered to handle these complex community issues by establishing community conservation committees involving people from all the group ranches. Frequent meetings should be held to ensure the constant engagement of the local people with management issues. In addition, we recommend equitable sharing of the revenue collected from the reserve.

In addition to these interventions, education and awareness are fundamental to attitude change. Therefore, the male respondents with a high positive attitude toward vultures but whose activities adversely affect them is a potential group that education should target for involvement in vulture conservation interventions in the future. The results also suggest that those respondents who attended the previous IVAD have a higher mean of positive attitude toward carnivore conservation, suggesting that IVAD and other educational forums influence attitudes positively. Education could be achieved through engaging and training a specified number of youths to act as vulture ambassadors

in the area, providing reports on vultures, for example, on dead ones, nesting sites and community awareness. In addition, improving the awareness of the importance of vultures should concentrate on their aesthetic, environmental and cultural value rather than their financial benefit, which may not be sustainable in this area. The results of this study suggest the strong cultural attachment to vultures which is likely to decline with the rate of diversification and civilization. This cultural attachment could be a strong asset for future conservation interventions. It is suggested that IVAD and other educational forums should incorporate the cultural component in their trainings in future by engaging the elderly who understand the cultural values and uses of vultures, and perhaps the traditional ornaments made from vultures should be put in national museums.

The conservancies in this area are probably being developed as a result of the concern of conservation organizations attempting to ensure the continuation of the wildlife in the ecosystem through community-based conservation approaches. However, this community-based conservation is likely to fail, no matter how good their intention, if community expectations are not met. In addition, the Maasai livelihood and lifestyle are part of the ecosystem; therefore, disconnecting them from their grazing areas by limiting their access to pastures and water will increase their intolerance, leading to opposition to these interventions. As the result suggests, conservancies have limited the community grazing areas in the Mara, forcing the Maasai to adopt other strategies, for example night grazing in the Reserve. Therefore, any intervention that separates pastoralism from wildlife conservation is likely to meet resistance in the future (Goldman, 2003; Homewood, 2004), a situation which the results predict for the conservancies in the Mara

region. Consequently, this conservation strategy should fully embrace all aspects of the Maasai culture and more specifically their pastoral system. In addition, this study suggests collaboration by ensuring constant communication between the conservancies, the community and the reserve authority to avoid antagonism which may hinder a conservation agenda.

In addition, and as suggested by various research studies (see Chap II), the Maasai are increasingly becoming intolerant to carnivores. The results suggest that more than half (66%) are likely to kill carnivores in retaliation for livestock lost, a condition detrimental to vultures if the method of elimination is lethal. This conflict can be minimized through promoting effective methods of livestock protection and husbandry, for example, fencing and intensive herding as most respondents indicated. This study also suggests effective alternative pesticides for use in preventing fleas and other pests in livestock. Furadan, which is implicated in the decline of vultures and carnivores in Kenya, is used by pastoralist as the only effective and inexpensive pesticide for preventing livestock pests. Therefore, unless alternatives are provided, the Maasai will continue using Furadan, which, in turn, will make it readily available for lethal poisoning of carnivores. In addition, this study suggests promotion of effective methods of livestock protection and husbandry to minimize further loss of livestock through predation.

APPENDICES

Appendix A

Information about Being in a Research Study

Clemson University

Assessing Maasai attitudes and perceptions toward vultures: A case study of resident Maasai around Maasai Mara National Reserve, Kenya.

Description of the Study and Your Part in It

The research team (Dr. Joseph Lanham and Eric Reson) are requesting you to be interviewed for purposes of an ongoing study on the assessment of the Maasai attitudes and perceptions toward vultures. Dr. Lanham is a Professor and faculty at the Department of Forestry and Natural resources. The researcher (Eric Reson) is a graduate student in the department of Forestry and Natural Resources Clemson University. He is running the study with Dr. Lanham who is his Academic advisor. The purpose of this study is to assess the Maasai attitudes and perceptions toward vultures. Based on the findings, the study will provide recommendations for conservation of vultures in the area.

This study is voluntary. You may decide not to participate and there is no punishment. However, the researcher is encouraging you to participate in order to assist him understand the Maasai knowledge on vultures. The researcher is a Maasai speaker and he will be going to take you through the survey. He will also ensure that all the questions are translated to Maasai language for your convenience. The survey will take approximately 30 minutes. Remember the study is not compulsory neither are you required to answer question that you feel not comfortable with. The researcher will also interview one person at a time and no information will be shared to other respondents.

The researcher will also record the conversation but only with the agreement of the respondent. You may decide not to be recorded but you are assured that the recording is just for the purposes of this study. The links to the audio recordings will not be shared to anybody outside the research team. It is the responsibility of the researcher to organize interview date and time. He will also ensure confidentiality throughout the study.

Risks and Discomforts

There are no known risks or discomforts to participants involved in this research.

Possible Benefits

The findings of this study will help provide recommendations on how to encourage the Maasai to conserve vultures in the area.

Protection of Privacy and Confidentiality

Your privacy and confidentiality is paramount in this study. Therefore the research team will ensure that no information will be shared to other people outside the research team. As stated above, all the information collected including the recorded information will be confidential.

The results of this study will be presented as a summary of all the information collected.

Choosing to Be in the Study

You do not have to be in this study. You may choose not to take part and you may choose to stop taking part at any time. You will not be punished in any way if you decide not to be in the study or to stop taking part in the study

Contact Information

If you have any questions or concerns about this study or if any problems arise, please contact Dr. Joseph Lanham at Clemson University at the department of Forestry and Natural Resources. If you have any questions or concerns about your rights in this research study, please contact the Clemson University Office of Research Compliance (ORC) at 864-656-6460 or irb@clemson.edu. If you are outside of the Upstate South Carolina area, please use the ORC's toll-free number, 866-297-3071.

Consent

I have read this form and have been allowed to ask any questions I might have. I agree to take part in this study.

Appendix B

Self-Introduction

My name is ERIC OLE RESON. I am a Graduate student from Clemson University, South Carolina, USA. I am undertaking a study on the assessment of the Maasai attitude and perceptions toward vultures in order to understand vultures and threats to their survival. Scientists have been monitoring vultures in this area over the last several years. While we have learned a lot from their studies, I would also like to collect information from the Maasai people in this area, who may have important knowledge about vultures. I would therefore like to ask you a number of questions in order to get your opinions about vultures and various activities, which may be impacting them. All of the answers you provide will be confidential and will not be shared with anyone outside the research team. The questionnaire will be oral and will take about thirty minutes. You don't have to participate in the survey, but I hope that you agree to answer the questions since the information you provide will help me understand interactions between the Maasai and vultures. If you don't want to answer any of the questions, please let me know and I will go on to the next question. I can also stop the interview at any time but I am here to learn from you so I encourage you to answer all the questions in as much details as possible. In addition, if there is any other information that you think would be useful to this study, please let me know.

Interview Questions:

- Verbal consent received to conduct interview
- Verbal consent received to record interview
- Explanation of study given

Group Ranch	Village no	Roof material	GPS location	Questionnaire no
		<ul style="list-style-type: none">○ Aluminum○ Thatched		

SECTION 1: RESPONDENT SOCIAL DEMOGRAPHIC CHARACTERISTICS

1. To which age bracket do you belong?

- 18-32 (Irmeshuki)
- 33-45 (irkisaruni)
- 46-55 (Irkitoiip)
- 56-70 (Iseuri)
- Above 70 (Ilnyankusi)

2. Gender

- Male
- Female

3. Level of education

- None
- Primary
- Secondary
- College/ University

4. Are you the head of household?

- Yes
- No

5. What is your religion?

- Christian
- None Christian

6. What is your primary source of income?

- Livestock
- Tourism
- Agriculture
- Business
- Others (specify)_____

7. How long have you been living in Maasai Mara?

SECTION 2: THIS SECTION FOCUSES ON THE RESPONDENT’S KNOWLEDGE AND OPINION ABOUT VULTURES.

Please identify the birds pictured by giving the Maasai local name. **check**= seen, or seen but no idea in the respective box **and blank**= **not seen**

	Vulture species	Scientific name	Seen	Seen but no idea	Maasai name
8.	Rupell vulture	<i>Gyps ruepellii</i>			
9.	Egyptian vulture	<i>Neophrone percnopterus</i>			
10.	African white back	<i>Gyps africanus</i>			
11.	Lappet faced vulture	<i>Torgos tracheliotus</i>			
12.	Hooded vulture	<i>Nechrosyrtes monachus</i>			
13.	White headed	<i>Aegyptiu occipitalis</i>			
14.	Tawny eagle	<i>Aquila rapax</i>			

15. Vultures are birds of prey that feed on carcass

- Agree
- Neutral
- Disagree

16. Do you know any stories about vultures? What do these stories tell us about vultures?

17. Do vulture parts (i.e. eggs, feathers, bones, etc.) have any uses in your community?

18. Apart from the uses of parts, do vultures have any other importance in this area?

For each statement, mark one response that indicates your **Agreement** or **Disagreement**. The scale ranges from 1= **Agree**, 2= **Neutral**, 3= **Disagree**

		Agree	Neutral	Disagree
19.	Vultures prevent disease spread among other types of wild animals	1	2	3
20.	Sometimes, some vulture species kill livestock (e.g. lambs and calves) in this area	1	2	3
21.	Vultures sometimes compete with dogs and other scavengers for carcass and eventually get killed	1	2	3
22.	I have seen large numbers of dead vultures in this area	1	2	3
23.	Vultures in this area sometimes feed on poisoned carcass	1	2	3
24.	Sometimes people in this area poison carcass to target vultures	1	2	3
25	Poisoning is causing vulture decline in Maasai Mara region	1	2	3
26	Vegetation cover around this area has decreased in recent years	1	2	3
27	We should conserve vultures for our future generations	1	2	3
28	I participated in the previous vulture awareness day.	1	2	3
29	I would participate in any other event of vulture awareness in future.	1	2	3
30	It is important to protect breeding habitats for vultures	1	2	3
31	It is important to educate the Maasai about vultures in this area.	1	2	3
32	Vultures are generally declining in this area	1	2	3

33. If you agree with statement 20 above, please identify from the pictures which vulture/s species kill livestock.

SECTION 3: ATTITUDES TOWARD MAASAI MARA NATIONAL RESERVE.

MMNR

For each statement, mark one response that indicates your **Agreement** or **Disagreement** with the statement. The scale ranges from 1= **Agree**, 2= **Neutral**, 3= **Disagree**

		Agree	Neutral	Disagree
34.	People adequately benefit from revenue generated from Maasai Mara national reserve.	1	2	3
35	Tourism development brings economic benefits to people in this area.	1	2	3
36	My relationship to the management of MMNR is good.	1	2	3
37	The management of MMNR is working hard in an attempt to reduce livestock death from predation	1	2	3

ATTITUDES TOWARD CONSERVANCIES

38. Are you a member of a conservancy?

- Yes
- No

		Agree	Neutral	Disagree
39.	I benefit from the establishment of conservancies in this area.	1	2	3
40.	Establishment of conservancies is a boost to conservation in this area.	1	2	3
41.	I would prefer creation of more conservancies in this area.	1	2	3
42.	Conservancies have helped in reducing predation of livestock by carnivores in this area.	1	2	3

SECTION 4: LIVESTOCK PREDATION

43. On average, how many of your livestock die each year from the following causes?

Disease	Predation	Starvation/Old Age

44. What are the common diseases that livestock die from in your area?

45. Do you give your livestock any veterinary medicines to try to prevent diseases?

46. When livestock die from the following causes, what do you do with the meat?

Disease	Predation	Starvation/Old Age
a) Nothing, leave the animal where it died	a) Nothing, leave the animal where it died	a) Nothing, leave the animal where it died
b) Eat the meat	b) Eat the meat	b) Eat the meat
c) Feed the meat to dogs	c) Feed the meat to dogs	c) Feed the meat to dogs
d) Burn or dispose of the carcass	d) Burn or dispose of the carcass	d) Burn or dispose of the carcass
e) e. Others _____	e) Others _____	e) Others _____

47. How many dogs do you own?

- One
- Two
- More than two
- None

48. What do your dog's normally eat?

49. How do you protect your livestock from predation?

50. The following animals are a problem in livestock predation in this area. Please rank them from the most problematic to the least.

Animal	Rank (e.g. 1,2,3)
Lion	
vultures	
Eagles	
Buffalo	
Hyena	
Leopard	
Cheetah	

51. Are there particular seasons of the year when predators are more likely to attack livestock?

For each statement, mark one response that indicates your **Agreement** or **Disagreement**. scale ranges from 1= **Agree**, 2= **Neutral**, 3= **Disagree**

		Agree	Neutral	Disagree
52.	Predation by carnivores is the most common cause of livestock death in this area	1	2	3
53.	I prefer to live in an area free of carnivores	1	2	3
54.	Lions and other carnivores who kill our livestock should be killed	1	2	3
55.	Predation has highly increased in the recent years	1	2	3
56.	There is significant decline of predators in this area.	1	2	3
57.	Warriors kill lions for cultural reasons in this area	1	2	3
58.	Warriors kill carnivores in retaliation for their livestock killed.	1	2	3
59.	Agricultural pesticides can be used to poison animals.	1	2	3
60.	Agricultural pesticides are used to target species of carnivores (e.g. hyenas, lions and leopards).	1	2	3
61.	Some people in this area use agricultural pesticides to kill carnivores in retaliation of their livestock killed.	1	2	3
62.	Educational programs should be established to create awareness of broader impacts of poisoning in Maasai Mara.	1	2	3
63.	Programs should be established to compensate for livestock lost due to predation in this area.	1	2	3
64.	In general, it is possible to conclude that carnivore decline in this area is as a result of poisoning.	1	2	3

Thank you very much for your help and participation. Please feel free to give any other additional comments or opinion which you think may be useful to this study.

Appendix C

Pictures of Vultures used in the Study.

Picture I

Common name: Ruppell vulture (*Gyps rueppellii*)

Maasai name: Orkurragos



Picture II

Common name: Egyptian vulture (*Neophron percnopterus*)

Maasai name: Kilerua



Picture III

Common name: African white-backed vulture (*Gyps africanus*)

Maasai name: Orkurragos



Picture IV

Common name: Lappet-faced vulture (*Torgos tracheliotos*)

Maasai name: Ormotonyi loommurran or Partakulen



Picture V

Common name: Hooded vulture (*Necrosyrtes monachus*)

Maasai name: Enkinyia nkik



Picture VI

Common name: White-headed vulture (*Trigonoceps occipitalis*)

Maasai name: Ormotonyi loorkuoo



Picture VII

Common name: Tawny eagle (*Aquila rapax*)

Maasai name: Sarikoki



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