Monitoring lion movements

Bevakning av lejons rörelsemönster

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ABSTRACT

Prevention of lion predation towards African livestock is of great importance due to the economical losses farmers have because of this. Predation is also one of the main reasons for human-wildlife conflicts and lions often get killed because of it. Therefore, a pilot study using camera traps was conducted to monitor movements of lions and other wildlife through a wildlife corridor in Ol Pejeta Conservancy. The results were compared with a previous study that counted prints in the soil in front of the corridor. Due to theft risk the cameras had to be taken down and pictures were only collected from nine days. However, the results were consistent with the previous report. I also discuss solutions on lion - livestock problems, both from previous literature and also from interviews conducted in different parts of Kenya. My study suggests that the camera traps used in this pilot study are a suitable method when monitoring wildlife, although should be left to collect data for a longer period of time. Future results from the cameras, combined with foot prints in the soil and also solutions from literature and interviews collected in this study, may all help in developing strategies for coexistence between humans and wildlife in different parts of Africa.

SAMMANFATTNING

Att förhindra lejons predation på Afrikanska tamboskap är viktigt på grund av de lokala lantbrukarnas ekonomiska förlust på grund av detta. Predation är även en av de största orsakerna till den konfliken som finns kring människan och vilda djur och lejonen dödas ofta på grund av det. Av den orsaken utfördes en pilotstudie där kameror användes för att bevaka lejon och andra vilda djurs rörelsemönster vid en viltkorridor i Ol Pejeta Conservancy. Resultaten jämfördes med en tidigare utförd rapport där avtryck i sanden vid samma korridor hade samlats in. På grund av stöldrisk togs kamerorna ner och enbart bilder från nio dagar samlades in. Emellertid stämde dessa överens med den tidigare skrivna rapporten. Jag diskuterar även potentiella lösningar på lejon – boskapsproblemen, både från tidigare studier samt från intervjuer gjorda i olika delar av Kenya. Min studie föreslår att kamerorna som användes i den här pilotstudien är ett bra sätt att bevaka vilda djurs rörelsemönster på men måste lämnas för att samla in data under en längre period. Framtida resultat från kamerorna, kombinerat med avtryck i sanden samt potentiella lösningar från litteratur och intervjuer som sammanställts i den här studien kan förhoppningsvis alla bidra till att utveckla strategier för samexistens mellan människor och vilda djur i olika delar av Afrika.

INTRODUCTION

Human – wildlife conflicts

Human-wildlife conflicts are increasing in Africa due to human interests and activities (WPC, 2004; Browne-Nuñez and Jonker, 2008) and a big part of these conflicts are because wildlife is injuring and killing livestock (WPC, 2004). Killing of livestock by lions (*Panthera leo*) is one of the main problems regarding predation on domestic animals (Bauer, 2003; Ledama, personal communication). Bauer (2003), Romañach et al. (2007) and Gusset et al. (2009) all suggest that lions are one of the top predators that kill and injure livestock and this in turn lead to great economical losses. O´Connell-Rodwell et al. (2000) showed that lions caused the highest economic losses compared to other wild animals, regarding predation on livestock.

Cattle owners do not always get compensation for these losses, leading to potential conflicts (Bauer, 2003; Romañach et al., 2007; Kissui, 2008). Keeping livestock is the main source of income for many locals, and hence the losses of these to lions have great impact on their lives (Romañach et al., 2007).

Locals that get their livestock killed or injured by lions often kill the lions (Kissui, 2008; Gusset et al., 2009), which is one of the reasons that lion populations are declining (Woodroffe and Frank, 2005). Studies have shown that lions are more commonly being killed by poisoning, which in turn can affect other animals negatively (Romañach et al., 2007; Kissui, 2008). However, the negative attitudes towards lions are not only due to predation problems. There are also historical and cultural events that include killing lions, like how it used to be part of the Masai warriors (Morani) ritual (Kissui, 2008; Lenaimado, personal communication). Even though this is now illegal it is still occurring (Kissui, 2008; www.africanlatitude.com).

Locals often understand the importance of preserving lions and wildlife since this is of importance for tourism (Bauer, 2003; Lenaimado, personal communication; Ledama, personal communication). Tourism is an important industry in some parts of Africa (Ottichilo et al., 2000) and generates natural resources like fish and thatch, job opportunities and money through the parks and conservation areas that have formed (Bauer 2003; Lenaimado, personal communication; Ledama, personal communication). However, Bauer (2003) showed in his study that the reasons for conserving wildlife differed between ethnic groups, sex and occupation. It is of great importance to address human wildlife conflicts to be able to develop a coexistence with humans and wildlife and keep the support for conservation (WPC, 2004).

Lions choice of prey and habitat

Prey

According to Bauer et al. (2008) the diet of a lion is consistent of middle-sized animals like gazelles (*Gazella spp*.), impala (*Aecyperus melampus*) and warthog (*Phacochoerus africanus*) which range from 50-200 kg live weight, and also by large animals such as zebra (*Equus quagga*), wildebeest (*Connochaetes taurinus*) and buffalo (*Syncerus caffer*) that weigh over 200 kg. This is supported by Lehmann et al. (2008a) and De Boer et al. (2010). In Ol Pejeta, where the present pilot study was conducted, all of these prey species except wildebeest exist (Gichohi, personal communication). The density of lions has shown to have a linear relationship with the density of prey (Bauer et al., 2008). Wild prey has learned to flee or strike back when lions are around or/and attacking, although this is not the case with domesticated livestock which makes them easy prey for lions (Lenaimado, personal communication).

According to Romañach et al. (2007) livestock was killed three times as often by lions than by other predators. Those working with livestock, especially with cattle, mentioned that lions had the most negative impact on them (Bauer, 2003). There is also information that it is more common for lions to prey on cattle than on sheep and goats (Patterson et al. 2004; Kolowski and Holekamp, 2006; Kissui, 2008; Maynard 2012, personal communication; Soralo conservation report, 2012). According to a report conducted in the Soralo conservation area in

Kenya, two goats, one sheep and eleven cows (where one of these were pregnant) were killed by lions during the months of January to the beginning of April, where most of these attacks were recorded from Mars and April (Soralo conservation report, 2012). Another report conducted in northern Botswana regarding predator attacks on livestock describes how a large proportion of these attacks were done by lions (Gusset et al., 2009). In a study made during 4 years near Tsavo East National Park, Kenya, lions were responsible for about 90% of all attacks on livestock; 266 of 277 attacks were targeted towards cattle (Patterson et al., 2004).

Habitat and predation

According to Naurori (personal communication) most attacks towards livestock around Masai Mara National Reserve occur during the rainy period (supported by Kissui, 2008 and Kolowski and Holekamp, 2006), since this is when wild prey is rare there. In other areas there are more problems during the dry period since this is when livestock come in to the conservancies to graze (Toutain et al., 2004; Maynard, personal communication). However, predation on native prey has shown to be far higher during dry periods (Lehmann et al., 2008a). Lion home ranges have been determined at a harmonic mean of 247 ± 93 km^2 SE but vary with seasonal variation which Hayward et al. (2009) conclude have been reported in previous studies in parks like Savuti, Botswana. The study also concludes that home ranges differ in time periods of nocturnal and diurnal but according to Hayward and Hayward (2007) also between males and females. Lionesses where more active during the day which was thought to minimize conflicts with other lions. According to Patterson et al. (2004) and Kissui (2008) lion predation on livestock mostly occurred during daytime when the cows were grazing, but sometimes at night as well when they came in to the bomas. When it comes to territory ranges for males these do not differ much from their home ranges (Lehmann et al., 2008b). Lionesses adjust their territory more according to social factors with other lions, while males mostly regulate this by the frequency of prey (Lehmann et al., 2008b).

There are studies that suggest that lion predation decreases in relation to how far away from protected areas they are (Gusset et al., 2009). Problems regarding lion-livestock conflicts often occur inside these protected areas (Maynard, personal communication). There is need for predator-prey knowledge when conserving lion populations since there is preferred prey species among lions; introduction and monitoring of these species could help so that other prey species do not suffer population declines (Hayward et al., 2007). The same study suggests that this is of great importance also since it appears that prey availability is more important to the lions home range and choice of environment than vegetation. This is supported by Hayward et al. (2009) and Khan et al. (2004). The latter study explains how prey abundance leads to a preferred habitat choice for predators; the predators change their habitat when prey decline, called “switching”. Also, lions have shown to prefer predation near water where water dependent prey species occur (De Boer et al., 2010). Some studies suggest that predation on livestock occurs when the native prey of lions are absence, which is often during the rainy season since both lions and their wild prey change their home ranges during this period (Patterson et al., 2004), accordingly to their seasonal changes mentioned above (Hayward et al., 2009). Also, during the rainy season water is more easily available and wild

prey species are not as easy to target as during the dry season when they gather around concentrations of water (De Boer et al., 2010).

Aim of the study

The aim of this study was to increase the understanding of activity patterns of lions and other wild animals. This so that useful and plausible facts could help to develop strategies for coexistence between human and wildlife. Earlier studies showed that lions choose environments where wild prey is abundant, which makes it interesting to know if this is also the case for preying on livestock. In a pilot study, camera traps were used to test their suitability for monitoring wildlife. The pictures from these cameras were compared with prints from wildlife that was, by corridor guards, collected in the soil of the same and similar wildlife corridors. The following questions are discussed: Do lions migrate to environments where livestock exist? How can these facts help to minimize predation on livestock and develop a better coexistence between humans and wildlife? Do the camera traps give a more accurate result when monitoring wildlife movements through corridors than recording prints in the soil?

MATERIALS AND METHODS

Study area

To answer the aim of the study, I conducted a pilot study in Ol Pejeta conservancy located on the equator, in Laikipia County, Kenya. The private owned cattle farm with a size of 36,000 ha has become a conservancy where wildlife and livestock are integrated. According to the management, this has proved to be good for the biodiversity (www.olpejetaconservancy.org). The main income today comes from tourism related to wildlife, not from cattle, although the grazing from cattle has had great impact on grass quality which makes the environment more favorable for wildlife (www.olpejetaconservancy.org). This integrated strategy is now spreading to other conservancies in Africa (Gichohi, personal communication; www.olpejetaconservancy.org).

Animals and management systems

Livestock

Inside the conservancy area, there were grazing livestock consisting of 7000 boran cattle (www.olpejetaconservancy.org) and 105 ankole cattle that were taken inside mobile bomas at night to prevent predator attacks (Gichohi, personal communication; www.olpejetaconservancy.org).

Lions and wildlife corridors

According to the International Union for Conservation of Nature (IUCN) redlist, studies claim that there are approximately between 16,500 – 30,000 lions in Africa (www.iucnredlist.org) and around 69 of these are living in the Ol Pejeta conservancy area, where they can move freely in and out due to so called wildlife corridors. The corridors are located in the northern part of the conservancy with timber logs as barriers to keep the endangered rhinos inside the

conservancy, whereas all other resident animals can move freely in and out. On the other side of these corridors the Laikipia County continues which has a relatively similar ecosystem as the one in Ol Pejeta (www.sosian.com; www.olpejetaconservancy.org).

Results from the previous corridor movement report conducted during January – December 2011 showed approximately 65 carnivore movements out and approximately 50 carnivore movements in during April 2011. For herbivores, the corresponding numbers were about 100 movements in and about 200 movements out. During that month there were approximately 250 mm rainfall reported. According to that report, lions had the second highest number of carnivore movement, just after hyenas (Corridor movement report, 2011).

Data collection

Pilot study with infrared cameras

Wildlife movements at the wildlife corridors were estimated using camera traps, i.e. infrared motion-sensitive cameras of the type Reconyx HC600 Hyperfire™. They were put up at two corridors that had a width of about 50 m each. They took five pictures every time they sensed that a warm-blooded animal moved within an area of approximate ten meters forward and six meters to both sides of the cameras. The cameras also recorded date, time of the day, temperature and moon phase.

To assess how to position the cameras correctly, five live observations of about three hour each were made during three days (20th to 22nd of March 2012) at Corridor 3; three observations were carried out in the morning and two in the evening. During these observations we recorded wildlife that passed the cameras and the corridor (Table 1.). Only animals passing the cameras and the corridor were recorded; if there were animals visible in the area around the corridor but did not pass the corridor or the cameras these were recorded under “other” in the ethogram.

When the best positions of the cameras had been determined, they were left there to collect images for nine days.

Literature search and interviews

Relevant literature on human-wildlife conflict was compiled to get information regarding the conflicts and possible solutions. Also, four interviews were conducted in different parts of Kenya regarding the subject, specifically lion predation.

Data analysis

To confirm the reliability of the cameras, recordings from the live observations were compared with the pictures from the cameras taken at the same date and time as the observations were made. If necessary, the cameras were then adjusted to better positions in relation to where the animals passed the corridor, which were thought to be through paths made on the corridor by wildlife.

Images from the cameras that were positioned in the most optimal way were collected from Corridor 3 for nine days, 20th to 22th of Mars and 23th to 28th of April 2012. By using

Microsoft Excel the pictures were sorted according to date, time, species, whether the animal was passing in or out from the conservancy and temperature.

Images from Corridor 2 were only collected from one night. These cameras were taken down due to theft risk hence most of the results and conclusions were made from Corridor 3.

RESULTS

Positioning of cameras

Wildlife passing corridor on the first day of live observations (Table 1.) did not match photos from the cameras, which also showed that elephants (*Loxodonta Africana*) had knocked the right camera down at night. The cameras were then positioned directly on the timber logs on the corridor, giving a better camouflage and better knowledge on weather wildlife actually crossed the corridor. There were wildlife paths on the corridor which the cameras were directed towards. Recordings on ethograms were then only made on passing corridor, since this and passing camera were at the same position.

There was no wildlife recorded passing through the corridor during the observations after this alteration. However, images from the cameras showed activity during our absences which were of requested quality in regard to assessing wildlife movements in and out of conservancy, whereupon the cameras' positioning was determined to be on that same place for a longer period of time.

Table 1. Ethogram used to collect wildlife movements

Date:	Start:	Stop:	Weather:	Species:	Time:	Pass: Camera (beh)	Pass: Corridor (in/out)	Other:
March 20	08:45	11:00	Sun	Elephant	10:04	W	W – in	Ten elephants
March 20	08:45	11:00	Sun	Elephant	10:08	W	W – in	Three elephants
March 20	08:45	11:00	Sun	Elephant	10:32	W	W – in	One elephant
March 21	05:45	08:45	Starry	Hyena	05:45	R	R – in	Spotted? Right camera gone.
Mars 22	06:00	08:00	Starry					07:14 three buffalos visible outside of conservancy

Summary of recordings made on wildlife passing camera or/and corridor during three days of observations, what behavior (beh) was being executed (R = running, W = walking) and if moving in or out of the conservancy.

Collection of pictures

There were a total of six species moving through the corridor during the nine days (20th to 22th of Mars and 23th to 28th of April 2012) that the data was collected for; elephant, spotted hyena (*Crocuta crocuta*), striped hyena (*Hyaena hyaena*), buffalo, leopard (*Panthera pardus*) and impala (Figure 1). A total of 32 animals were recorded where 23 animals had movements in to the conservancy and nine animals had movements made outwards.

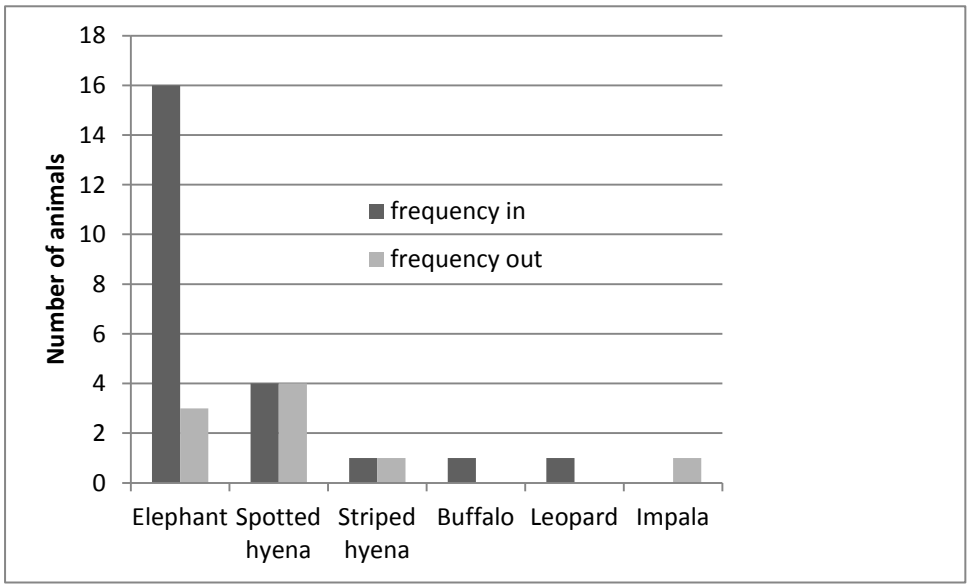

Figure 1. Total frequency of wildlife movement through Corridor 3 during nine days (20th to 22th of Mars and 23th to 28th of April 2012). Elephants had the highest frequency of movements (total of 19) followed by spotted hyena (eight), striped hyena (two) and buffalo, leopard and impala all had one recording each.

The pictures compiled in the pilot study showed signs of rainfall which Gichohi (personal communication) confirmed. Not enough pictures were compiled to make significant comparisons with the previous conducted corridor movement report although it will be discussed.

The first night (20th of Mars 2012), cameras positioned at Corridor 2 showed activity movement by cheetah (*Acinonyx jubatus*), jackal (*Canis mesomelas*), striped hyena and zebras.

DISCUSSION

Wildlife movements

Positioning of cameras

Since Corridor 2 was located next to a road, leading to great theft risk, the cameras at that corridor were taken down. However, because this corridor has shown great activity also according to the previous conducted report, it is important for future corridor movement

research. However, since Corridor 3 in that report had the most carnivore movement it was preferable for this pilot study (Corridor movement report, 2011).

There were only a few wild animals recorded when watching the corridor by observers, which could be due to several reasons. First of all, the observations were only made for three days and there is a possibility that animals of some species were by chance not active during these days. Also, to be able to observe the corridor in the most optimal way the car was positioned on a hill approximately 30 meters from the corridor. Observers were positioned inside the car at all times to prevent smell and noise to reach the animals, however this was probably not always the case. The car could be seen very well and at one point three buffalos were spotted moving towards the corridor (Table 1.) but suddenly they turned straight towards the car, to later turn around and move away. This behavior showed that the animals noticed the car which was probably a distraction for them. It is possible that more animals could have been in the area around the corridor but without being observed, since there was activity captured on the pictures when not observing.

After leaving Ol Pejeta Conservancy, the cameras at Corridor 3 were taken down due to the risk of theft, which led to loss of data. Hence, my results are only based on nine days. However, when the cameras where put up again they were positioned in the same optimal way as when the pilot study was conducted, i.e. directly on the corridor. There was also one camera positioned a few meters in front of the corridor, on the inside of the conservancy. During daytime this camera took good photos over the entire corridor, but during nighttime the animals were too far away to be able to define their species. Also, this camera was not camouflaged, leading to elephants and other animals like hyenas being captured on the photos when smelling and looking at it, which perhaps could disturb their future movements over the corridor. Also, the camera could be at risk for being torn down again by an animal.

There were several wildlife paths over the corridor and it is possible that more cameras placed over the entire corridor could capture all the animals that had movements made both inwards and outwards through the corridor. When a herd of 13 elephants crossed the corridor inwards, one camera captured only eight of these since they were too far away while another had captured the 13. If the cameras are not positioned correctly, recordings on the number of animals and their movements could be inaccurate.

Comparison of movement data with previous report

According to the previous corridor movement report (2011) conducted on prints from hooves and paws from the same corridor, there were movements made by five carnivore species during the entire year; hyena, lion, wild dog (*Lycaon pictus*), cheetah and leopard. The species with the highest number of movements were made in that same order. While hyenas were reported to have more movements in than out (207 out and 244 in), lions were reported to have more movements out of the conservancy than in (125 out and 103 in) (Corridor movement report, 2011). Even if there were not enough pictures to compare relevance to this report, hyenas were the carnivore species with the highest frequency of movements on the pictures collected as well.

The previous corridor movement report (2011) showed that elephants were responsible for most herbivore movement during the entire year, followed by zebras and buffalos, while impala had the least amount of recorded movements. Since elephants had a lot of movements both in and out of the corridor during observations and also according to the pictures collected this seems to be consistent. However, during the observations the first day, when there were a total of 14 elephants passing inwards through the corridor there is a big possibility that if there were any prints in the soil from other animals these were erased and replaced with elephant prints. Also, they crossed the corridor in one line, making it very difficult to see in the soil how many elephants had walked there. This questions the reliability of the number of recorded animal movements in the previous report, even though the results were relatively consistent with the ones made in this pilot study. Also, some species that exist in Ol Pejeta conservancy were not recorded in the previous report at all. This could be due to that prints in the soil gets erased or that some species do not cross the corridor. A combination of both pictures from these cameras and prints collected from the soil will probably give the most accurate result regarding wildlife movement through these corridors.

Lack of lions

According to movements recorded during 1st to 12th of April 2012 there were 19 lion movements through Corridor 3 (five inwards and 14 outwards), and five lion movements inwards through Corridor 2 (Gichohi, personal communication). The lack of lions on the collected pictures in this pilot study could be due to the low frequency of days collecting the pictures. The pictures also showed a lot of rainfall which may have affected their activity during these days; according to the previous movement report there was a relatively low frequency of movement from carnivores during April and May 2011 (Corridor movement report, 2011). Also, lion home ranges and territory may influence the activity through the corridor which would make determining the individuals of lions being captured on the cameras very interesting in order to see if there are different prides using it. Outside the corridor, where the Laikipia district continues, there are cattle in other nearby game ranches and conservancies as well (www.sosian.com). Hence, it is hard to determine whether lions prefer areas with livestock in it, since the ecosystem and prey reference is almost the same on both sides of the corridor. However, the movement on the corridor could still give results regarding future research on the subject if data is collected for a longer period of time.

The movement and activity of hyenas, could also have an impact on human-wildlife conflict since these are also major predators of livestock, which is consistent with previous reports (Kolowski and Holekamp, 2006; Kissui, 2008), which also have shown to result in economical losses (Romañach et al., 2007; Gusset et al., 2009). The monitoring of these movements are also of great importance because of the hyenas' high activity of using the corridor and because the previous report showed more movements in to the conservancy than out throughout the year.

Lion-livestock solutions

Knowledge

Handling human-wildlife conflicts may need to be applied differently since there are different conditions in different areas, which is supported by Patterson et al. (2004) and Toutain et al. (2004) who address the importance of a regional dialogue. In some areas livestock are taken into the conservancy to graze (Lenaimado, personal communication) and in some areas there is a high frequency of migration on native prey (Khan et al., 2004; Patterson et al., 2004). Since there are many of these different factors affecting attacks and predation on livestock from lions and other predators it is hard to have overall suggestions and custom-made solutions may need to be developed. Better wildlife managing standard was expressed to be achieved through knowledge and education regarding herding systems (Lenaimado, personal communication). During the conducted interviews examples of improvements regarding herding systems were; using stronger herders and not children (Lenaimado, personal communication), walking in front of livestock instead of behind them, keeping old herding traditions (Maynard, personal communication), have specific areas where livestock can graze, not being in lion territory (Ledama, personal communication; Lenaimado, personal communication), and not leaving livestock unattended (Naurori, personal communication). This knowledge on how to herd livestock the best way to prevent attacks could be applied in most areas. Some of these examples are supported by other studies, one example made by Gusset et al. (2009) whose results show an increase in threat of predation towards livestock when leaving them unattended during daylight. Combining knowledge on herding, also by keeping old herding traditions so that livestock does not need to go in to conservancies to graze, and maybe having rangers patrolling if livestock is left unattended could all help develop strategies to prevent predator attacks.

When visiting Kenya I heard of examples of when lions had taken two calves during the day when these were grazing, but there were also examples of how lions tried to get to the cattle inside the bomas at night (Naurori, personal communication). More examples of this have been reported by Patterson et al. (2004), Kolowski and Holekamp (2006) and Kissui (2008), which shows both diurnal and nocturnal activity among lions. This could support the statement of Lenaimado (personal communication) that livestock is easy prey. Education on how to develop stronger fences around bomas and settlements is important to be able to prevent this, which has been suggested in previous studies and the conducted interviews as well (Lenaimado, personal communication; Naurori, personal communication; Kissui, 2008) even if Kolowski and Holekamp (2006) thinks that improved guarding of the bomas would be even better.

Knowledge on lion choice of prey and habitat is of great importance and the avoidance of specific water areas in these territories could help prevent the attacks since this is a preferable predation site (de Boer et al., 2010). Hayward et al. (2009) also discuss this and how lion home ranges decrease during dry periods because of the concentration the native prey makes around water sites, i.e. this is where the lions preferably are. Also, a system or an introduction of preferred native prey in these sites may help to prevent livestock being targeted as prey as well, which could be supported by Lehmann et al. (2008a) and Gusset et

al. (2009), where the latter discuss the importance of keeping livestock and wildlife together since the number of wild prey species is relevant to the number of attacks made on livestock. This is interesting also when discussing the expressed desire to use natural resources and land use (Bauer, 2003) since this, under the right circumstances, has shown to be great for the environment because of the increase in biodiversity (Toutain et al., 2004; www.olpejetaconservancy.org)

Compensation

To be able to stop the decrease of lion population while at the same time keep the support for conservation one of the most important factors to consider is probably having dialog with the affected citizens. This is important since they have more positive attitudes in regard to what benefits they get (Bauer, 2003) and because of the economical losses that they have due to existing wildlife (Gusset et al., 2009). Articles and interviews compiled in this study have also shown that the ones that can accept coexistence with wildlife want either financial compensation for their losses (Gusset et al., 2009), some kind of income from tourism (Bauer, 2003), or income from trophy hunting (Bauer, 2003; Romañach et al., 2007), which in turn may alter the negative attitudes towards wildlife (Romañach et al., 2007). The question regarding economical compensations is complex but Gusset et al. (2009) discuss the possibility of penalty if trying to make false claims. In fact Rasmussen (1999) showed in his study that there were more cattle losses due to circumstances beyond predation, such as swallowing foreign objects. There are also studies that show how diseases have a much higher frequency of death in livestock than predation (Kissui, 2008). This highlights the importance of developing compensational systems were only predation towards livestock has occurred, where one expressed idea were scholarships (Lenaimado, personal communication).

Even though one solution was regarding using trophy hunting as a control of problematic predators (Bauer 2003; Romañach et al., 2007), a translocation of these animals to areas away from livestock and human settlements could be better in a conservation point of view.

To address these conflicts there should be easily applicable information on solutions regarding this that could be used in areas with different circumstances. At the 5th World Parks Congress, conservation organizations, governments etc was urged to among other things create an international forum for this (WPC, 2004).

CONCLUSIONS

To get accurate results regarding wildlife movements through corridors the pictures from the cameras used in this pilot study should be combined with the report conducted on prints in the sand. However, the collection of data should be for several years, which is also needed for monitoring specific species. These pictures can result in great research within many different areas, which with the discussed solutions hopefully can develop strategies for a better coexistence between humans, livestock and wildlife. As discussed there are many different factors affecting the existing conflicts regarding predation towards livestock, and there are carnivores other than just lions involved. There is an urgent need for solutions so that

endangered species such as lions increase their chance of survival, and so that humans don't lose too much livestock to these and other carnivores.

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