Poaching in the Mount Elgon Trans-Boundary Ecosystem

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ABSTRACT: This article assesses poaching in the Mount Elgon trans-boundary eco-system. The study employed a social survey research design. One hundred households were sampled and interviewed using questionnaires. Secondary data was collected from KWS and UWA wildlife offices and key informants in Kenya and Uganda. Household survey results showed that the wildlife class mostly targeted in poaching is mammals. Traditional weapons are still dominant in poaching. Use of firearms occurs mainly when the target is large animals. The main drivers of poaching within the study area were need for a protein source, need for income and cultural beliefs and attachment. Human-wildlife conflict was also found to be a driver of poaching. Poaching within the study area takes place in both the core zone and the buffer zone. Poaching in the buffer zone occurs when wildlife come out of the core zone to raid farms. Seasonality/temporal patterns of poaching occur in the study area. The peak poaching seasons were the wet season in the Kenyan (Biosphere Reserve) BR and the dry season in the Ugandan BR. This article presents a comparison of responses from respondents in either BR. There are valuable lessons that can be learnt from this article. It is my hope that these lessons will be incorporated in the formulation and improvement of policies related to poaching and conservation of wildlife.

KEYWORDS: Poaching, fauna, wildlife, Mount Elgon, Kenya, Uganda

Introduction

In Africa, wildlife resources offer many important benefits for ecosystems and rural communities found within or near wildlife areas. Various ecosystem processes such as plant regeneration, food webs and plant diversity are dependent upon the presence of fauna. Rural communities use wildlife products as a source of food, medicine, in traditional ceremonies and a source of income (Scoones *et al.,* 1992). In Central and West Africa, bush meat is often the only source of protein in addition to being a source of income and safety net during times of hardship (Bowen-Jones *et al.,* 2003). 15-72% of average household income in Gabon is obtained through hunting. Trade in bush meat is also a significant contributor to the economies of countries in this region though it rarely figures in national economic statistics (Bowen-Jones *et al.,* 2003). In Eastern Africa more specifically in Tanzania, bush meat hunting is an important economic activity (Mfunda and Roskafti, 2010) while a research carried out in Kenya established that 25% of meat in Nairobi butcheries was bush meat (Okello and Kiringe, 2004: Olupot *et al.,* 2009).

Human pressure on wildlife resources is however increasing (Wilfred and Maccoll, 2015) especially due to increasing human and cattle population around wildlife areas (Ijeomah *et al.,* 2013). Africa's population largely depends on natural resources for their livelihoods (Syed *et al.*, 2015). Agriculture which is a major practice in Africa (Nkamleu and Manyong, 2005) requires land and with the increasing population has led to deforestation. Deforestation fragments and degrades wildlife habitats increasing human wildlife conflicts (Hill, 2004) leading to revenge killings and poaching. There is also increasing demand for bush meat and animal-based products which coupled with development and dissemination of modern firearms and other more effective methods of hunting, and increased access to remote forests is continuously putting pressure on the wildlife resources (Swamy and Pinedo-Vasquez, 2014).

Poaching is one of the major threats facing wildlife in Africa (WWF, 2014). The UNESCO-Encyclopedia of Life Support Systems (EOLSS) defines poaching as all the illegal taking of wildlife species, species being either terrestrial or aquatic, both vertebrates and invertebrates, prompted by reasons that differ across localities, social and political conditions, traditions, and animals themselves that are the objects of poaching. Poaching therefore includes instances where the poacher does not have a license or permit, the animal is not in season for hunting or was killed on land that does not allow hunting, illegal weapons or hunting practices were used, hunting the animal is forbidden by law and the poacher is selling the animal or parts for profit. Based on this definition, two

forms of poaching emerge, that is subsistence and commercial poaching.

Subsistence poaching involves hunting of wildlife mainly for provision of food inform of bush meat for households of poachers/hunters involved. It also involves hunting as rites of passage where young men hunt and kill wildlife to prove their manhood. Commercial poaching is done mainly for income. The wildlife parts and products are sold to willing buyers in available markets. Depending on need, poachers can either work alone, in groups or under command (Neale and Stiles, 2011).

Bush meat hunting either for household consumption or local commercial trade is a major threat to the continued viability of particular wild fauna species (Fa *et al.,* 2002) as many species are being hunted at unsustainable rates. An estimated 6 million tonnes of animals are extracted yearly for consumption in the Congo Basin alone (Nasi *et al.,* 2008) and research evidence suggests that at this rate, it is impossible to sustain the current levels of hunting in the long term (Wilkie *et al.,* 2011) and this will lead to the eventual collapse of game populations.

Poaching especially for bush meat has a significant effect on wild animal populations. According to Swamy and Pinedo-Vasquez (2014), poaching for bush meat is the primary threat to about 85% of primates and ungulates and 93% of large-bodied ground-feeding birds that are listed as endangered or critically endangered in IUCN Red List. According to Lamprey *et al.* (2003), massive hunting in the 1970's reduced the population of large mammals by 90% in Uganda. Reducing game populations ultimately reduces the availability of food and income to the people who rely on them (Bennett *et al.,* 2007; Nasi *et al.,* 2011). Other negative impacts include the imperilment of the cultural identities of many indigenous and traditional people for which hunting is part of their heritage and sense of cultural identity (Vliet and Mbazza, 2011), emptying of Africa's forests and savannahs of large-bodied species and eliminating the important ecological roles these play in the functioning of such ecosystems (Nunez-Iturri and Howe, 2007; Lindsey *et al.,* 2011).

This paper presents an assessment of poaching in the Mount Elgon trans-boundary ecosystem. This ecosystem comprises of two biosphere reserves – Mount Elgon, Kenya and Mount Elgon, Uganda.

This article addresses the following objectives:

1. To determine the type of wildlife species poached in the core and buffer zones of the Mt Elgon trans-boundary ecosystem

2. To determine the spatial-temporal extent of poaching in the core and buffer zones of the Mt Elgon trans-boundary ecosystem

3. To determine the causes of poaching in Mount Elgon trans-boundary ecosystem

4. To evaluate the methods employed in poaching in Mount Elgon trans-boundary ecosystem

Method

The Mount Elgon trans-boundary ecosystem is the physical landscape transcending the international border between Kenya and Uganda that includes two biosphere reserves- Mt Elgon Biosphere Reserves in Kenya and Uganda. The Mt. Elgon ecosystem on the Kenyan side was declared a Biosphere Reserve by UNESCO in 2003 (Mwaura, 2011) while the Biosphere Reserve on the Ugandan side was nominated in 2005 (Makenzi, 2013). The BRs comprise three zones which are the core zone, buffer zone and transition zone (figure 1).

Within the BRs are five protected areas namely Mount Elgon National Park (MENPU) managed by Uganda Wildlife Authority (UWA), Namatale Central Forest Reserve managed by the National Forestry Authority (NFA) in Uganda and Mt. Elgon National Park (MENPK) managed by Kenya Wildlife Service (KWS), Mt. Elgon Forest Reserve managed by Kenya Forest Service (KFS) and Chepkitale National Reserve managed by Mt. Elgon County Council and KWS (Mwaura, 2011) in Kenya.

As of August 2010, the administrative boundaries of Mt. Elgon Ecosystem included areas under two Counties of Bungoma and Trans Nzoia in Kenya. In Uganda it covers eight districts, namely Kapchorwa, Kween, Sironko, Bulambuli, Mbale, Manafwa, Bududa and Bukwo (Mwaura, 2011; Makenzi *et al.*, 2014).

Rainfall on the mountain ranges from 1,500 –2,500 mm per year (Nakakaawa *et al.,* 2015; James *et al.*, 2014). Mid slope locations tend to receive more rainfall than the lower slopes or the summit. The climate is moist to moderate dry. The dry season runs from December to March. The rainfall pattern is bimodal with the wetter months falling between March and October (KWS, 2010; Nakakaawa *et al.,* 2015). The mean maximum and minimum temperatures are 23° and 15° C respectively.

The rocks of Mt Elgon are volcanic in origin and include tuffs, coarse agglomerates, basalts and mudflow materials. The geology of the Mt Elgon ecosystem generates a fertile soil associated with volcanic action which supports the livelihoods of inhabitants who are largely farmers (Scott, 1998; Nakakaawa *et al.,* 2015).

The vegetation of Mt. Elgon is stratified attitudinally (Van Heist, 1994) in belts commonly associated with large mountain massifs. Four broad vegetation communities have been recognised (Mwaura, 2011):

a) Zone I: mixed montane forest up to 2,500 m asl;

b) Zone II: bamboo and low canopy forest, from 2,500 to 3,000 m asl;

c) Zone III: high montane heath, from 3,000 to 3,500 m asl; and

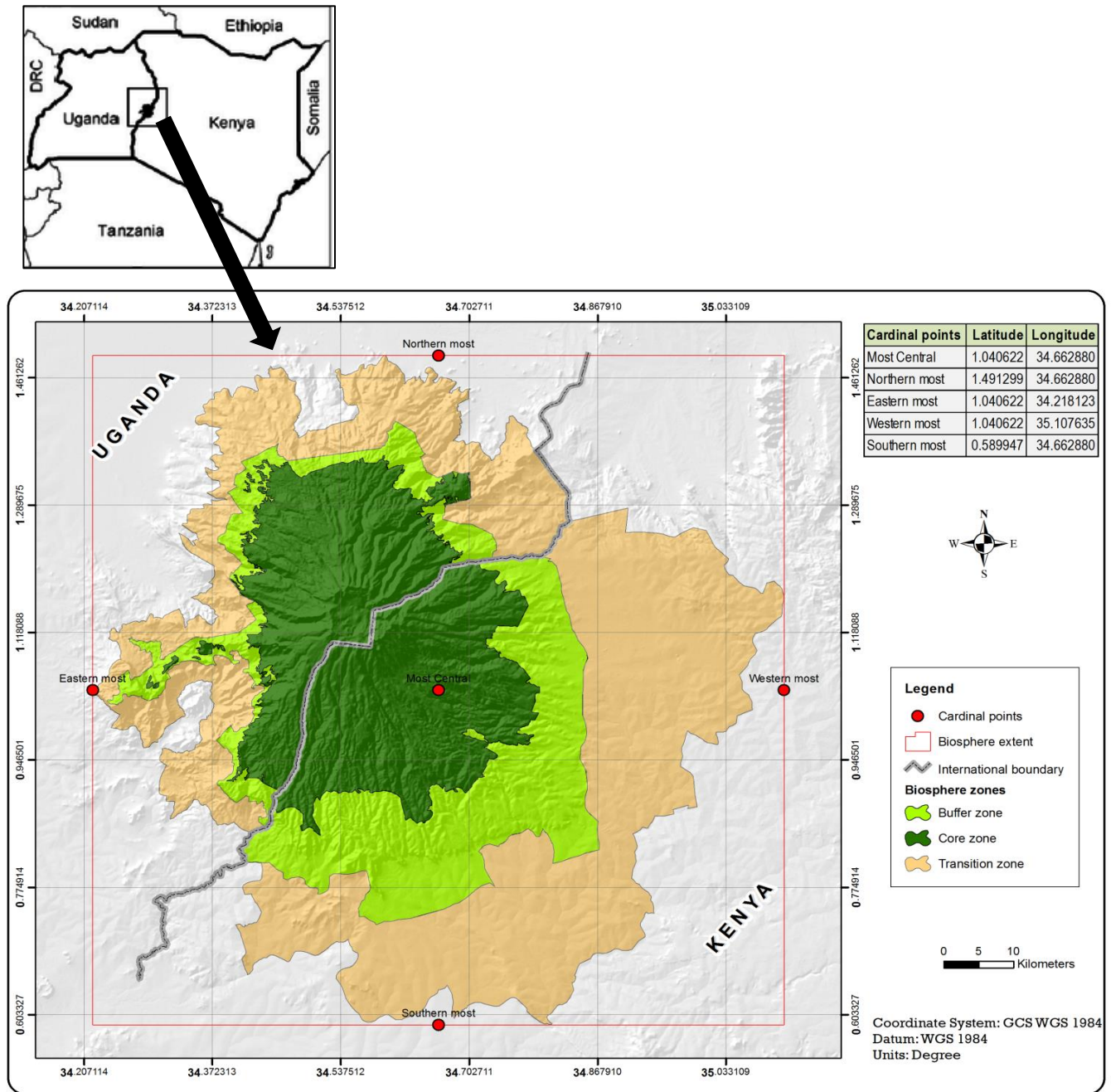d) Zone IV: moorland and alpine zone, areas above 3,500 m asl.

Cardinal points	Latitude	Longitude
Most Central	1.040622	34.662880
Northern most	1.491299	34.662880
Eastern most	1.040622	34.218123
Western most	1.040622	35.107635
Southern most	0.589947	34.662880

Legend
- ● Cardinal points
- ▭ Biosphere extent
- ∿ International boundary

Biosphere zones
- Buffer zone
- Core zone
- Transition zone

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree

Figure 1: Location Map of the Study Area (Source: James *et al.*, 2014)

This rich flora is important in providing habitat for biodiversity, acting as a tourist attraction, as well as providing plant resources that support people's livelihoods and generate forest produce.

Mount Elgon supports many fauna species of extreme conservation importance by virtue of their rarity and/or limited distributions. Mt. Elgon ecosystem is a habitat for 37 "globally threatened" species (22 mammals, 2 insect and 13 bird species). The Mt Elgon ecosystem is also home to 9 endemics, making the area a priority for species conservation (Mwaura, 2011).

This study employed a social survey research design. Social survey research design involves collecting data from respondents through a series of questions either in the form of a questionnaire or an interview. In this study, questionnaires and interview schedules were used. Qualitative and quantitative data was collected to meet the research objectives.

Primary data was collected from households and key informants. The key informants included the biosphere reserve manager/park manager, forest manager and chief (administrative) found within the core and buffer zones. They were chosen purposively for inclusion in the study.
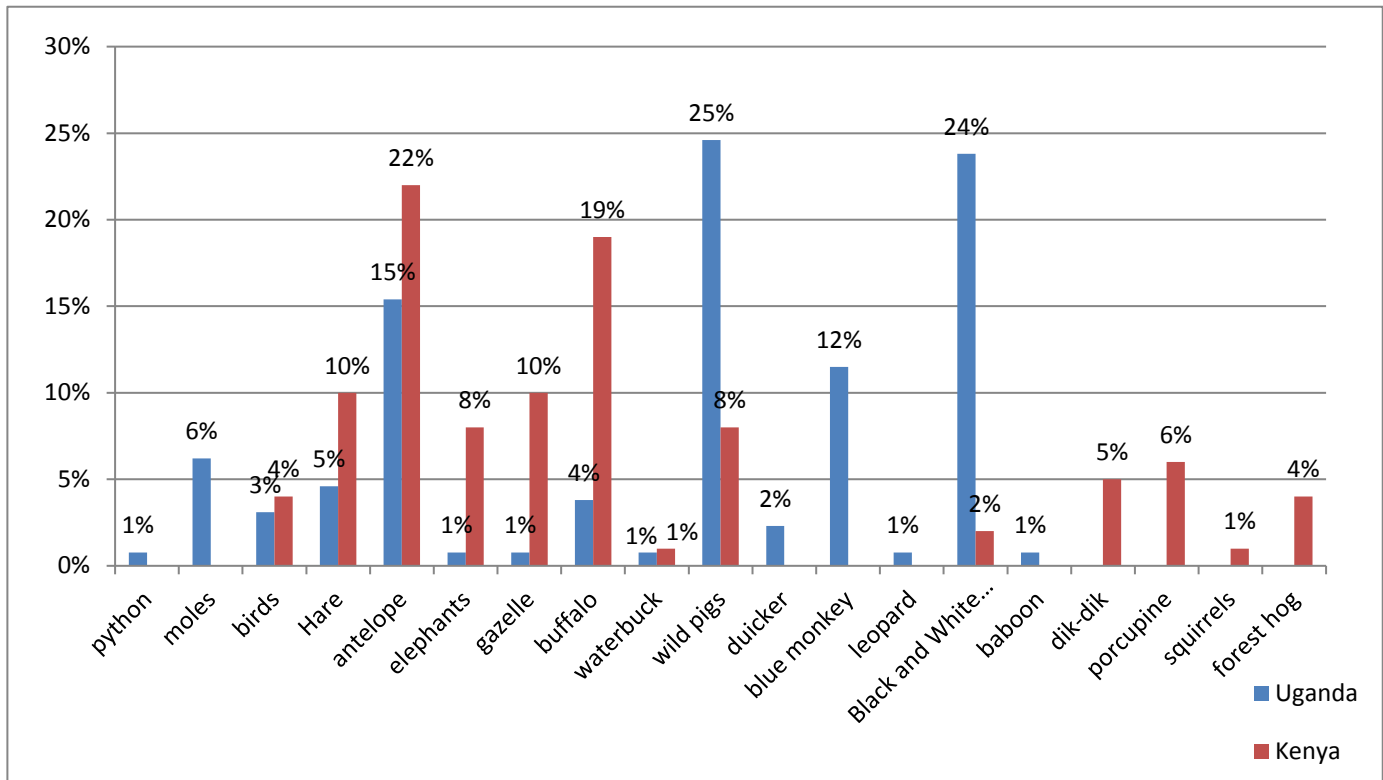
Figure 2: Wildlife species subject to poaching

Secondary data mainly on wildlife population trends, population counts and Occurrence Book records (OB) was acquired from the Kenya Wildlife Service and Uganda Wildlife Authority.

The households included those found within the core zone and buffer zone of the trans-boundary ecosystem. These households were chosen using multi-stage sampling (Stratified sampling, cluster sampling, simple random sampling and systematic sampling). Each zone was treated as a stratum. The wards in each stratum were treated as clusters and some chosen for inclusion in the study. Some villages from these wards were randomly selected using a table of random numbers and households within these villages were chosen using systematic sampling for inclusion in the sample. Kapsokwony, Kopsiro, Kimwondo (Kenya), Kapkwai, Bushiyi and Matuwa (Uganda) were selected for inclusion in the study.

The formula by Nassiuma, (2000) was used to get the sample size:

$$n = \frac{NC^2}{C^2 + (N-1)e^2}$$

Where n = sample size

N = population

e= Error margin (3%)

C= coefficient of variation (30%)

The sample size will therefore be:

$n=1786831\times30^2 \div [30^2 + (1786831\text{-}1)3^2]$ =99.99≈100 households

50 households were chosen from each Biosphere Reserve. The 50 households were apportioned proportionately in each of the two zones based on their population. One household from the core zone and 49 households from the buffer zone were chosen for inclusion in the study. There were no households living within the core zone in the BR in Uganda hence all the households were chosen from the buffer zone. The area of interest for the household surveys in both BRs was the villages up to 5 km from the protected area boundaries. The study was accomplished with the help of field assistants who were mainly community members chosen by the wildlife department or key informers. All information gathered was regularly cross validated for error.

Results

Wildlife species subject to poaching

Different wildlife species were targeted in poaching (table 1). In Kenya, Antelopes (22%) and buffaloes (19%) were the two wildlife species mostly targeted in poaching. Elephants (8%) were targeted mainly for ivory.

Respondents from the households in Uganda mentioned a number of wildlife species. The most popular wildlife species were black and white colobus (24%), wild pigs (25%) and antelopes (15%). Majority of the wildlife species are mammals (figure 2). *Spatial extent of poaching*

Poaching in the BRs occurs in both the core zone and buffer zone (figure 3). In Kenya, poaching in the core zone accounted for 58% and the buffer zone 44%. The buffer zone mainly consists of farms where agriculture is practised and wildlife is poached when they enter the farms to eat the crops. Within the core zone are Plantation Establishment for Livelihood Improvement Scheme (PELIS) plots where farmers set up traps to capture wildlife that come to destroy their crops. If the wildlife captured is edible, it is used as bush meat. If it is not edible, it is killed. The community also gets an opportunity to poach when they are working in their PELIS plots.
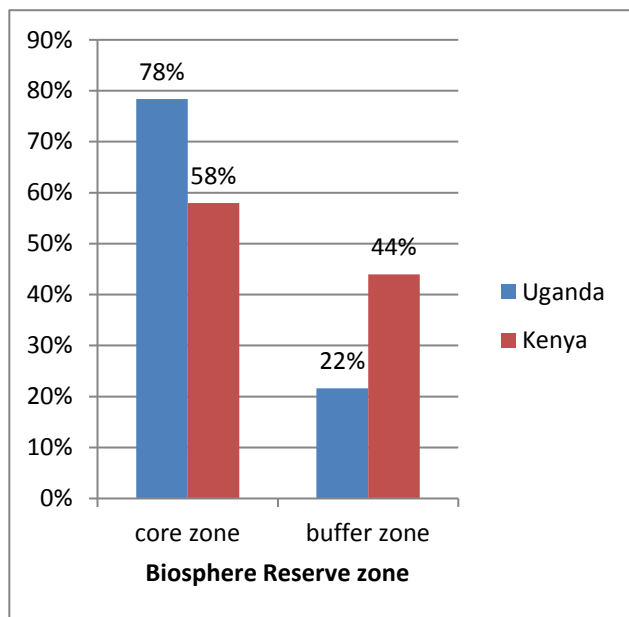

Figure 3: Spatial extent of poaching

Poaching in Mount Elgon BR, Uganda takes places mostly in the core zone (78%) with the buffer zone

accounting for 22%. The buffer zone comprises of privately held farms where agricultural activities take place. Wildlife is poached when they leave the forest and enter farms to destroy crops.

Temporal extent of poaching

With regards to temporal extent of poaching, 38% of respondents from the households sampled in Kenya mentioned that it is an activity that takes place all year round. This is because the poachers are fully dependent on the activity for their livelihood. The planting season was also popular (30%) because this is the time when plants are growing in the farms and wildlife come into the farms to eat the crops. The wildlife is killed if captured by the farmers. The rainy season accounted for 22%. Poaching in the rainy season occurs mainly in the buffer zone as during this time wildlife come into the farms to destroy maturing crops and end up being captured by the community members.

In Uganda, the most popular time being during the dry season (50%) that occurs from October to March. During this time there is no food and people go into the core zone to hunt. Christmas festivities also occur during this time and bush meat is an important delicacy for this season.

Other seasons mentioned are every August to December (8%) before every circumcision year (even year) when people are actively looking for the black and white colobus monkey whose skin is used to make circumcision garments and May to September (20%) during the rainy season when crops are in the farms. The animals that
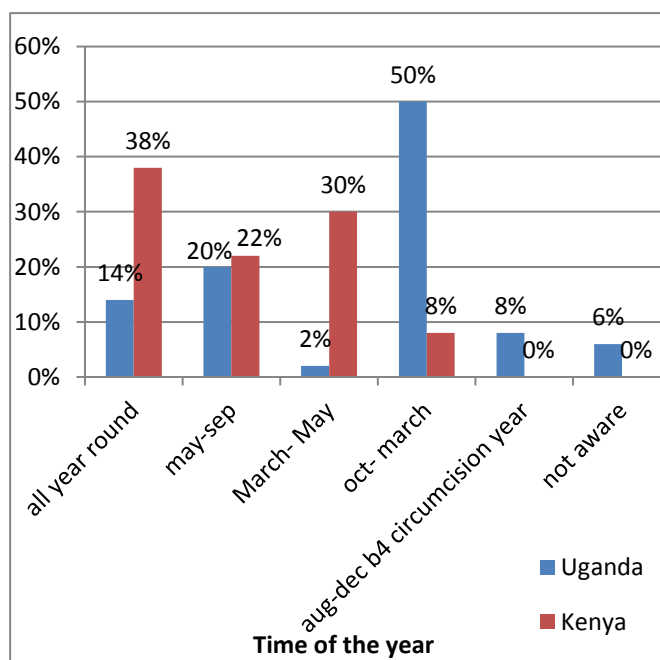

Figure 4: Temporal extent of poaching

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come to destroy the crops are caught in the traps laid by farmers to protect their crops and are ultimately used as bush meat if they are edible (figure 4).

Causes of poaching

Poaching in the Mt. Elgon BR, Kenya is caused mainly by need of food and income. Household consumption and local sale as a means of earning income accounted for 56% and 29% respectively. The main causes of poaching in the Mount Elgon BR, Uganda are subsistence (59%) and culture (31%). Wildlife is poached mainly to provide protein in the form of bush meat and skins that are used in cultural ceremonies and for various household chores such as grinding flour and making baskets. Local sale accounts for 8% and occurs when the catch is large (figure 5).

Methods used in poaching

Different methods are used by poachers in the Mt. Elgon BR, Kenya and Uganda (table 2). The most common methods in Kenya were wire traps/snares that accounted for 30% and chasing with dogs that accounted for 24%. Other methods include use of firearms, spears and pangas, bows and arrows and hole/pit traps.

In Uganda the methods used include snares (46%) which are the most popular, chasing with the help of dogs (28%) and use of spears and pangas (18%). Other methods are use of holes, pits and bows and arrows (figure 6).

Discussion

Type of wildlife species poached

This study established that mammals were the main class targeted in poaching (table 1 and figure 2). In Mount Elgon BR, Kenya respondents mentioned antelopes and buffaloes as the main species targeted. Antelope meat is preferred because it tastes like goat meat. Antelopes also enter into farms and are captured by traps or get stuck in the mud as they are being chased. Buffaloes are targeted because of the large amount of meat that can be obtained and for their tails. The tail is a cultural requirement for elderly bukusu men as a sign of prestige. Buffaloes are also a problem animal in the farms. They are dangerous hence when they stay in the farms up to daytime, they are shot down by rangers to avoid the risk of injuring community members. Buffaloes are also the main species targeted by poachers from the Ugandan side. Buffalos are locally extinct on the Ugandan side hence poachers come to the Kenyan side mainly during the dry season (October to February) and mainly target buffaloes because of the large amount of meat they provide. Other wildlife species targeted include gazelles whose meat is nearly similar to
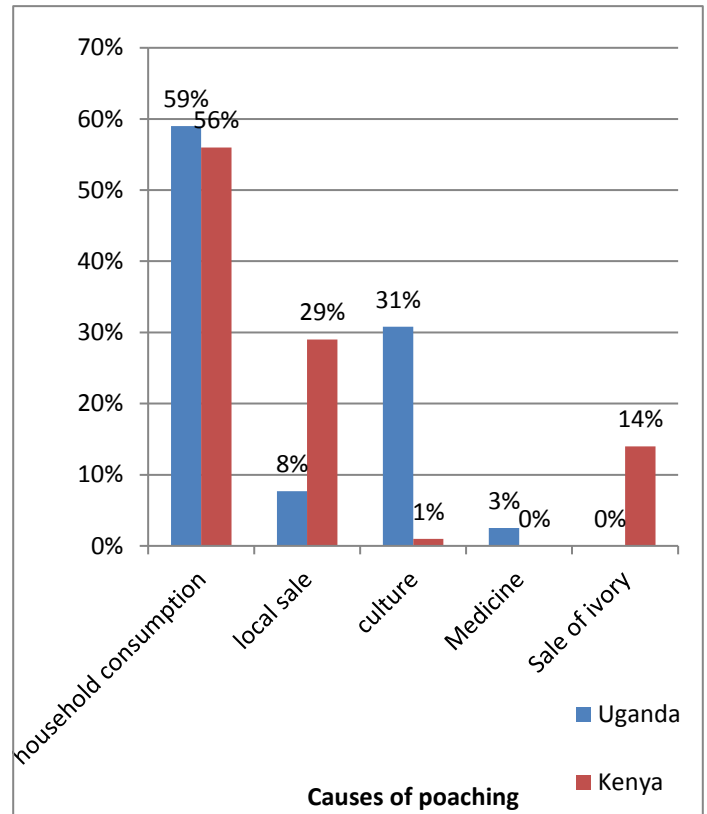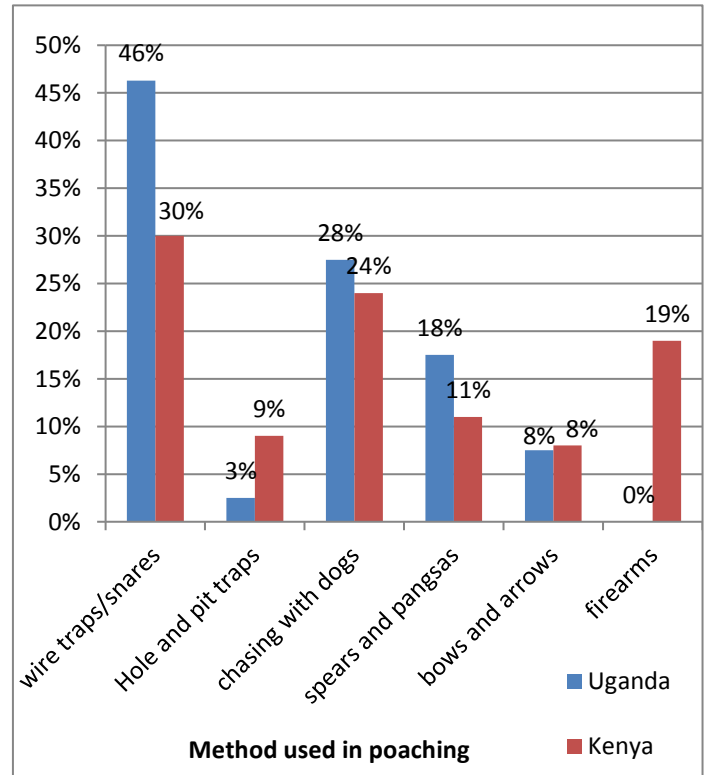

Figure 5: Causes of Poaching.

Figure 6: Methods used in poaching.

goat meat, porcupines and wild pigs that were mentioned as problematic animals which destroy growing crops. Elephants which occur only on the Kenyan side of the ecosystem were subject to trophy poaching. Black and white colobus were targeted albeit to a small extent. The reason for this was assumed to be a departure from culture as most households preferred circumcising their male children in hospitals.

In Mount Elgon BR, Uganda black and white colobus, wild pigs and antelopes were the main species targeted. Black and white colobus were targeted for their skin and meat. The skin is a cultural requirement for prestige in the traditional circumcision ceremony of mainly the Bagisu. A candidate undergoing the circumcision rituals must have this skin. Wild pigs were the most encountered wildlife species. This was attributed to their high reproduction rates. They are also an aggressive species when they encounter human beings and are a problematic animal. Antelopes are targeted because of their meat which tastes like goat meat. Species like the blue monkey are targeted because of the reducing population of the black and white colobus. Their skin and meat are useful. Rodents are common just like the wild pigs.

The findings of this study were similar to others like Fa *et al.,* (2006) in their study in the Cross- Sanaga region in Nigeria and Cameroon, calculated that of over a million carcasses traded in 100 sites, 99% were mammals of which 40% were ungulates, 30% rodents and about 15% were primates. These are the three most important taxa for human consumption. Other studies with similar findings include Starkey (2004); East *et al.* (2005) and Crookes *et al.* (2006).

Spatial-temporal extent of poaching

Incidences of hunting took place in both the core zone and buffer zone of the BRs (figure 3). Hunting within the buffer zones occurs when the animals come out of the core zone/ protected area to raid crop farms, livestock and threaten human lives. These animals are killed so as to reduce the losses. They are used as bushmeat if they are edible. This wildlife includes baboons, leopard, hyena, wild pigs (bush pigs), rodents, porcupines and black and white colobus. They damage crops at different times of the year from the planting to harvesting season. Livestock are prone to attacks all year round. Human-wildlife conflict is thus a driver of poaching for communities within the BRs. A study by Barnett (2000) also showed that increased demand for land for agriculture has led to conflict such that problem animals are poached and killed.

Seasonality/ temporal pattern of poaching is a known occurrence. In the Mount Elgon BR, Uganda, hunting was common during the dry season while in Kenya it was common during the wet season (figure 4). In addition to food being scarce during the dry season, most people are idle as most of the crops have been harvested from the farms. It is also important to note that the end-of-year festivities occur within the dry season, an important day when delicacies such as bush meat are eaten. During the wet season that is from the time crops are sown to the time they mature and are ready for harvest, most wildlife species come into the farms in the buffer zones (and core zone in Kenya) looking for food. This is a loss to the farmers who lay traps, capture the wildlife and kill them to reduce the losses. Studies with similar findings include Bennett and Deutsch (2003) who reported peaking during the rainy season and around end-of-year celebrations at the Mbam Djerem National Park in Cameroon and Owusu *et al.,* (2006) who reported climatic peaks in the Afadjato and Agumatsa Conservation Area in Ghana. A study by Olupot *et al.* (2009) in four sites in Uganda reported that hunting was common during the wet season and the dry season with off-take increasing at the end of the year during the end-of –year festivities.

Causes of poaching

The key factors causing poaching in the study area include household consumption, local sale and culture (figure 5). Poaching for food was the main reason given for poaching (59% in Uganda and 56% in Kenya). Bush meat is a protein source that is believed to be more nutritionally superior when compared to livestock meat (Hoffman 2008). Furthermore, it is considered a free and limitless resource that is just captured and cannot get finished (Eves, 1996). This was followed by cultural reasons (31% in Uganda and 1% in Kenya). Wildlife parts play significant roles in culture especially in circumcision ceremonies. Black and white colobus and buffaloes were mainly targeted under this reason for their skin and tails. The skin of the monkey is used to make mantels that are used in performing circumcision dances while the tail of the buffalo is a prestigious ornament with which high ranking men of the bukusu tribe are buried with. Poaching for income was also identified as a reason for poaching. Local sale occurs when the poachers catch is large (either a large animal or an assortment of small animals). The meat was sold undercover to community members especially in drinking dens (Kenya) or to specific households known by the poacher. In Kenya, the meat had been given names that were understood between the poachers and their customers. This naming reduces the risk of the poacher and community members being arrested. Nasi *et al.,* (2011) report these three as the main reasons for obtaining bushmeat in the Congo and Amazon Basins. Olupot *et al.* (2009) identified poverty and cultural beliefs and attachment as the root causes of bushmeat use in Uganda.

Methods used when poaching

This study found out snares, spears, bow and arrows and chasing with dogs were the main hunting methods employed (figure 6). Snares were the most common method (46% in Uganda and 30% in Kenya). They were made from wires and ropes though wires were mostly preferred because they were longer lasting. Snares targeted all animals from the large ones such as elephants and buffaloes to the small ones such as antelopes and were laid on the paths used by these animals. Firearms were used but to a smaller extent (19%) especially where the target was large animals such as buffaloes and elephants. Chasing with dogs (28% in Uganda and 24% in Kenya), bows and arrow, spears and pangas was most commonly used when poaching small body sized animals like the black and white colobus, wild pigs and hare. Spears and pangas were also reported as the method used for animals as big as elephants and buffaloes. Hole and pit traps targeted all mammals. They are dug and covered to disguise them. The poacher frequently checks them to see the animal that has been captured. If an animal was captured and is edible, it was speared to death. Use of snares was the most common method as is concluded in a study by Wato *et al.,* (2006) in the Tsavo National Park, Kenya and Nielsen (2006) in Udzungwa Mountains, Tanzania. The popularity of snares can be attributed to easy availability, durability and low cost (Lindsey *et al.,* 2011; Fa and Brown, 2009). These two studies and others such as Grey-Ross *et al.,* (2010), Jachmann (2008), Lindsey *et al.,* (2011) found out that snares in addition to chasing with dogs, spears, pangas, hole traps, bow and arrows were methods used when poaching wildlife.

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References

Barnett, R. (2000). *Food for Thought: the utilization of Wild Meat in Eastern and Southern Africa.* Nairobi, Kenya: TRAFFIC/WWF/IUCN.

Bennett, E.L., Blencowe, E., Brandon, K., Brown, D., Burn, R.W., Cowlishaw, G.U.Y., Davies, G., Dublin, H., Fa, J.E., MilnerGulland, E.J., Robinson, J.G., Rowcliffe, J.M., Underwood, F.M., and Wilkie, D.S. (2007). Hunting for Consensus: Reconciling Bushmeat Harvest, Conservation and Development Policy in West and Central Africa. *Conservation Biology, 21*, 884-887.

Bennett, E.L. and Deutsch, J.C. (2003). *Hunting and wildlife trade in central Africa: Identifying gaps and developing strategies. Report of a meeting held in Lopé National Park, Gabon.* . Wildlife Conservation Society.

Bowen-Jones, E., Brown, D., Robinson, E.J.Z. (2003). Economic Commodity or Environmental Crisis? An Interdisciplinary Approach to Analysing the Bushmeat Trade in Central and West AFRICA. *Area, 35*(4), 390-402.

Crookes, D.J., Ankudey, N. and Milner-Gulland, E.J. (2006). The value of a long-term bushmeat market dataset as an indicator of system dynamics. *Environmental Conservation, 32*, 333-339.

East, T., Kümpel, N.F., Milner-Gulland, E.J. and Rowcliffe, J.M. (2005). Determinants of urban bushmeat consumption in Río Muni, Equatorial Guinea. *Biological Conservation, 126*, 206-215.

Eves, H. (1996). *Socieconomic Study 1996 Nouabalé-Ndoki National Park Congo Volume I: English. Summary Consultant Report.* Wildlife Conservation Society and Global Environment Facility.

Fa, J.E and Brown, D. (2009). Impacts of hunting on mammals in African tropical moist forests: a review and synthesis. *Mammal Review, 39*(4), 231-264.

Fa, J.E., Seymour, S., Dupain, J., Amin, R., Albrechtsen, L. and Macdonald, D. (2006). Getting to grips with the magnitude of exploitation: bushmeat in the Cross-Sanaga rivers region, Nigeria and Cameroon. *Biological Conservation, 129*, 497-510.

Fa, J.E., Peres, C.A., and Meeuwig, J. (2002). Bushmeat exploitation in tropical forest: An intercontinental comparison. *Journal of Conservation Biology, 16*, 232-237.

Grey-Ross, R., Downs, C.T. and Kirkman, K. (2010). An Assessment of Illegal Hunting on Farmland in KwaZulu-Natal, South Africa: Implications for Oribi (Ourebia ourebi) Conservation. *Southern Africa Journal of Wildlife Research, 40*, 43-52.

Hart, J. (2000). Impact and sustainability of indigenous hunting in the Ituri Forest, Congo-Zaire: a comparison of unhunted and hunted duiker populations. Hunting for sustainability in tropical forests. In J. a. ROBINSON, *Hunting for sustainability in tropical forests* (pp. 106-153). New York: Columbia University Press.

Hill, C. (2004). Farmers' Perspectives of Conflict at the wildlife-agriculture boundary: some lessons learned from African subsistence farmers. *Human Dimensions of Wildlife, 9*, 279-286.

Hoffman, L. (2008). The yield and nutritional value of meat from African ungulates, camelidae, rodents, ratites, and reptiles. *Meat Science, 80*, 94-100.

Ijeomah, H.M., Ogogo, A.U., and Ogbara, D. (2013). Analysis of Poaching Activities in Kainji Lake National Park of Nigeria. *Environment and Natural Resources Research, 3*(1), 51-61.

James Lutalo, George Owoyesigire, Martin Nsubuga, Dominic Mundrugo-Ogo Lali, and Edgar Buhanga. (2014). *Elgony-Masaba Trans-boundary Biosphere Reserve Dossier.* Uganda Technical Team.

KWS. (2010). Mount Elgon National Park Brochure. KWS.

Lamprey, R., Buhanga, E., and Omoding, J. (2003). *A study of wildlife distributions, wildlife management systems, and options for wildlife-based livelihoods in Uganda.* Kampala, Uganda: IFPRI/USAID.

Lindsey,P.A.,Romañach,S.S.,Tambling,C.J.,Chartier,K., and Groom,R. (2011). Ecological and financial impacts of illegal bushmeat trade in Zimbabwe. *Oryx, 45*, 96.

Makenzi, P. (2013). The Biosphere Reserve Concept as a Tool for Sustainable Natural Resource Mangement in the Eastern Africa Region. In R. P.-S.-G. Eds), *AfriMAB Biosphere Reserves in Sub-saharan Africa: Showcasing Sustainable Development* (pp. 1-14). Pretoria: UNESCO and Department of Environmental Affairs, South Africa.

Makenzi, P., James Njogu, Albert Ingati, George Tokro, Anastacia Mwaura, and Chrispine Ngesa. (2014). *Elgony-Masaba Trans-Boundary Biosphere Reserve.*

Mfunda, M.I., and Roskaft1, E. (2010). Bushmeat hunting in Serengeti, Tanzania: An important economic activity to local people. *International Journal of Biodivesity and Conservation, 2*(9), 263-272.

Mwaura, A. (2011, June). *Mt. Elgon Transboundary Ecosystem Western Conservation Area, Kenya.* Dresden, Germany: Biodiversity Department, KWS.

Nakakaawa, C., Moll, R., Vedeld, P., Sjaastad, E., and Cavanagh, J. (2015). Collaborative resource management and rural livelihoods around protected areas: A case study of Mount Elgon National Park, Uganda. *Forest Policy and Economics, http://dx.doi.org/10.1016/j.forpol.2015.04.002.*

Nasi, R., Brown, D., Wilkie, D., Bennett, E., Tutin, C., van Tol, G., and Christophersen, T. (2008). *Conservation and use of wildlife-based resources: The bushmeat crisis: Secretariat of the Convention on Biological Diversity, Montreal, and Center for International Forestry Research (CIFOR), Bogor Technical Series No 33.*

Nasi, R., Taber, A. and Vliet, N.V. (2011). Empty forests, empty stomachs? Bushmeat and livelihoods in the Congo and Amazon Basins. *International Forest Review, 13*, 355-368.

Nassiuma, D. (2000). *Survey Sampling: Theory and Methods.* Njoro: Egerton University Press.

Neale, E. and Stiles, D. . (2011). *Elephant Meat Trade in Central Africa: Central African Republic Case Study.* Gland, Switzerland : IUCN.

Nielsen, M. (2006). Importance, cause and effect of bushmeat hunting in the Udzungwa Mountains, Tanzania: Implications for community based wildlife management. *Biolo. Conserv., 128*, 509-516.

Nkamleu Guy Blaise and Manyong, V. (2005). Factors Affecting the Adoption of Agroforestry Practices by Farmers in Cameroon. *Small-scale Forest Economics, Management and Policy, 4*(2), 135-148.

Noss, A. (2000). Cable snares and nets in the Central African Republic. In J. a. ROBINSON, *Hunting for sustainability in tropical forests.* (pp. 282-304). New York: Columbia University Press.

Nunez-Iturri, G. and Howe, H.F. (2007). Bushmeat and the fate of trees with seeds dispersed by large primates in a lowland rain forest in Western Amazonia. *Biotropica, 39*, 347-354.

Okello, M.M. and Kiringe, J.W. (2004). Threats to Biodiversity and their Implications in Protected and Adjacent Dispersal Areas of Kenya. *Journal of Sustainable Tourism, 12*, 55-69.

Olupot, W., Alastair, J.M., and Andrew, J.P. (2009). *An analysis of socio-economics of bushmeat hunting at major hunting sites in Uganda WCS Working Paper No. 38.* New York, USA: Wildlife Conservation Society.

Owusu, E.H., Ntiamoa-Baidu, Y.Y., and Ekpe, E.K. (2006). The dependence of local people on bushmeat in the Afadjato and Agumatsa Conservation Area, Ghana. *Nature & Faune, 21*, 33-44.

Scoones, I., Melnyk, M., and Pretty, J. (1992). *The Hidden Harvest: Wild Foods and Agricultural Systems: A Literature Review and Annotated Bibliography.* London, UK and Gland, Switzerland: IIED, SIDA AND WWF.

Scott, P. (1998). *From Conflict to Collaboration: People and Forests at Mount Elgon, Uganda.* Gland and Cambridge: IUCN.

Starkey, M. (2004). *Commerce and subsistence: the hunting, sale and consumption of bushmeat in Gabon.* Cambridge, UK. : PhD Thesis. University of Cambridge.

Swamy V. and Pinedo-Vasquez M. (2014). *Bushmeat harvest in tropical forests: Knowledge base, gaps and research priorities. Occasional Paper 114.* Bogor, Indonesia: CIFOR.

Syed Ajijur Rahman, Samson Foli , Muha Abdullah Al Pavel , Md Abdullah Al Mamun , and Sunderland, T. (2015). Forest, trees and agroforestry: Better livelihoods and ecosystem services from multifunctional landscapes. *International Journal of Development and Sustainability, 4*(4), 479-491.

Van Heist, M. (1994). *Land Unit Map of Mt. Elgon National Park: Accompanying Report.Mbale, Mt. Elgon Conservation and Development Project.* IUCN.

Vliet, V. N. and Mbazza, P. (2011). Recognizing the multiple reasons for bushmeat consumption in urban areas: a necessary step toward the sustainable use of wildlife for food in central Africa. *Human Dimension of Wildlife, 16*, 45-54.

Wato, Y.A., Wahungu, G.M., Okello, M.M. (2006). Correlates of wildlife snaring patterns in Tsavo West National Park, Kenya. *Biol. Conserv., 132*, 500-509.

Wilfred, P., and Maccoll, A. (2015). Local Perspectives on Factors Influencing the Extent of Wildlife Poaching for Bushmeat in a Game Reserve, Western Tanzaniz. *International Journal of Conservation Science, 6*(1), 99-110.

Wilkie, D.S., Bennett, E.L., Peres, C.A., and Cunningham, A.A. (2011). The Empty Forest Revisited. *Annals of the New York Academy of Sciences, 1223*, 120-128.

WWF. (2014). *Wildlife Crime Technology Project: Integrating Technologies to Combat Poaching of Elephants, Rhinos and Tigers.* WWF.