

Nyandiere C. (2006). Increasing Role of Computer-Based Information Systems in the Management of Higher Education Institutions. *Proceedings of the Annual Strathmore University ICT Conference*.

Obeng, T.K. (2004). Practical Application of ICT to Enhance University Education in Ghana

O'Brien, J. (1999). *Management Information Systems: Managing Information Technology in the Internetworked Enterprise*. 4th Ed. Boston, McGraw Hill-Irwin inc.

Oppenheim, A.N. (1982). *Questionnaire design and attitude measurement*. London: Heinemann Educational Books Ltd

Selwyn, N. (2007). *The use of computer technology and learning: a critical perspective*. Cardiff: Black Well Publishing Limited.

University Of Bristol. (2008). *Information technology strategy*. Bristol: UOB.

Wanyembi, G. (2002). *Application of a model for improving ICT management: a case study* International Academy of Information Management, Delft University.

Ward J. & Peppard (2002). *Strategic planning for information systems*. (3<sup>rd</sup>.ed.).New York: John Wiley & Sons.

**B2012-13: Impact of Electric Fence on Pastoralists Movement in Ol Pejeta Eco-System in Laikipia, Kenya**

Mutahi D. Muthoni<sup>1</sup>, Mwangi P. Gichohi<sup>2</sup> & Mutura R. Bariu<sup>1</sup>

<sup>1</sup> Karatina University College, <sup>2</sup>Kagumo Teachers College, [davidimutahi@yahoo.com](mailto:davidimutahi@yahoo.com)

**Abstract**

The challenge of human- wildlife conflict (HWC) in Ol Pajeta eco-system has been there since early 1980s. An electric fence was erected as a mitigation strategy to resolve HWC 2006. However, some parts such as southern boundary of Mutara ADC farm had not been fenced. By 2009 electric fence was installed on the southern boundary of Mutura ADC farm. The fencing closed out migratory corridors of elephants, interfered with pastoralists' movement patterns and morans' cultural rite activities. Persistent

drought and increased elephants aggression in the eco-system has compounded the problem of HWC due to dwindling natural resources particularly water, vegetations and mineral licks. Consequently, tempering of fence by pastoralists and morans' rites activities rendered electric fence ineffective hence elephants had easy access to farms. This led to increased farm raids incidences by elephants. These farm raids have consequently resulted to escalation of threats to human life, leading to low school retention rates and food insecurity. Moreover, food insecurity spread of zoonotics, livestock diseases and pests were a great source of concern to the major stake- holders. Hence, the problem of HWC related to threats on wildlife conservation, safety of human and their livelihood had continued to persist. The purpose of the study was to establish the impact of electric fence on pastoralist movement in Ol Pejeta conservancy. The general objective of the study was to assess the impact of electric fence on pastoralists in Ol Pajeta conservancy. Cross-sectional descriptive survey and purposive sampling were used to identify the respondents. Interviews and focused group discussions were used for data collection. The conservancy communities could conduct awareness campaigns on the benefits of local communities' participation in conservation efforts and eco-tourism and address the water problem; introduce school feeding programs, pest control mechanisms. The community could be involved as key stakeholders in the conservancy by restoring and maintaining migratory corridors in partnership with the government among other stakeholders in OLpajeta ecosystem. This approach enhances acceptability of the electric fence because it upholds the communities values and priorities, thus eventually mitigating human- wildlife conflict in Ol Pajeta resulting to peaceful co-existence between the communities and wildlife. If this approach of community participation and involvement is enhanced and sustainably managed, such conservancy strategies can be replicated nationally and international as a creative and innovative mitigation strategy for restoration of peace and reconciliation in areas experiencing human- wildlife conflict hotspots. The approach of this magnitude can contribute immensely in biodiversity management, conservation of wildlife resources in Kenya and the rest of the world for socio-economic development now and in future.

**Key words:** *Human Wildlife Conflicts, Electric Fence, pastoralists, movement*

## **1.0 Introduction**

Human-wildlife conflict (HWC) in Kenya and world over focuses on threats posed to wildlife, human and their livelihoods. Conservation of wild species, the security human and their livelihoods play a critical role in sustainable biodiversity and socio-economic development as well as peaceful co-existence (FAO, 2007; Hill, 2004; Muchane et al, 2012 and Madden, 2006). HWC occurs as when demands for more space caused by human population explosion interfere with habitats leading to wild species' contact with humans as they compete for space and natural resources (Animal on the edge, 2010 and Hoare and Du Toit, 1999). HWC is also caused by encroachment on wild species habitat leading to animals straying into human settlements (Fearn, 2010 and Laverdire, 2007). When wild animal interact with humans there is spread of pests (such as ticks, flea, and lice), animal-related injuries (such as bruises, stings and bites) (Langley, 2012), spread of infectious diseases to human and their livelihoods (like swine fever, African swine fever, swine influenza (Carlson, et. al., 2012), foot and mouth as well as and rabies. The feeding habits of large mammals (like elephants, hippos and buffaloes) in over 70% parts of the world are a major threat to food security. For example, in 2005 alone, crops for 12000 families were ravaged and three (3) villagers killed by elephants in the vicinity of Chinese nature

reserves in Xishuangbanna, Southwest Province of Yunnan since wild elephants' population had exploded from 80 to 300 over the past twenty years (Laverdier, 2007). Although HWC had political, biological, ecological and socio-economic significance, the issues on optimization and creative strategies of human wildlife interactions had not been fully exploited. Hence, the need for the current study is justified.

Human-elephants conflicts (HEC) in Africa and Asia are associated with cultivation taking place just next to protected areas (Graham, et al., 2009). Africa alone is home to over 70% of the world population of the large mammals like elephants. (Sitati and Walpole, 2006). Yet, in Africa, elephants invade human settlements and raid crops, cause damage to personal belongings, injure or kill livestock and in instances even injure and kill people (Omondi, et al., 2004). The conflict lead to decline of African elephants (Douglas-Hamilton, 1987). In Ghana, 117 elephant crop damage incidences involving 58 farms belonging to 43 framers were reported (Danquar, Opong and Sam, 2006). In Namibia, 3,194 farm-raided incidences and crop destruction by elephants were reported (Graham & Ochieng, 2008 and Jones and Elliot, 2006). Lions in Tanzania attacked and killed 120 people who were guarding their crops at night (Lavediere, 2007). The global wildlife conservation policy since mid-1990s had been no compensations. If the human felt that their interest were ignored or wildlife had priority over their lives and livelihoods when compensation after attacks or raids were not forthcoming, retaliation was inevitable (Emerton, Bishop, and Thomas, 2006). Human in retaliation, killed wild species indiscriminately, poisoned or engaged in poaching. Rebel militia killed 400 hippos within two weeks in Virunga National Park in Democratic Republic of Congo. In Africa, majority (60%) of the large mammals involved in farm raids and food crop destruction included elephants, hippos and buffaloes causing food insecurity, poverty and injure or kill people as they guard their food crops.

The large mammals' dietary needs serve as a major threat to food security. In Kenya, over 90% of crop raiding incidences of wild animals involve elephants (Gore and Kahler, 2006) and elephants kills people (Omondi, et al., 2004). When elephants stray into food crop farms, they cause heavy losses to farmers (Koch, et al., 1995). Animals destroy food crops and sometimes kill farm owners who try to protect their crops (Hill, 2004). The staple foods' (like Maize, bananas, cashew nuts, pumpkins, sugar canes and onions) time of maturation coincides with the elephants farm raids and crop destruction (Hoare 1999 and Kiiru, 1995). In their rampage, elephants also destroy infrastructure like artificial water points, grain stores, kill or injure livestock apart from interrupting functions like going to school, religious functions and market activities. Yet only 5% of the total claims were compensated in the last 12-years in Kenya

(Ngiro, 1995). Traditional methods did not scare away elephants from their farms. As humans tried to scare away elephants from their farms, 108 people were killed by elephants in Kenya in 1993 (Kangwana, 1995 and Kiiru, 1995a). Lethal elimination (or legal killing) is used to deal with defiant, aggressive and crop raiding elephants to ease human temper while sometimes, illegal killing of elephants occur (Omondi, et al., 2004). In some other instances, elephant translocation was used. In the year 2000, ten elephants were culled from Laikipia which had the highest incidences of conflicts and taken to Meru National Park (Gore and Kahler, 2006). The troublesome elephants could have caused a stir in their new locations. Electric fences were constructed to separate humans from elephants. Some of challenges to that option were uprooting by elephants, tampering, vandalism and theft by local residents or pastoralists on transits or morans in rites of passage activities and higher construction and maintenance costs. The issue of human wildlife conflicts (HWC) around Ol Pajeta eco-system had been there since early 1980s. An electric fence was erected in 2006 as a mitigation strategy to deal with HWC. However, fencing could have confined elephants and densities increased in their habitats (Litoroh, 2002 and Madden, 2004) as well as interfering with pastoralists' movement. Thus biodiversity destruction was likely to increase. Despite the efforts, elephants still raided farms and destroyed crops. That was because as one problem was being resolved new ones emerged. For example, pastoralist communities had their animal movement routes closed leading to tampering and damage to the fence. Hence, creative and innovative biodiversity management strategies are desired.

## **2.0 Problem**

Although heavy investments for construction of electric fence around Ol Pajeta Conservancy as a mitigation strategy had been incurred, the electric fencing interfered with pastoralists' movement patterns and morans' cultural rites activities. Persistent drought and increased animal population in the eco-system has compounded the problem of HWC due to competition for dwindling natural resources like water, vegetations and mineral licks. Consequently, pastoralists' movement patterns and moran rites activities were interfered with by erection of electric fence which acted as barrier that hindered their movements into ,through and from the conservancy. Pastoralists traditionally move into the conservancy during drought seasons in search of pastures and water. While the morans from the same pastoralist communities in the northern use the conservancy as hiding ground and escape route from their cultural moran rites activities which include cattle rustling from farming communities in the southern side of the conservancy. The erection of the electric fence did not serve the interests of the northern pastoralists communities .This perhaps accounts for the high incidence of fence tampering by human beings in the conservancy. The purpose of the study was to establish the impact of electric fence as a mitigation strategy of HWC in the conservancy and its effect on pastoralists' movement patterns and moran rites

activities. The general objective of the study was to assess the impact of electric fence as a mitigation strategy to HWC and its effect on pastoralists' movement patterns.

### *3.0 Literature*

Human wildlife conflicts (HWC) in Kenya and world over is a persistent threat to food insecurity apart from endangering wildlife, human and their livelihoods. Only 11.5% of the all the wild animals in the world can be found in protected areas. That suggested that about 88.5% of the animals had their habitat in the unprotected areas (Gore and Kahler, 2012). Besides, a study by Norton-Griffith (2000) had found that African elephants' population was decreasing. If the humans can live with 88.5% of wild species, then the 11.5% should not cause HWC when wild animals stray into human settlements. Hence, there is need for creative and innovative mitigation strategies to deal with human wildlife conflicts through participatory approaches. In Africa, HWC risks perceptions of elephants' farm raids and crop destruction was also considered and involvement in inclusive approach to research and stakeholders' decision making processes was important. Besides HWC resulting from elephants' farm raids and crop destruction was considered a major threat to food insecurity in Africa (FAO, 2007). Assessment of the threats posed to wildlife and livelihoods in the process of using wildlife deterrence interventions like "bombs" and fences because of smell from chili placed in bombs, ropes that create barriers around the crop field (Graham & Ochieng, 2008 and Gore & Kahler, 2012). Other inventions included communication to reinforce or maintain desirable behavior or restrain people from taking the law into their hands. Although the above strategies were used to scare elephants, electric fencing as a barrier that discourages elephants from conducting farm raids and crop destruction was considered a better option (Hoare, 1995). Electric fence can be thought of as a psychological measure because using wooden poles and electrified wires for fencing off elephants is not a 100% effective besides the cost involved in maintenance.

Kenya has over 1200 Km of game proof fences in various elephant and wildlife ranges and plans to develop another 1300Km are underway. Electric fencing has been done in Laikipia Plateau in Sweet Waters Sanctuary where 105 km<sup>2</sup> is fenced to protect over 150 elephants in wildlife sanctuaries in Nanyuki areas of Oljogi and Elkama. One of the policies of KWS is to protect people and property from injury or damage from wildlife (KWS, 1990). As such, KWS strives to reduce the level of human wildlife conflicts (HWC) in areas where the protected area has high conservation values, (Butynski, 1989) and has used electric fencing, elephant translocation, and establishment of sanctuaries at various pressure points (Bitok *et al.*, 2004). KWS maintains three major fence categories; simple, intermediate and comprehensive fences. Simple fences have (2 – 3) strands designed to restrict elephants.

Intermediate fences are multi-stranded ideal for confining many animals' species in Savannah ecosystems. Comprehensive fences are designed for high potential agricultural areas, (Bitok *et al.*, 2004).

A study by Graham et al. (2009) sought to establish the effectiveness of electric fencing on separating elephants and people to reduce HWC in Ol Pejeta conservancy. The work by Graham et al. (2009) found that farm raid incidences reduced by 43% from 692 in 2005 to 392 in 2007. Initially, the problem of farm raid incidences continued due to unfenced area around southern part of Mutara ADC farm. Later it was fenced also making it possible for elephants to be completely separated from humans (Graham et al, 2009). The same study also indicated that elephants' migratory corridors to Mt. Kenya and the Northern part of Laikipia are accessible. Although Graham et al. (2009) found that electrified fence was a better option in significantly reducing HEC, the cost of maintenance is high.

The study by Graham et al (2009) consider Laikipia plateau as mainly absentee savannah grassland. Besides, the small-scale farming communities and pastoralist communities have a difference in perception about natural resources (Mwajefa, 2012). The pastureland and other land resources might be in unfenced areas but it belongs to the communities. Besides the pastoralists depend on pasturelands for 'shifting grazing' that ensure that grass is not diminished and the land is protected from soil erosion due to overgrazing. As such, the current study sought to establish the impact of the electric fencing on pastoralists' movement.

## 4.0 Results and discussion

The results obtained were analyzed discussed to establish the impact of electric fencing on pastoralist movement. Several hypotheses were tested and discussed as shown below.

### 4.1 Test of hypotheses

$H_{01}$ : **Electric fence has no effect on the socio-cultural fabric of the communities**

Table 1 shows the views of the non-cultivating communities (pastoralists)

Table 1: **Pastoralist Communities' View of Electric Fence**

| Electric fence:                                  | Agree |      | Disagree |      |
|--|-------|------|----------|------|
|  | F     | %    | F        | %    |
| a) Helped the community from wildlife farm raids | 4     | 17.4 | 19       | 82.6 |
| b) Helped deal with crops destruction            | 3     | 13.0 | 20       | 87.0 |
| c) Affected Moran rite movements                 | 23    | 100  | 0        | 0.0  |
| d) Affected Pastoralist movements                | 21    | 91.3 | 2        | 8.7  |
| e) Affected inter-community interactions         | 21    | 91.3 | 2        | 8.7  |
| f) Protects government's wildlife                | 23    | 100  | 0        | 0.0  |
| g) Is a project to benefit the rich              | 20    | 86.9 | 3        | 13.1 |
| h) Is beneficial to the community                | 2     | 8.7  | 21       | 91.3 |

|  |    |      |   |     |
|--|----|------|---|-----|
| i) Is donor funded project for wildlife benefits | 22 | 95.6 | 1 | 4.4 |
|--|----|------|---|-----|

n = 23

The results in Table 1 show that the pastoralist communities view the fence as an obstruction and an intrusion to the communal activities with over 70%(n=23) in favor of nomadic lifestyle and disinterested with protection of cultivated food crops or wildlife at over 70%(n=23). Results of Pearson’s correlation ( $r_{12} = 0.874$ ,  $p = 0.05$ , n = 23) indicated a strong positive relationship between the pastoralists’ attitude and tampering of the electric fence in Ol Pejeta. Therefore the researchers rejected the null hypothesis  $H_{01}$  and accepted the alternate. As such, the electric fence affected the socio-cultural fabrics of the pastoralists’ communities. The pastoralists perceive that the “rich man” dominates over them, by shrinking their grazing land and watering points. Cultivation is perceived as “kuharibu nyasi” (interfering with grazing land). Their need for green pasture and water from the natural resources available whether in protected areas or open grassland is more important than conservation of wildlife. The current study found that the agro-pastoralists and pastoralist communities have differences in perception of the role of natural resources name pasture, water and land. The current study concurred with what Muthoni et al (2012) found that scarcity of pasture and water fuel conflicts, Laikipia plateau is a water scarce locality, improved technologies lead to use of more water for irrigation hence tilling of more land that was formerly pastureland deplete pasture-land and reduce grass for pastoralist and consultation of local communities and local communities participation in bio-diversity planning and management can lead to development of increased willingness to participate in conservation effort.

$H_{02}$ : Electric fencing **in Ol Pejeta conservancy has no impact on pastoralists’ movement**

Table 2 shows the opinion of the pastoralists’ community on the impact of electric fencing in Ol Pejeta conservancy on their movement

Table 2: Men and Women Opinion on impact of electric fencing on pastoralists’ movement in Ol Pejeta ecosystem

0-Unsure, 1-Strongly Disagree, 2- Disagree, 3-Agree, 4-Strongly Agree

| Statement  | Male | Female |
|--|------|--------|
| Electric fencing blocked routes to certain parts of the pastureland  | 3.50 | 3.70   |
| Occupied and unoccupied grassland belongs to the community           | 3.60 | 3.80   |
| Elephants belong to the government while livestock belongs to people | 3.10 | 4.00   |
| Cultivation of pastureland “nikuharibu nyasi”                        | 3.80 | 3.60   |

|  |      |      |
|--|------|------|
| Pastoralists need large space to graze without causing soil erosion                            | 3.20 | 3.80 |
| Pastoralists move from one place to another in search of water and greener pastures            | 3.10 | 3.80 |
| Green pasture is suitable for multiplication of livestock and production of milk               | 3.20 | 3.40 |
| Electric fencing prevent pastoralist from accessing certain part of pasture in protected areas | 3.20 | 3.90 |
| Drought is a major threat to pastoralists livelihoods  | 3.10 | 3.80 |
| Pastoralists co-exist with elephants if they do not injure, kill people or livestock           | 2.30 | 3.50 |

$N_1=45$  men and  $N_2=65$  women

The results in Table 2 showed that the level of agreement with opinions of men and women on the impact of electrified fencing on pastoralists' movement was high. Hence, the null hypothesis was rejected and alternate accepted. The current study concurred with what Kimuyu (2012) asserted that movement of pastoralists and their livestock is important due to the socio-economic benefits of livestock rearing. Kimuyu (2012) noted that savannah ecosystems have supported thriving pastoralist economies for over 3000 years, the livestock raised by pastoralists is worth US\$800 million per year and Kenya's livestock production accounts for 24% of total agricultural output. Similarly, the current study concurred with what Mwenzwa (2012) had found that arid and semi-arid areas like the Laikipia plateau is home to two-third of Kenya pastoralists and agro-pastoralist total population who lack basic human development indexes and register higher poverty indexes, yet they contribute about 5% of the Gross Domestic Product (GDP) through livestock production.. The current study agreed with the findings by Mwenzwa (2012) and Chesire & Mwenzwa (2012) that pastoral-nomadic communities face challenge such as extended drought, low literacy levels, unemployment and shortage of water. The challenges are compounded by the practice of accumulation of livestock for customary practices and payment of fines if found guilty of an offence. Hence, there is need to consider providing pastoralists avenues to gain access to the conservancy with out discrimination to allow sustainable use and provide the movements of pastoralist which can encourage bio-diversity management (Kimuyu, 2012) and encourage co-existence.

**$H_{03}$ : The electric fence in Ol Pajeta conservancy is not effective in mitigating human wildlife conflict**

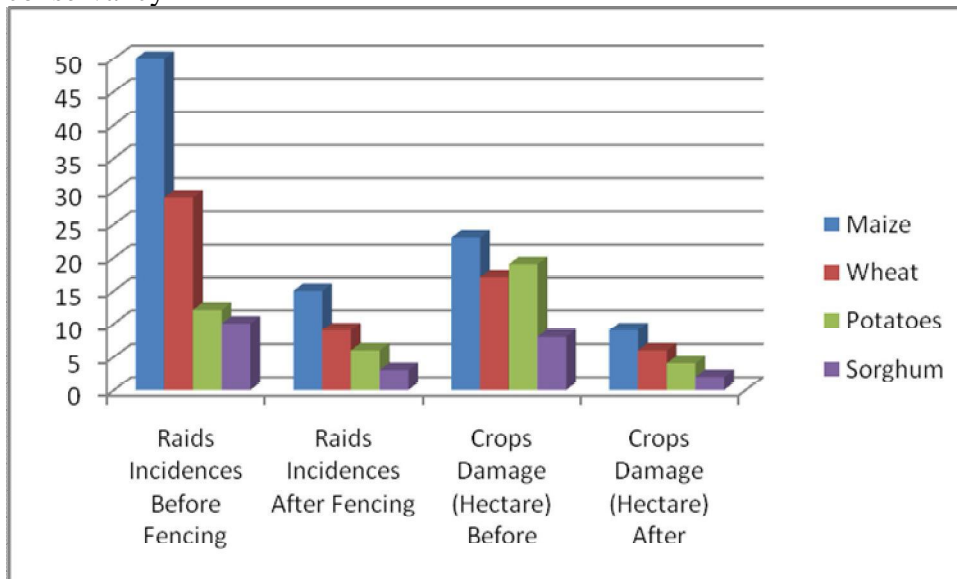


The results of Table 3 shows farm raid incidences and crop damages before and after the electric fence of Ol Pajeta conservancy

Table 3: Results on farm raid incidences and crop damages before and after the electric fence of Ol Pajeta conservancy

| Crop     | Raids Incidences Before Fencing | Raids Incidences After Fencing | Crops Damage (Hectare) Before | Crops Damage (Hectare) After |
|----------|---------------------------------|--------------------------------|-------------------------------|------------------------------|
| Maize    | 50                              | 15                             | 23                            | 9                            |
| Wheat    | 29                              | 9                              | 17                            | 6                            |
| Potatoes | 12                              | 6                              | 19                            | 4                            |
| Sorghum  | 10                              | 3                              | 8                             | 2                            |
| Totals   | 111                             | 33                             | 77                            | 21                           |

Fig1: Farm raid incidences and crop damages before and after the electric fence of Ol Pajeta conservancy



The results in table 3 and figure 1 show the opinion of the cultivating communities that the electric fence played an important role in reducing farm raid incidences and crop damages. The Pearson's correlation analysis of farm raids incidences and crop damages before and after the electric fence was a high positive relationship ( $r_{12} = 0.908$  at 0.01 level (2-tailed)). Over seventy nine percent of the farmers interviewed acknowledged that elephants' raids were frequent before the installation of the electric fence ( $n=110$ ). 79.4 % of them reported that the electric fence had reduced raids by elephants, (Table 1, Table 2 and Figure 1). The finding of this study agrees with what Knickerbockers and Waithika (2005) and Madden (2004) that electric fence can be a solution to HWC with both positive and negative consequences' to local communities. One of the negative impacts of the electric fence relates to the lifestyles and life

patterns of the pastoralists communities. Their feelings and welfare was completely overlooked. Electric fence interfered with their socio-cultural fabrics. As such, the view of the fence and an intrusion and obstruction to movement and social interactions results in tampering with the fence.

The cultivating farmers observed that the electric fence did not fully deter elephants from farm raids and crop destruction. There are still some instances of raids and crop destruction. Although villagers guard their farms against the few incidences of farm raids and crop damage, it is difficult to do so especially after the fence was put up because it is difficult to know where the elephants aim at. The villagers would like to get the support of the conservancy guards in taking care of their farm produces from damage. However, this suggestion could be explained by what Jones and Elliots (2006) found that it may be equally difficult for the guards to know where the elephants aimed. The challenges associated with constants elephants farm raid incidences include noise as farmers try to scare them, tearing of roofs of grain stores, property damages, breaking of fences and inflicting fear and insecurity to resident. In the event that elephants become adamant and aggressive the local don't have authority to carry out lethal elimination. KWS is officers can be called but sometimes take time to respond due human and logistical obstacles. Further more, Lervedire (2007) observed that restrictive laws prevent people from hunting problem animal species. The conservancy management among other conservancy agent may need to appreciate the agreement of findings of this study that in Kenya, elephants are responsible of three quarters of crop damages on crops (FAO, 2009). Furthermore, staple food-crops such as maize, millet and potatoes are constantly destroyed in Ol Pejeta conservancy and farmland around protected areas. Hence, ownership of large animals associated with the government-rural population demand wildlife authorities and government to protect them from animals menace.



## **4.2 Other pertinent issues raised by local communities**

In the interview and focused group discussions, some of the issues raised on HWC by the local communities that directly or indirectly impact the OI Pajeta eco-system included the following

### **4.2.1 Peace and reconciliation in OI Pejeta**

The communities' peace has from time to time been interrupted by the morans' rite raids by the communities from the northern side of the OI Pejeta conservancy. The conflict is caused by the morans because they come carry out cattle rustling of the few domestic animals belonging to the crop farming communities around OI Pejeta as a prerequisite condition for young men to pass the rite of passage and recognition by the community as a warrior hence qualification for marriage. The conservancy serves as hiding ground when they are spying, immediately after they execute the rustling raids. However, the electric fence acted as distracter to morans' movements with cattle that are stolen from southern community. It sealed off the exit routes of the morans' rite raiders. Hence the raiders could tamper with the electric fence in their flight and this has significantly resulted more farm raid incidences and crop damage by elephants which get easy access to farms. The current study findings concurred with what Mwenzwa (2012) had found that pastoral-nomadic communities engage in cattle raiding for accumulation of livestock among other cultural rites that require that their forested hide-outs during rites such as circumcision are available. Besides, their increased demand for pasture and water calls for construction of livestock watering points to cater for livestock water needs.

### **4.2.2. Pastoralists overgrazing and presence of IDPs**

From time to time, drought force the communities from the north to migrate to the eco-system hence causing an over strain on the vegetation and water sources because of over-paddockging. If the by-laws in place can be followed, they can be encouraged to ensure that a low number of animals can be better to co-exist with non-original-pastoralist communities. In the recent past, the internally displaced persons (IDPs) who were victims of post election violence of 2007/2008 are in the process of being settled. Their settling down may increase the strain on wildlife resources. This is because conversion of range land to small-scale farming holdings and land fragmentation had been cited as a major cause of human wildlife conflicts (FAO, 2009). The individuals to be settled were formerly in rich agricultural areas and as such their desire is to practice small-scale farming. Although their farming activities might not look economically viable, their effort to gain a decent living will propel them to work hard. The agencies

concerned can attempt to ensure that their settling is complete and harmonious to prevent a possibility of causing a threat to the bio-diversity conservation

#### **4.2.2 Health Services and Shortage of water in Ol Pejeta**

The local communities usually walk for long distances to access health care. Some of them travel as far as Nyahururu, Nyeri or Nanyuki to access maternity services and basic medical consultancy. What the people desire is health care at whatever cost. The source of water is a major cause conflicts with wildlife and between the locals. Hence, alternative water point to elephants away from the main source for livestock and domestic use could be availed. Shortage of water in Ol Pejeta has been a major set-back to the mitigation strategies used to deal with HWC and support co-existence through sustainable use and socio-economic development in the eco-system. The problem of water shortage escalates due to over-use of river water for irrigation at the source of River Uaso-nyiro, while existing dams are few and some are non-functional, the cost of bore-hole pumps, maintenance is high for the local communities to poor management and persistent drought. Burning of grass to control pests and its effects on pasture for livestock

Burning of pastureland by some pastoralists to control pest like ticks has been found to be a disaster especially when the rains are not forthcoming. Apart from that burning in savanna grassland if not controlled can cause a big loss to lives and property. The effect of burning to the bio-diversity conservation can not be overlooked because when wildlife does not get grass in the protected areas, will cause damage to the fence as they get out finding pasture. Alternative ways of dealing with pest can be identified and implemented.

#### **5.0 Summary, Conclusion and Recommendations**

The cultural activities of the morans like their rites can be incorporated into the schemes that enrich the eco-tourism. To increase their participation in creative and innovative conservancy management, inclusive consultation is encouraged and envisioned. Conservation authorities could make the communities accept that the benefits derived from the conservancy outweighs the perceived losses incurred as a result of HWCs. Provision of alternative water points for elephants away from the main source of livestock and domestic use could be constructed. The harvesting of rain and storm water and initiating water projects could be done. The conservancy could work with local leaders to source for funding to initiate quality health care projects. Making the communities benefit from the income by construction of schools and school feeding programs, pest control mechanism by KWS and the Ol Pajeta Conservancy. The conservancy could be encouraged to conduct awareness campaigns on the benefits of local communities' participation in conservation efforts and eco-tourism. The involvement of the community in decision making processes, restoring and maintaining migratory corridors in partnership

with the government and other stakeholders could be encouraged. This approach enhances acceptability of the electric fence because upholds the communities' priorities eventually mitigating human wildlife conflict in Ol Pajeta resulting in peaceful co-existence between the communities and with wildlife. When sustainably managed, it can be replicated as a creative and innovative mitigation strategy for restoration of peace and reconciliation in human wildlife conflicts.

## References

- Animal on the edge (2010).** Animals on the Edge: Slovakia project addressing the issue of human/wildlife conflict in the Tatra mountains, author, Lynch Lane, Weymouth, UK available at: <http://www.animalsontheedge.org>
- Carlson, J. C., Ellis, J. W., Tupper, K., Franklin, A. B., and Linz, G. M. (2012).** The effects of European starlings and ambient air temperature on salmonella enterica contamination within cattle feed bucks in human-wildlife interaction
- Chesire, M. and Mwenzwa, E. M (2012).** Harnessing alternative conflict resolution strategies for sustainable peace in kenya: a civil society perspective. In
- Cousins, J. A., J. P. Sadler, and Evans, J. (2008).** Exploring the role of private wildlife ranching as a conservation tool in South Africa: stakeholder perspectives. *Ecology and Society* 13(2): 43. [online] URL: <http://www.ecologyandsociety.org/vol13/iss2/art43/>
- Danquah, E., Oppong, S.K. and Sam, M.K. (2006).** Aspects of Elephants Crop Raiding Behavior in Kakum Conservation Area, Ghana in (FAO, 2007). Human wildlife conflicts Nature and Faune, Vol. 21 issue 2, Accra, Ghana, Food and Agriculture Organization of the United Nations (FAO), Available at [www.fao.org/world/regional/raf/workprog/forestry/magazine\\_en.htm](http://www.fao.org/world/regional/raf/workprog/forestry/magazine_en.htm)
- Emerton L., Bishop, J. and Thomas, L. (2006).** Sustainable financing of protected areas: a global review of challenges and options in (FAO, 2007). Human wildlife conflicts Nature and Faune, Vol. 21 issue 2, Accra, Ghana, Food and Agriculture Organization of the United Nations (FAO), Available at [www.fao.org/world/regional/raf/workprog/forestry/magazine\\_en.htm](http://www.fao.org/world/regional/raf/workprog/forestry/magazine_en.htm)
- Fearn, E. (Ed) (2010).** State of the Wild 2010-2011: A Global Portrait. Washington D.C., Wildlife Conservation and Island Press, State of the Wild
- Food and Agricultural Organization (FAO) (2009).** Human Wildlife Conflicts in Africa: Causes, Consequences and Management Strategies, FAO Forestry Paper 157.
- FAO (2007). Human wildlife conflicts Nature and Faune, Vol. 21 issue 2, Accra, Ghana, Food and Agriculture Organization of the United Nations (FAO), Available at [www.fao.org/world/regional/raf/workprog/forestry/magazine\\_en.htm](http://www.fao.org/world/regional/raf/workprog/forestry/magazine_en.htm)
- Gore, M. L., Kahler, J. S. (2012).** Gendered Risk Perceptions Associated with Human-Wildlife Conflict: Implications for Participatory Conservation in Somers (Ed.) (2012, March 5<sup>th</sup>) Michael, Pretoria, PLoS ONE 7(3): e32901. doi:10.1371/journal.pone.0032901

Government of Kenya. *Kwale District Development Plan Report*. 1979-1983. Potential Land Uses in Kwale District.

Government of Kenya. Ministry of Environment and Natural Resources. *The Kenya National Biodiversity Strategy and Action Plan*. March 2000.

Government of Kenya. National Development Plan and District Development Plan, Kwale District, 1979-1983; 2002-2008.

**Hoare, R. E. (1999)**. Determinants of human-elephant conflict in a land-use mosaic. *Journal of Applied Ecology*. **36**:689-700.

**Hoare, R. E. & Du Toit J. T. (1999)**. Coexistence between people and elephants in African Savannas. *Conservation Biology*.**13**: 633-639.

**Human- Wildlife Conflict Collaboration (HWCC, 2012)**. Benefiting Conservation through Conflict Resolution Available at: <http://www.humanwildlifeconflict.org> downloaded on 9/07/2012 at 8 pm.

**Jones, B. T. B. and Elliott, W. J. (2006)**. Experience Human wildlife conflict in Namibia: Experience from a Portfolio of Practical Solution (FAO, 2007). Human wildlife conflicts Nature and Faune, Vol. 21 issue 2, Accra, Ghana, Food and Agriculture Organization of the United Nations (FAO), Available at [www.fao.org/world/regional/raf/workprog/forestry/magazine\\_en.htm](http://www.fao.org/world/regional/raf/workprog/forestry/magazine_en.htm)

**Kangwana, K. (1995)**. Human-Elephant conflict: The challenge ahead. *Pachyderm* **19**:11-15.

**Kibet, D. (2012, June 21<sup>st</sup>)**. 'Lions speared: Kenya's Human Animal Conflicts grow' in *Rapid City Journal*, Nairobi, Associated Press. Available at: [http://rapidcityjournal.com/news/lions-speared-kenya-s-human-animal-conflicts-grow/article\\_0d240354-bbba-11e1-bcff-001a4bcf887a.html](http://rapidcityjournal.com/news/lions-speared-kenya-s-human-animal-conflicts-grow/article_0d240354-bbba-11e1-bcff-001a4bcf887a.html).

**Kiiru, W. (1995a)**. The current status of human-elephant conflict in Kenya. *Pachyderm*.**19**:15-20.

**Koch, P. L., Heisinger, J., Moss, C., Carlson, R.W., Fogel, M.L. & Behrensmeyer, A.K. (1995)**. Isotopic Tracking of Change in Diet and Habitat Use in African Elephants. *Science*. **267**:1340-1343.

**Lamprey, R. H. & Reid, R. S. (2004)**. Expansion of human settlement in Kenya's Maasai Mara: what future for pastoralism and wildlife? *Journal of Biogeography* **31**: 997–1032.

**Langley, R. L. (2012)**. Animal-related injuries resulting in emergency department visits and hospitalization in the US 2006-2008 in human wildlife interaction 6(1):123-136, Spring 2012. North Carolina, Department of Health and Human Services available at

[http://www.berrymaninstitute.org/journal/spring2012/HWI\\_6.1\\_Book.pdf](http://www.berrymaninstitute.org/journal/spring2012/HWI_6.1_Book.pdf)

**Litoroh, M. (2002).** Aerial elephant count in the Shimba Hills ecosystem, Kenya. *Pachyderm*. **32**:55-63.

**Lynch, J. (2008).** Book reviews of Adams, C. E., Lindsey, K. J. and Ash, S. j.(2006). Urban wildlife management, Boca Rato, florida, USA in *human wildlife conflicts* 2(1):136-138, spring 2008.

**McLerran, D. (2011)** archeology's new frontier in popular archeology vol 4 September 2011 available at <http://popular-archaeology.com/issue/september-2011/article/space-archaeology>

**Madden, F. (2004)** Creating coexistence between humans and wildlife: global perspectives on local efforts to address human-wildlife conflict in *Human dimensions of wildlife*, 9:247-257, 2004, Washington DC, Taylor and Francis Inc. ISSN: 1087-1209

**Muthoni, D.M., Gichohi, P.M. and Bariu, R. M. (2012).** Influence of Electric Fence on Human Wildlife Conflicts Around Ol-Pejeta Conservancy in Kenya. In 1<sup>st</sup> international conference on natural resources-, Karatina University College, Karatina, Karatina University College.

**Mwajefa, M, (2012, August 24<sup>th</sup>)** 'History of wars between herders and crop farmers'. Nairobi. Friday Daily Nation, p17, col 1&2.

**Mwenzwa, E. M. (2012).** Enhancing Sustainable Dry-land Development in Kenya: Environmental and Anthropogenic Challenges and Research Priorities. In 1<sup>st</sup> International Conference on Natural Resources-, Karatina University College, Karatina, Karatina University College.

**Nation media Group (2012, June 23<sup>rd</sup>).** 'Lions at park reduced to 30' in *Saturday Nation*. Nairobi. Author, p11 col. 2, 3 &4

**Ngure, N. (1995).** People-elephant conflict Management in Tsavo, Kenya. *Pachyderm* **19**: 20-25.

**O'Connell-Rodwell, C. E., Rodwell T., Rice, M., & Hart, A. L. (2000).** Living with the modern conservation paradigm: Can agricultural communities co-exist with elephants? A five year case study in the East Caprivi, Namibia. *Biological Conservation*. **93**:381-391.

**Packer, C., Ikanda, D., Kissui, B., and Kushnir, H. (2006).** The ecology of man-eating loins in Tanzania in (FAO, 2007). *Human wildlife conflicts Nature and Faune*, Vol. 21 issue 2, Accra, Ghana, Food and Agriculture Organization of the United Nations (FAO), Available at [www.fao.org/world/regional/raf/workprog/forestry/magazine\\_en.htm](http://www.fao.org/world/regional/raf/workprog/forestry/magazine_en.htm)

**Schumaker, A., Peck, D. E. and Kauffman, M. E. (2012).** Brucellosis in greater Yellowstone area: disease management at the wildlife-livestock interface in *human-wildlife interaction* 6(1). Check page numbers.

**Thouless, C. R. and Sakwa, J. (1995).** Shocking Elephants: Fences and crop raiders in Laikipia District, Kenya. *Biological Conservation*. **72**: 99-107.