



Wildlife-Human conflicts and community perceived benefits with proximity to Meru National Park, Kenya

Gervase M. M'ibui^{1*}, Caroline K. Karani¹, Ananias N. Nkonge¹ and Edward M. Ireri²

¹ Meru University of Science and Technology ² African Medical Research Foundation

ARTICLE INFO

ABSTRACT

KEY WORDS

Animal-human conflict

Wildlife-human interface

Meru National Park

Background: Communities and wildlife living in close proximity bear the brunt of direct impacts from human-wildlife conflicts (HWC). HWC can lead to hostility to animal species and loss of livelihoods and spread of infectious diseases. However, few studies have examined HWC and perceived community benefits with proximity to wildlife conservancies. We examined HWC and perceived community benefits of residents bordering Meru National Park, Kenya.

Methods: Data were collected via a structured questionnaire and focused group discussion guide in a cross-sectional study. Ethical clearance was obtained from Meru University of Science and Technology Ethical Review Committee (MIRERC). Authority to carry out interviews was sought from the County Government of Meru. Data were coded and analysed through STATA and summarized using descriptive statistics.

Results: Overall, 96.7 % of the study population were aware of human-wildlife conflict or had experienced it. Elephant, monkey, hyena, lion and the leopard were the frequently reported conflict animals to cause crop damage, loss of livelihood, bodily injuries and destruction of property.

Conclusions : Only 26.6% of respondents were aware of benefits associated with proximity to the park. A multifaceted approach through KWS, community and government urgencies is essential in the management of HWC, to improve corporate responsibilities and minimization of spread of zoonoses.

Introduction

Human Wildlife Conflict (HWC) is defined as negative interactions between people and wild animals resulting to adverse impact for both entities and damages to property and environment¹. This has been attributed to population growth and encroachment to wildlife conservation areas, hence competition for resources.^{1, 2} Over the years, wildlife-human conflicts have occurred and

will continue to jeopardize human and wildlife co-existence despite ground breaking recommendations dating back to many years.³ This is expected going forward, with regards to changing environment. More so, human-wildlife conflicts will be enhanced due to climate change, animal migration, land use, livestock management, agricultural practices as well as infrastructure expansion and urbanization.⁴ Consequently, wild animals that

Corresponding author: Gervase M. M'ibui Email: gmiriti@must.ac.ke

<https://doi.org/10.58506/ajstss.v2i2.144>

threaten personal safety and lead to property damage are perceived as menace to the community.⁵

HWC has gained stakeholders attention over the years since the international union for the conservation of nature (IUCN) highlighted the issue to the global community.³ This was followed by development of recommendations that were geared towards strengthening HWC management in protected areas and conservancies. The stakeholders addressed establishment of a national forum, capacity development, national and international cooperation as well as funding.⁶ However, despite these attempts and gains made from wildlife conservation so far, governments and HWC managements still lack well-defined, universal and integrated approaches to focused transfer of benefits of human and wildlife co-existence to neighboring communities. This situation is aggravated by increasing competition of resources including land and water driven by agricultural activities, mining and logging hence diminished natural habitat for wildlife¹. Furthermore, impact of HWC has not been well addressed and this has derailed achievement of United Nations Sustainable Development Goal number fifteen.⁷ Addressing drivers of HWC is important to realizing harmonious human-wildlife coexistence.⁸

Communities living near parks experience negative impacts as a result of conflict arising from

Characteristic	Category	Igembe
Gender	Female	90 (32.8%)
	Male	184 (67.2%)
Marital status	Single	23 (8.4%)
	Married	216 (78.8%)
	Widowed	10 (3.6%)
	Divorced	25 (9.1%)
Religion	Catholic	40 (14.6%)
	Protestant	229 (83.6%)
	Others	5 (1.8%)
Education	No formal education	18 (6.6%)
	Primary	199 (72.6%)
	Secondary	46 (16.8%)
	Post-secondary	11 (4%)
Occupation	Peasant	252 (92%)
	Civil servant	3 (1.1%)
	Entrepreneur	16 (5.8%)
	Casual	3 (1.1%)

Table 1: Socio-demographic characteristics

wildlife interaction. For instance, wildlife-human conflict has led to destruction of agricultural crops causing food insecurity, loss of livestock, death of humans and possibly, disease transmission.⁹ In such instances communities have resulted to self-mitigation measures that lead to injury or killing of animals.¹⁰ Results of studies conducted in wildlife parks in Kenya reveal that wildlife-human conflict is a prevalent challenge.⁹ However, relatively few studies have been conducted to assess the nature of human-wildlife conflicts and perceived community benefits within the park vicinity. This study sought to examine the types of HWC among residents bordering Meru National Park Kenya and perceived benefits of living within

Causes of wildlife-human conflict	Yes	No	Total
Broken Fences in the Park	167 (60.9%)	107 (39.1%)	274 (100%)
Wild animals searching for food and water in the community during droughts	123 (44.9%)	151 (55.1%)	274 (100%)
Decrease of pasture for wildlife in the park	116 (42.3%)	158 (57.7)	274 (100%)
Illegal grazing of livestock in the park	9 (3.3%)	265 (96.7)	274 (100%)
Illegal hunting	3 (1.1%)	271 (98.9%)	274 (100%)
Charcoal burning and fetching firewood	2 (0.7%)	272 (99.3%)	274 (100%)

Table 2: Causes of wildlife-human conflicts

Conflict Animal	Yes	No	Total
Elephant	213 (77.7%)	61 (33.3%)	274 (100%)
Monkey	206 (75.2%)	68 (24.8%)	274 (100%)
Hyena	160 (58.4%)	114 (41.6%)	274 (100%)
Lion	114 (41.6%)	160 (58.4%)	274 (100%)
Leopard	89 (32.5%)	185 (67.5%)	274 (100%)
Bird	60 (21.9%)	214 (78.1)	274 (100%)
Snake	2 (0.7%)	273 (99.6%)	274 (100%)
Gazelle	1 (0.4%)	273 (99.6%)	274 (100%)
Porcupine	1 (0.4%)	273 (99.6%)	274 (100%)

Table 3: Conflict animal

Authority to whom conflict was reported	Yes	No	Total
Game warden	186 (67.9%)	88 (32.1%)	274 (100%)
Chief	31 (11.3%)	243 (88.7%)	274 (100%)
Agricultural officer	26 (9.5%)	248 (90.5%)	274 (100%)
Police	24 (8.8%)	250 (91.2%)	274 (100%)

Table 4: Authority to who conflict was reported

Measure taken	Frequency	Percentage
Trapping	100	36.5%
Fencing	2	0.8%
Nothing was done	172	62.7%
Total	274	100

Table 5: Measures taken by the government when last conflict was reported

Type of mitigation measure	Self-measure taken	No measure taken	Total
Keeping guard at night	180 (65.7%)	94 (34.3%)	274 (100%)
Fencing own property	63 (23%)	211 (77%)	274 (100%)

Table 6: Self-Mitigation Measures against conflict

the wildlife-human settlement interface zone.

Methodology

We employed a structured questionnaire and focused group discussion guide in a cross-sectional study design to interview household members living at the Wildlife-Human settlement interface of Meru National Park in the month of April 2021. The study was cleared by the Meru Uni-

versity of Science and Technology Ethical Review Committee (MIRERC) and authority to conduct interviews sought from the County Government of Meru. Data were coded and analysed through STATA and summarized using descriptive statistics and presented in tables and graphs.

Results

There were no significant findings on gender, marital status, religion, education, and occupation. This is summarized in Table 1. Reasons associated with conflicts included broken fences and animals searching for food and water in the community as shown in Table 2. The frequently reported animals that cause conflict in this community were, elephants, monkeys, hyenas, lions and leopards and birds as shown in Table 3. Most of the conflicts were reported to the game wardens, agricultural officers, chiefs or the police in that order, as shown in Table 4.

72% (n=274) of the respondents reported that no measure was taken by the government after occurrence of a conflict but 36.5% and 0.8%

Type of benefit	Frequency	Percentage
Employment	20	7.2
Provision of clinics	19	6.9
Building schools	12	4.4
Provision of water	2	0.7
Roads	1	0.5
Beefing up security	19	6.9
Reported No benefits	201	73.4
	274	100.0

Table 7: Economic benefits associated with proximity to the Park

reported trapping of the animals and fencing of the park conservancy was done. (see Table 5). Self-mitigation measures included fencing property (23%), guarding property at night (65.5%) though others did not take any measures. (Table 6).

Majority 73.4% (n=274) did not report any benefits derived from nearness to the park. Employment and provision of medical clinics were cited by 7.2% and 6.9% of the respondents respectively, while enhancement of security and building of schools was cited by 6.9% and 4.4% respectively. (Table 7)

Discussion

This study interviewed a total of 274 respondents. More males than females answered to the questionnaire at 67.2% and 32.8% respectively in the month of April 2020. Men in the study area predominantly engage in miraa (Khat) business and would therefore not have been expected at home during the time of the study. However, more males than females were probably interviewed during the time because many businesses had closed down due to Covid-19 pandemic rendering most men redundant. Moreover, men in the study area are culturally responsible for making decisions on family matters and therefore females gave a chance to males present to answer to the questionnaires.

The mean age of the interviewees was 43.9 years, with a standard deviation of 11.6 years. Majority of the participants (92%) were peasants.

Overall, 96.7 % of the study population was aware of wildlife-human conflict. Gender, marital status, religion, education, and occupation of respondents was not significantly associated with awareness on wildlife-human conflicts.

Improved livelihood with proximity to the park significantly differed between males and females $\chi^2 (2) = 11.24, p = 0.004$ and $\chi^2 (2) = 1.08, p = 0.58$ respectively. This could be attributed to the role of men in the African culture as primary decision makers both at the household and societal levels. This finding is consistent with studies which previously looked at the role of men in the African set-up with regards to decision making.¹¹

Having formal education had a significant influence on awareness to improved livelihood: $\chi^2 (2) = 12.16, p = 0.002$. This could be expected because previous studies indicate that education attainment has a positive impact on overall health. It equips an individual with abilities such as reasoning, knowledge and skills to address health issues.¹² Interestingly, one of the benefits mentioned as a Health Facility in the Park, could have resulted to this statistical significance.

Unpredictably, being married had a significant effect on awareness to improved livelihood compared to being single, widowed and divorced: $\chi^2 (2) = 12.06, p = 0.002$. This could be as a result of use of facilities in the park such as Health Centre for treatment of common diseases and Maternal and Child Health services.

Various wild animals were mentioned as agents of HWC in this study. Our study agrees with previ-

ous ones where different wildlife species have been documented to cause conflicts with humans.^{9,13,14} A similar trend was noticed in analyses of wildlife human conflict over 16 years span in Narok County Kenya which revealed that 90% of all incidents were due to six animal species including non-human primates. These were elephant (46.2%), buffalo (10.6%), Burchell's zebra (7.6%), leopard (7.3%), spotted hyena (5.8%) lion (3.3%) and non-human primates 11.7%. Similar studies conducted in various wildlife reserves in Kenya portray the same. For instance, a study that examined human-wildlife conflicts in Tsavo and Maasai Mara wildlife conservatories in Kenya informed that most cases were triggered by African elephant for both the Tsavo (64.3%) and Mara (47.0%). This was followed by primates Tsavo (11.4%), and Mara (11.8%) besides buffalo Mara (11.3%) and Tsavo (5.5%). Among the carnivore species, lions had the highest but non-significant number of reported cases followed by the spotted hyena and the leopard. However, our study disagrees with a study in the Mara/Tsavo area, where carnivores made a minor contribution to the conflicts relative to the large herbivores.¹⁴ The variance is attributed to high elephant density in Tsavo and Mara which are premier wildlife reserves in Kenya relative to the smaller size of the wildlife park featured in this study. Nonetheless, this does not underestimate conflict from other animals like the birds which usually cause major damage to crops in our study.

Results of these previous studied are consistent with findings of this study. Frequently reported animals that cause conflict in this community are, elephants, monkeys, hyenas, lions and leopards at 77.7%, 75.2%, 58%, 41.6% and 32.5% respectively. To a lesser extent, birds were also reported to contribute to animal/human conflict.

A variety of conflicts reported in this study included crop damage, loss of livestock and human life; bodily injuries and destruction of property at 84.7%, 56.6% , 28.8% and 18.2% respectively. The study concurs with the findings of⁹ which reported crop raiding, human attacks, livestock pre-

dition, and property damage. The studies concur because the conflicts occurring are not permanently addressed in all areas where studies.

Our study revealed seasonality to be an important predictor of animal-human conflicts. This is consistent with other studies^{1,4,15}. In the study, most of the conflicts were due to broken fences in the Park (60.9%) paving way for animal access to the community land while in search of food and water. Similarly, droughts (44.9%) and decreased pasture for wildlife in the park (42.3%) contributed to these conflicts. Other minor causes include illegal grazing of livestock and hunting in the park at (3.3%) and (1.1%) correspondingly. It concurs with findings of others¹⁶ that reported similar causes of human-wildlife conflicts. Hunting and animals searching for food and water was reported in the study. Consumption of bush or sharing drinking water sources with animals can put people at greater risk of contacting zoonoses. Our study concurs with¹⁶ on this aspect. Indirectly, these acts may result to transmission of zoonotic diseases, although this study did not explore disease transmission options.

Over the years, rising population has led to limited land for settlement fueling animal/human conflict due to competition for diminishing resources. The mean age of the respondents was 43.9 years, with a standard deviation of 11.6 years. Demographically, the respondents comprised of a young population who were peasants at 92%. They could have moved next to the park in search of arable land. This finding agrees with others that found change in land use and infrastructural development exacerbated human wildlife conflict.^{14,17}

More than half of the conflicts were reported to the game wardens at 67.9%, chiefs 11.3% while others were reported to the police or agricultural officers. However, 19.3% of the population did not report conflicts at all. Two thirds of participants reported no action was taken by the government despite conflicts having been reported. Nevertheless, almost a third (29.2%) said that conflict animals were trapped by wardens and tak-

en back to the park after reports were made to the wardens.

It remains unclear why majority of the respondents reported no action was taken by the government yet regulations on compensation for HWC exists.¹⁸ Wildlife Conservation and Management Act provides for compensation for personal injury, death, damage to property and crops or livestock predation.¹⁹ However, the act states that where the compensation committees discover that the victim did not take reasonable measures to protect themselves and their property, then compensation would be denied.¹⁸

Our study found that self-mitigation measures included fencing property (23%) and guarding property at night (65.5%). Others did not take any precautionary measures. These result are consistent with similar mitigation strategies employed by residents of communities in other studies.¹⁶ This is supported by WildlifeDirect Kenya, an organization that endorses similar solutions to prevent HWC.¹⁸

Economic benefits associated with the proximity to the park were majorly employment, provision of Health Clinics and building of schools at 7.2%, 6.9% and 4.4 % respectively. This is in line with the National Wildlife Strategy 2030 that has put in place a plan for sharing of revenue generated from wildlife services. The plan promotes increased access to incentives and sustainable use of wildlife resources, while ensuring equitable sharing of benefits. For instance, funds are directed to community development projects such a construction of hospitals, water supply, cattle dips and classrooms for schools. This inspires communities to actively get involved in wildlife conservation hence preventing HWC¹⁹. Remarkably, majority of the respondents (73.4%) did not report any benefit. This can be attributed to lack of well-defined policies and structures of community benefit transfer in human and wildlife co-existence.¹

Limitations of the study

This study had gender bias since most of the respondents during data collection were men.

More males than females were probably interviewed since the study was done during the Covid-19 pandemic when many businesses had closed down making most men redundant. In addition, cultural norms in the study area require males when present to answer to strangers when present.

There was disruption of implementation of the study work plan because of corona virus pandemic, impeding data collection. These limitations were beyond the control of the researchers. The challenges were however overcome with time.

Conclusions

Just a quarter (26.6%) of respondents mentioned benefits associated with proximity to the park. A multifaceted approach through KWS, community and government urgencies is essential in the management of wildlife, to enhance coexistence of wildlife and humans for economic growth and control of zoonoses through one health strategy.

Acknowledgements

We acknowledge Meru County Commissioner for allowing us to conduct public interviews and thank the Ministry of health officials for providing us with the Community strategy registers in the study areas. We also thank the Kenya wildlife Service for enabling us to work with the wardens during the study.

We are indebted to the members of the community around park for their participation and willing to answer to the questionnaires especially during the difficult times of COVID-19 pandemic.

Funding: *This work was supported by the Royal Society for Tropical Medicine and Hygiene (Grant number.....). Without the funding, this study could not have been carried out.*

Competing interests: *None declared.*

Ethical approval: *Ethical clearance was obtained from Meru University of Science and Technology Institutional Ethical Review Committee (MIRERC)*

Data availability: *The dataset for this study is available on request*

References

- Gross E, Jayasinghe N, Brooks A, Polet G, Wadhwa R, Hilderink-Koopmans F. The need for Human-Wildlife Coexistence a Future for All: WWF and UNEP joined forces to raise the profile of human-wildlife conflicts worldwide. 2021;
- Newmark WD, Leonard NL, Sariko HI, Gamassa DGM. Conservation attitudes of local people living adjacent to five protected areas in Tanzania. *Biol Conserv.* 1993;63 (2):177–83.
- Madden F. Creating coexistence between humans and wildlife: Global perspectives on local efforts to address Human–Wildlife conflict. *Hum Dimens Wildl.* 2004;9(4):247–57.
- König HJ, Kiffner C, Kramer-Schadt S, Fürst C, Keuling O, Ford AT. Human–wildlife coexistence in a changing world. *Conserv Biol.* 2020;34(4):786–94.
- Torres DF, Oliveira ES, Alves RRN. Conflicts Between Humans and Terrestrial Vertebrates: A Global Review. *Trop Conserv Sci.* 2018;11.
- Preventing and Mitigating Human–Wildlife Conflicts: World Parks Congress Recommendation. *Hum Dimens Wildl* [Internet]. 2004 Dec 1;9(4):259–60. Available from: <https://doi.org/10.1080/10871200490505684>
- United Nation. *Transforming the World: The 2030 Agenda fo Sustainable Development.* 2016.
- Madden F, Mcquinn B. Conservation conflict transformation: The missing link in conservation. In 2015. p. 257–70.
- Mukeka JM, Ogutu JO, Kanga E, Røskaft E. Human-wildlife conflicts and their correlates in Narok County, Kenya. *Glob Ecol Conserv* [Internet]. 2019;18:e00620. Available from: <https://doi.org/10.1016/j.gecco.2019.e00620>
- Stoldt M, Göttert T, Mann C, Zeller U. Trans-frontier Conservation Areas and Human-Wildlife Conflict: The Case of the Namibian Component of the Kavango-Zambezi (KAZA) TFCA. *Sci Rep* [Internet]. 2020;10(1):7964. Available from: <https://doi.org/10.1038/s41598-020-64537-9>
- Okonedo Enase. Decision-making Practices in Africa", *Indigenous Management Practices in Africa* [Internet]. Bingley: Emerald Publishing Limited; 2018. 221–247 p. Available from: <https://doi.org/10.1108/S1877-636120180000020012>
- Mirowsky J, Ross CE. Education, social status, and health. *Education, social status, and health.* Hawthorne, NY, US: Aldine de Gruyter; 2003. vii, 242–vii, 242. (Social institutions and social change.).
- Inskip C, Zimmermann A. Human-felid conflict: A review of patterns and priorities worldwide. *Oryx.* 2009 Jan 1;43:18–34.
- Mukeka JM, Ogutu JO, Kanga E, Roskaf E. Characteristics of Human-Wildlife Conflicts in Kenya: Examples of Tsavo and Maasai Mara Regions. *Environ Nat Resour Res.* 2018;8 (3):148.
- Tweheyo M, Tumusiime D, Turyahabwe N, Asimwe A, Orikiriza L. Wildlife damage and control methods around Lake Mburo National Park, Uganda. *Int J Pest Manag - INT J PEST Manag.* 2012 Jan 1;58:25–31.
- Kamau J, Ashby E, Shields L, Yu J, Murray S, et al. (2021) The intersection of land use and human behavior as risk factors for zoonotic pathogen exposure in Laikipia County, Kenya. *PLOS Neglected Tropical Diseases* 15 (2):e0009143. <https://doi.org/10.1371/journal.pntd.0009143>
- Mekonen Sefi. Coexistence between human and wildlife: the nature, causes and mitigations of human wildlife conflict around Bale Mountains National Park, Southeast Ethiopia. *BMC Ecol* [Internet]. 2020;20(1):51. Available from: <https://doi.org/10.1186/s12898-020-00319-1>
- Lamprey R, Reid R. Expansion of human settlement in Kenya's Maasai Mara: What future for pastoralism and wildlife? *J Biogeogr.* 2004

- Jun 1;31:997–1032.
19. Kaai R, Shah B, Gitari E, Kahumbu P, Kang'ong'oi B. A Guide To the Wildlife Act of Kenya (WCMA 2013) [Internet]. 2013. Available from: <https://wildlifedirect.org/wp-content/uploads/2017/02/A-Guide-to-the-Wildlife-Act-of-Kenya-2013.pdf>
 20. GoK (Government of Kenya,) National Wildlife- 2018.