Original Article

Examining Livelihood Activities in Siana, Mara and Naikarra Wards related to Wildlife Conservation

Kipkosgei Meshack Lagat[1] Prof. James Simiren Nampushi, PhD[1] & Dr. Maurice Omollo, PhD[1]*

[1] Maasai Mara University, P. O. Box 861-20500, Narok, Kenya.
[*] Correspondence ORCID ID: https://orcid.org/0000-0001-5053-2345; email: mlagat@mmarau.ac.ke

ABSTRACT

This study examined livelihood activities that are related to wildlife conservation in the Siana, Mara, and Naikarra Wards of Maasai Mara Ecosystem (MME), Narok County. The focus of this paper was livelihood activities which included; ecotourism, tourism (travel and hotel industry), land leasing, beekeeping, green economy, selling of tree seedlings, public education for a fee, pastoralism, trade-in tourism artifacts and cultural activities (songs and dances). Alternative life forms in conservation areas, especially the ones compatible with wildlife conservation are important in reconciling the challenges the local community face in hosting wildlife. This paper demonstrates the place of livelihood networks, the contribution of alternative livelihoods to spatial and temporal harmony, and sustainable coexistence between wildlife and human beings. The study employed a Mixed Methods design and the main data collection tools were questionnaires, interviews, and Focused Group Discussion (FGD). The findings indicated that 86.3 % of the respondents noted the existence of livelihood activities supporting wildlife conservation. Further, the Chi-square test of association indicated a significant relationship between livelihood activities and the conservation of wildlife ($x^2 = 106.401$, df = 16, p = 0.000) at 95 % confidence level, and since $p < 0.05$, it revealed that there are livelihood activities in Siana, Mara and Naikarra Wards related to wildlife conservation. It was also revealed that age ($x^2 = 45.059$, df = 20, p = 0.001) associated positively with satisfaction level on livelihood networks at 95 % confidence level, indicating that there was a significant positive relationship between the age of the respondents and their satisfaction on the influence of the benefits accruing from Maasai Mara National Reserve (MMNR) on their livelihoods. The study recommended for the establishment of support systems for

these livelihood activities, through the creation of credit facilities that could easily be assessed by the local community.

INTRODUCTION

Human-wildlife conflicts are prevalent in Africa, where large numbers of big mammals, such as elephants and lions, still roam freely in marginal rangelands and protected areas (Schiess-Meier *et al., 2007*; Mmbaga *et al.,* 2017). The increase in human population has resulted in encroachment into more marginal lands inhabited by wildlife, leading to fragmentation and conversion of land, for instance, to settled agriculture and other uses incompatible with wildlife (Obong *et al.,* 2013; Amaja *et al.,* 2016). Studies indicate that this not only escalates conflicts between the people, wildlife, and the authorities responsible for the conservation of wildlife but also poses a real challenge to sustainable wildlife conservation practice (Matseketsa *et al.,* 2019). In Kenya, for instance, where much of the wildlife lives outside designated protected areas, it is observed that the people who live in these areas depend more on natural resources and find it difficult to tolerate wild animals in their lands when they consider them a threat to their lives and livelihoods (Crystal & Courtney, 2015).

Past studies have indicated that the understanding of how land use change happens, variations in climate, and both human and livestock population numbers influence human-wildlife conflict (Kideghesho *et al.,* 2013; Tallis *et al.,* 2009). This can be a crucial precursor for creating effective human-wildlife conflict mitigation and biodiversity conservation strategies (GeAnge Imanishimwe & Nsabimana, 2018; Mwakatobe, Nyahongo, & Røskaft, 2013).

Previous studies have tried to link wildlife conservation and tourism with the intention to alleviate poverty from the adjacent communities, which in most cases has been observed to be pastoralist (Katherine M Homewood, 2012; Kathleen Krafte Holland, *et al.,* 2021). Past studies also saw the establishment of a conservation wave that promotes the empowerment of the local community in order to support conservation initiatives (Noe & Kangalawe, 2015). The extent to which wildlife revenues contribute to pastoralist livelihoods is a matter that is between conservation and empowerment of the local communities in a way that will change their perspective towards conservation and, by extension, to coexist with wildlife (Femke *et al.,* 2021; Walpole & Thouless, 2009b). Past studies have also looked into the role of livestock and other activities in the context of rural pastoral communities and what they can do with their rural-local economies and livelihoods at

large (Katherine M Homewood, 2012; Schleyer, 2018).

From previous studies, it has also been noted that security concerns, which range from periodic raiding to prohibition of access to natural resources within protected area boundaries, have been reported to have numerous negative social and economic impacts on local people, especially when they have no alternative form of livelihood and they have traditionally relied upon those resources for their livelihoods (Bayani *et al.,* 2016; Galanti *et al.,* 2006). Further, the local people, in many studies, have been reported to incur additional costs such as crop losses, livestock depredation, and human injury and death caused by wildlife from protected areas which often left their livelihood exposed and made them socio-economically vulnerable (Gren *et al.,* 2018; Nyirenda *et al., 2013;* Obiero *et al., 2019).*

Previous studies have revealed that the survival ways in the face of the changing climate for pastoral communities living adjacent to PAs are actually diversification of livelihoods into viable alternative livelihoods forms, which in itself acts as a way to spread the risk (Baird *et al.,* 2009; Sarmiento, 2011; Wittemyer *et al.,* 2013). Moreover, in the wake of land fragmentation enabled by the sub-division of community lands, there results in an impediment to the movement of livestock and access to key resources, thus it has necessitated pastoral communities to opt for non-livestock sources of income for their livelihoods (Shah, 2019; Mekonen, 2020). Diversification of pastoral livelihoods is widely observed among pastoralists in East Africa (Katherine M Homewood, 2012; Reid *et al.,* 2016). At a place like MMNR, studies have indicated that diversification into tourism is a viable option, especially when the local community considers land consolidation to create more conservancies to host wildlife (Kelman, 2013; Reyers, 2013). Kenya, for instance, in its semi-arid and arid lands, is inhabited by pastoral communities whose majority coexist together with wildlife and so these pastoral lands are vital habitats for wildlife and tourism (Mutanga & Vengesayi, 2015).

Social Exchange Theory

This theory is based on the elements of reward and its value, cost, profit and equity and distributive justice. The current study relied on the postulation of (Homans, 1961). Homans (1961) observed that exchange is social in nature. He further noted that social exchange is the exchange of activity, tangible or intangible, or more or less rewarding or costly, between at least two groups (actors). The more valuable to a man a unit of the activity another gives him, the more often he will emit activity rewarded by the activity of the other. Cost is conceived as the activity forgone and behaviour change is also greatest when perceived profit is least (Homans, 1961).

Reward and the value of the reward, costs, profit (reward minus costs), equity and distributive justice are the main elements of the Social exchange theory (Homans, 1961). According to Redmond (2015), the social behaviour of actors often involves social exchanges when people are motivated to attain some valued reward for which they must forfeit something of value (cost).

This study is informed by this theory that conservation and livelihood development at least must strike an equilibrium by actors in order to both be sustainable. The socio-economic benefits like employment, access to food, shelter, and health services are the benefits the pastoralist get as a reward for the conservation of wildlife in Maasai Mara National Reserve. The reward obtained is a result of foregoing their grazing land for the conservation of wild animals. Consequently, the pastoralist bears the brunt of conservation which in this study are the economic costs which include livestock depredation, human and livestock diseases (zoonotic), crop damage, accidents, and fear of wildlife roaming in homesteads and their grazing land. In this case, pastoralists may be willing to continue bearing the cost of conservation as long as the rewards emanating from conservation are greater than the costs they meet.

Studies have also shown that the costs are greater for a protected area than the contrary. In this case, the local people closer to the MMNR, according to the principle of equity and distributive justice, would be the ones receiving the greatest reward

owing to the greatest costs they receive from wildlife conservation. Their livelihood networks are highly disrupted than the people living a distance far from the MMNR. Homans (1961) postulated that if the cost of members of one group is higher than those of another, distributive justice requires that their rewards should also be higher, for if the rewards are higher, the costs are higher too. The quest for pastoralists to continue supporting conservation initiatives is pegged on the great profit they derive from MMNR when they receive a great reward, and in reciprocation, they participate and support initiatives towards sustainable conservation and management of wildlife.

MATERIALS AND METHODS

Study Area

The study was conducted in Siana Ward, Naikarra Ward and Mara Ward of Narok County (*Figure 1*).

It is located in the South Western part of Kenya and lies between latitudes $0^0 50^{'}$ and 1^0 $50^{'}$ S and Longitudes $35^0 28^{'}$ and $36^0 25^{'}$ E. Siana Ward covers an area of 2800 km^2, Mara ward covers 1318 km^2 and Naikarra Ward covers 1053 km^2 (IEBC, 2017). Siana Ward has seven sub-locations, namely; Sekenani, Koyiaki, Nkoilale, Siana, Olkinyei, Eldonya Narasha and Megwara while Mara Ward has five sublocations; Aitong, Lemek, Mararianda, Rongena and Enelerai. Naikarra Ward has five sublocations; Leshuta, Naikarra, Esoit, Olderkesi and Osarara/ Entarado Wards. It lies at a mean altitude of 1600 m above sea level, a mean annual rainfall of 1015 mm, and daily maximum temperatures range between 26^0 C and 30^0 C, while minimum temperature range between 12^0 C and 14^0 C (Bartzke *et al.,* 2018). It borders Maasai Mara National Reserve, which is considered "Kenya's Jewel" regarding wildlife resources.

Figure 1: Map of the study area
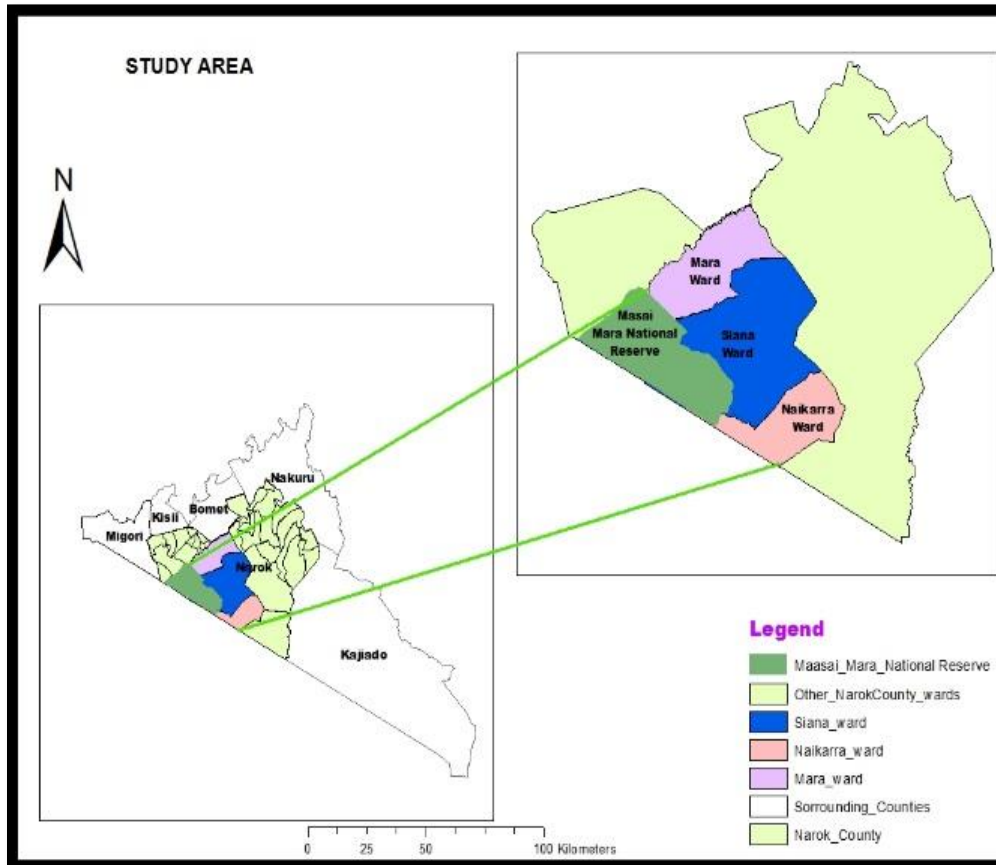
Source: Researcher, 2022

Population of the Study Area

According to the Kenya National Bureau of Statistics (2019), Siana Ward, which comprises seven sub-locations has 55388 persons, of whom 27928 are males and 27460 are females, while Mara Ward comprising 5 sublocations, has a population of 46661 individuals (23431 are males and 22930 are females) and Naikarra Ward has a population of 33081 (16003 are males and 17078 are females).

Sample size and Sampling Techniques

This study used mixed methods, that is, the concurrent design where both quantitative and qualitative components of the study were executed (Halcomb & Hickman, 2015; (Judith Schoonenboom and R. Burke Johnson, 2017; Almalki *et al.,* 2016)

The population of Siana Ward (N) is 55388 individuals and 10385 households, Mara Ward (N) is 46660 individuals and 9400 households and Naikarra ward (N) has 33081 individuals and 6819

households (Kenya Population and Housing Census, 2019) and all used the formula proposed by Kothari (2004), to derive the sample sizes for each area of study. For Siana Ward, the sample size was derived as follows;

$$n = \frac{z^2 pqN}{e^2(N-1) + z^2 pq}$$

(1)

Where N = the population of the study area, z = 1.96 (using 95% confidence level), p = 0.5, q = (1-.5) = 0.5, e = 0.05 (confident that the percentage has been estimated to be within ± 5% of the true value), then;

Substituting equation (1) for every County Assembly Ward resulted in sample sizes as follows; Sample size (n) for Siana Ward was 382, Sample size (n) for Mara Ward was 381, and Sample size (n) for Naikarra Ward was 380.

Mugenda, G.A and Mugenda (1999) proposed that 30 % of the sample size can be used in the study. Therefore, this study used 30 % of the sample size in each ward computed as follows (*Table 1*);

Table 1: Sample size (n) used in the study for each ward

County Assembly Ward	Sample size (n)	30 % of n
Siana	382	115
Mara	381	114
Naikarra	380	114

Source: Researcher, 2022

Sampling Techniques

This study used stratified sampling. Three County Assembly Wards (Siana, Mara and Naikarra Wards) were stratified using the existing sublocations. In Siana Ward, there are seven (7) sublocations that became seven strata in this study; in Mara ward, there are five (5) sublocations which in this study became five strata; and in Naikarra, there are five (5) sublocations became five strata. Within the strata, the subjects (respondents) were selected using systematic random sampling. Purposive sampling was used to select key informants that were interviewed on the wildlife conservation benefits accruing to the community. This study conducted 2 FGDs of 6 individuals in each at Nkoilale trading centre, where every ward was represented. All the members of the FGDs were

identified based on their knowledge of the matters within their villages and were considered reliable sources of information. By use of SPSS Version 21 and excel packages, for descriptive statistics, quantitative data were analysed using frequencies, measure of central tendency (median) and cross-tabulations (Chi-square) while for inferential statistics Ordinal Logistic regression was used. Qualitative data in this study was used to develop the quantitative data.

RESULTS AND DISCUSSION

Demographics

From the study, it was noted that 62 % of the household heads were males while 38 % of the household heads were females. The study indicated

that the majority of household heads were between the age of 38 - 47 years (40.8%), followed by those between the age of 28 -37 years (26.2%), while the minority were of the age 68 and above years (0.9 %). The majority of household heads had no formal education 47.2 %, household heads with primary education were 14 %, secondary education at 23.9 %, tertiary education at 8.5 % and only 6.4 % of the household heads were university graduates or were still in the university (*Table 2*). This study compares with the Narok County CIDP (Government of Narok County, 2018) and the KNBS (Kenya National Bureau of Statistics, 2013) study, which indicated that 38 % of the residents of Narok had no formal education. It was expected that owing to the high percentage of young people in the study area, there would be a correspondingly high number of educated people. This indicated that there is more to be done in the form of educational facilities and personnel, including the stepping up of bursaries, scholarships, and other necessary support, especially for post-primary, tertiary colleges, and university students, in order to improve the uptake and completion rate.

Table 2: Demographics of the respondents

Demographic Factor		Percentage
Gender	Male (%)	62
	Female (%)	38
Age	18-27	12.2
	28-37	26.2
	38-47	40.8
	48-57	16
	58-67	3.8
	68 and above	0.9
Education	None	47.2
	Primary	14
	Secondary	23.9
	Tertiary College	8.5
	University	6.4

Source: Researcher, 2022

From the findings, the majority of the households had members between 4-6 at 38.8 %, 25.7 % composed of members of 7-9, 13.4 % indicated members of 1-3, 11.1 % consisting of 10-12 members and 13 and above (*figure 2*). These findings varied from other studies (Kemboi, 2020; Kathleen Krafte Holland *et al.,* 2021; Claire Bedelian and Ogutu J, 2017), which recorded an average of between 8 and 9 individuals. In *Table 2*, the findings indicated that it is only in Mara ward that the majority of household members were between 7-9 individuals (41.3 %). In Siana and Naikarra wards, the majority of the membership of the households were between 4-6 at 52.1% and 37.2 %, respectively.

Figure 2: Number of household members
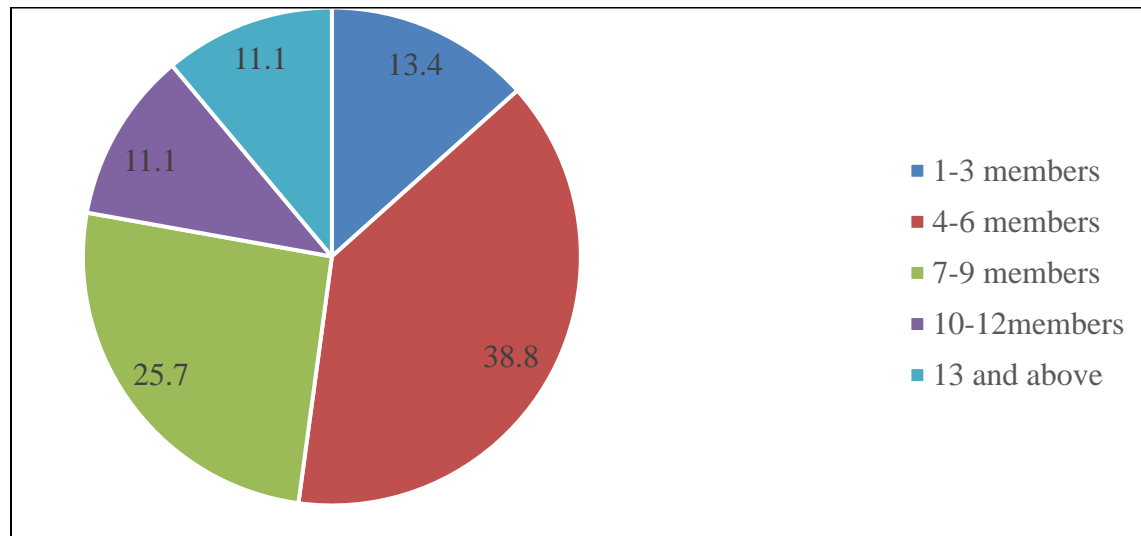
Source: Researcher, 2022

Livelihood Activities in Support of Wildlife Conservation

The respondents were asked to give their opinion on whether there were any livelihood activities they were engaged in and were supporting wildlife conservation and 86.3 % acknowledged that there were (*Table 3*). Akyol *et al.* (2018) observed that livelihood is the greatest of all the challenges to communities, households, and individuals. The researcher (Akyol *et al.,* 2018) further noted that livelihoods comprise the capabilities, assets (including both materials and social resources) and activities required for a means of living and it's about money, food, labour, employment, and assets. Research elsewhere indicated that pastoralists were often marginalised by government policy that favours the dominant settled farming lifestyles

(Reid *et al.,* 2016). Further, conflicts and illegal wildlife trade in most sub-Saharan countries were exacerbated by a lack of alternative livelihoods. This observation was not farther from what FGDs indicated because the majority of the residents were over-reliant on pastoralism and tourism as their main sources of income. Fausto (2011) noted that the emergence of the poverty alleviation wave on conservation aimed at addressing the livelihood of people adjacent to protected areas who felt insecure and suggested that empowerment of these local communities would guarantee the protection of biodiversity. (Walpole & Thouless, 2009b) also indicated that embracing the local community's economic development, including diversification of livelihoods, is a strategy for wildlife conservation and conflict resolution.

Table 3: Percentage of the locals acknowledging the presence of livelihood activities in support of wildlife conservation

	Frequency	Percentage
Yes	296	86.3
No	47	13.7
Total	343	100

Source: Researcher, 2022

Livelihood Activities in The Maasai Mara Ecosystem

The study sought to understand the extent to which the respondents agreed with statements of livelihood activities. The following livelihood activities were considered in this study; ecotourism, tourism (travel and hotel industry), land leasing, beekeeping, green economy, selling of tree seedlings, public education for a fee, pastoralism, trade-in tourism artifacts and cultural activities (songs and dances). A Likert scale was provided where 1 = Strongly Agree (SA), 2 = Agree (A), 3 = Neutral (N), 4 = Disagree (D) and 5 = Strongly Disagree (SD). Descriptive statistics were then computed, where percentages and median were computed and represented in *Table 4*.

The study observed that majority of the respondents agreed that ecotourism at 41.2 % (median = 2), land leasing at 42.9 % (median = 2), and trade in tourism artifacts at 46.8% (median = 2) were the main activity related to conservation in Maasai Mara Ecosystem. Tourism (travel and hotel industry) at 41.9 % (median = 2), pastoralism at 78.1 % (median = 1), and cultural activities (songs and dances) at 42.5 % (median = 2) were indicated by the majority of the respondents that they strongly agreed that these activities were the main livelihood activities. The majority of the respondents also were not sure that beekeeping at 48.2 % (median = 3) and public education for a fee at 29.9 % (median = 3) were the main livelihood activities in the Maasai Mara Ecosystem. However, the majority of the respondents disagreed that the green economy at 48.2 % (median = 4) and sell of tree seedlings at 43.9 % (median = 4) were the main livelihood activities across Maasai Mara Ecosystem (*Table 4*).

Katherine *et al.* (2012); Mutea et al. (2019) observed that half or more than half of households earned off-farm income from trade, business, land leasing, tourism, and cultural activities such as boma performances, sales of beadwork jewellery, and other craftwork in conservation areas that included Maasai Mara, Tarangire, Amboseli, Longido and Kitengela.

Nyumba Tobias *et al.,* 2021, noted that individuals with diverse sources of income tend to have more favourable conservation attitudes than those with fewer sources of income. Nyumba Tobias *et al.,* 2021 further associated this with the spread-out effect of income on the costs of conservation, such as livestock predation, crop damage and restriction of movement.

Ecotourism being responsible travel and sustainability of natural resources and livelihoods is practiced in Maasai Mara Ecosystem in the form of cultural activities that attract tourists and host tourists outside MMNR in tented camps. These areas must be kept as natural as possible in order to allow the environment to retain its natural effect. Comparatively, within the MMNR, there are several access roads that have been created under the pretext of enabling tourists to spot the much coveted big five animals, but this amounts to the degradation of the environment. It was noted from the FGD discussion that in Tanzania, the Serengeti, unlike in MMNR, there are hardly any access roads for tourists and this has left the environment in its natural setting without much human disturbance. Within the conservancies in the Maasai Mara ecosystem, the locals have been able to make a living from ecotourism activities that attracted both domestic and international tourists. However, it was observed that it is very challenging to distinguish between the main tourism activities and ecotourism. The study felt that immense public awareness, training, and capacity building was necessary consideration to debunk the difficulties surrounding the two.

While the majority were able to strongly agree that tourism in the hotel and travel industry was earning them alternative income, this only benefited those who owned conservancies or lived in close proximity to the MMNR. The local community members who lived far, like in Rongena, practiced crop farming for a living. It was observed that the majority of the local community members also benefited from employment opportunities as most young people were employed as cleaners, cooks, drivers, security personnel, and junior supervisors in hotels. The local community also was able to supply their livestock products like meat and milk to the small hotel establishments within and without the MMNR but in small quantities since trade was minimal. Trade too was considerably observed as an alternative income earner as they engaged in supermarkets, wholesale, and retail trade of

household items. There was also a livestock enterprise where businessmen and women bought livestock from pastoralists and took them as far as Nairobi and Narok town or elsewhere to sell.

From the FGDs, it was observed that most residents, especially those closer to MMNR, consolidated their land together and leased to conservancies, which supported the wildlife from MMNR. These conservancies provided money to the members as proceeds of tourism activities, but there have been reported cases of fencing in most villages which is impeding the movement of wildlife. These conservancies also are constricting grazing land for the local members because of the imposed regulations on grazing. These restrictions members complained about affecting their livestock, especially during periods of droughts. MMNR also does not allow livestock to be grazed within the reserve and HWCs sometimes stem from this as the local community members sometimes try to violate this restrictive measure.

Pastoralism, trade-in artifacts, and cultural activities were revealed to be the dominant livelihood activities within the Maasai Mara Ecosystem. Though there is competition between the livestock of the Maasai and the wildlife, comparatively, it was the most compatible activity to engage in within the savannah grasslands. However, a few households residing far from the MMNR engaged in crop farming, where they planted maise, wheat, and tomatoes. Pastoralism was facing challenges from wildlife, especially from livestock depredation and zoonotic diseases. It was also observed that the majority of households were dependent on pastoralism for a living though the numbers of herds each family owned varied. The Maasai cultural and traditional customs indicated that the higher the number of livestock one has the higher the perception that the household is wealthier. The artefacts sold to tourists were done at the gates of the MMNR or in the Manyattas of the households living adjacent to the reserve. The same scenario happened for the showcasing of cultural dances and songs which was done mainly in Manyattas. In these bomas, the Maasai also showcased how they traditionally used to slaughter and roast meat and narrated the importance and consequences of certain cultural events in their culture which necessitated actions (slaughter of bull or goat) to be taken.

The study further observed that most households practiced afforestation, and a few botanical gardens were noted through non-participatory observation in the Sekenani sublocation. These gardens were rich in medicinal vegetation, which traditionally, the Maasai community used for treating various ailments. The main vegetation occurring was observed to be natural and most planted trees were done in learning institutions like primary and secondary schools and a few homesteads. This trend was worrying and a lot of efforts through awareness of the importance of trees as carbon sinks needed to be made in the Maasai Mara Ecosystem. The trade-off in carbon may most likely encourage the residents to plant more trees and maintain the existing vegetation as it attracted a benefit.

Table 4: Livelihood activities related to wildlife conservation

Activities	SA (%)	A (%)	N (%)	D (%)	SD (%)	M
Ecotourism	10.6	41.2	13.3	3.7	5.3	2
Tourism	41.9	41.2	10.6	1	5.3	2
Land leasing	31.9	42.9	8.6	2.7	14	2
Bee Keeping	5	10.3	39.5	26.6	18.6	3
Green economy	5	8.6	14.6	48.2	23.6	4
Sell of seedlings	5.6	6.6	20.9	43.9	22.9	4
Public education	13.3	28.9	13	29.9	15	3
Pastoralism	78.1	16.6	2.3	2.3	0.7	1
Trade in artifacts	34.6	46.8	11.3	4.3	3	2
Cultural activities	43.5	40.9	8.6	4	3	2

Source: Researcher, 2022

Proceeds Supporting Livelihoods in Maasai Mara Ecosystem

78.4% of household heads acknowledged that the proceeds from MMNR were supporting livelihood activities (*Table 5*). It was argued that the income from employment, when invested elsewhere, could help create an alternative source of livelihood. The same applied to infrastructural development done by the County Government in urban areas, like street lighting, which was aiding in providing lights to support business till late in the night and providing security in the vicinity. From the FGDs it was discovered that most poor households relied on bursaries to take their children to school. The issue of water too had been partially resolved by the creation of many pans and dams to provide water for livestock, wildlife, and humans, although the majority of households still suffered from water stress.

Table 5: Proportion of the locals acknowledging that the proceeds from MMNR are supporting their livelihoods

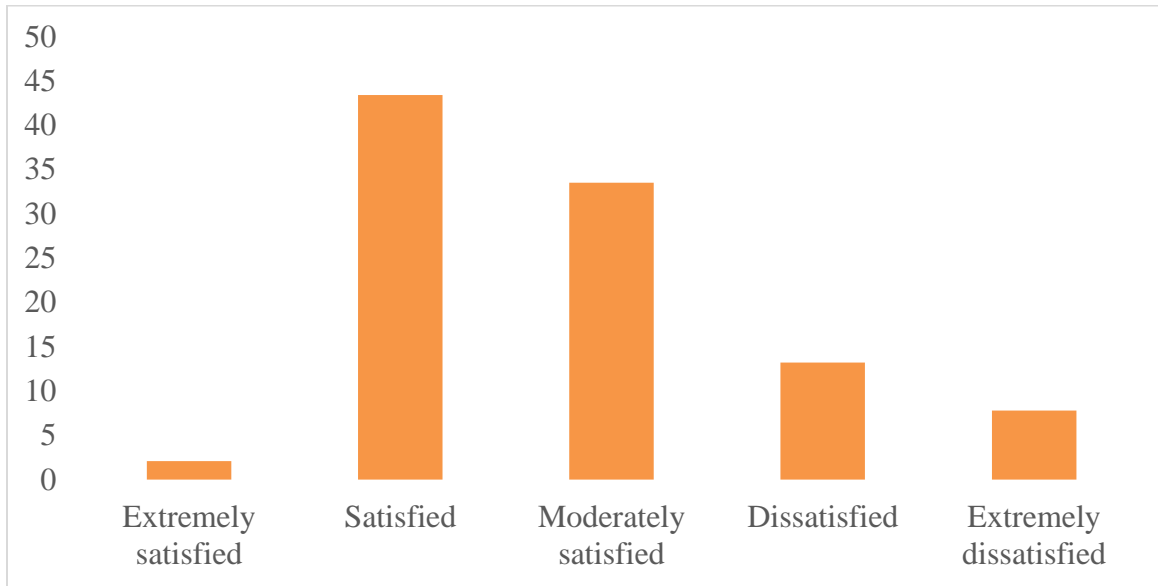|	Frequency	Percent
Yes	269	78.4
No	74	21.6
Total	343	100

Source: Researcher, 2022

Satisfaction Level on the Impact of the Proceeds from MMNR on Livelihood Activities

From figure 3 below, the majority of the respondents 43.4 %, were satisfied that the proceeds from MMNR were changing their livelihood. 3.5 % of the respondents were not sure whether their lives had changed courtesy of MMNR. This finding was in concurrence with the observation of (Nyumba Tobias *et al.,* 2021) that in Transmara, the favourable attitudes towards wildlife conservation could be attributed to both the direct and indirect income generation opportunities from the reserve, which included employment in catering, administration, business opportunities in lodges and sale of Maasai cultural items like embroidery and woodcarvings. Kathleen Krafte Holland *et al.* (2021) noted that at the community level, the higher levels of involvement in tourism activities resulted in more robust support for wildlife conservation in the MMNR. Further, (Mukeka, Ogutu, Kanga, & Røskaft, 2019) observed that HWC result in low satisfaction level as an outcome of negative perception, and thus promoting profitable conservation enterprise would and increasing conservation benefits to the local community would improve satisfaction level about the entire concept of wildlife conservation.

Kathleen A. Galvin (2018) found out that physical capital benefits support enhanced ecotourism opportunities and, in turn, increased financial revenue streams for the local community. The researcher further noted that the challenge faced by most conservation areas is a lack of collaboration due to inequity in decision-making and participation of the locals. Mojo *et al.,* (2020) observed that the relative proportion of benefits gained and losses incurred by the local people in relation to a protected area has important implications for biodiversity conservation and livelihoods. This was corroborated in the finding of this study from the accounts of an FGD, that the locals were discouraged when the control of benefit distribution was left in the hands of the elite and reiterated that, that kind of situation might not guarantee distributive justice of these benefits.

Figure 3: Satisfaction level to proceeds from MMNR on livelihoods

Source: Researcher, 2022

Relationship between Age, Education, Distance and the Satisfaction Level on the Impact of the Proceeds from MMNR on Livelihood Activities

A chi-square test of association was computed between age, education, distance, and satisfaction level. The findings revealed that age (x^2 = 45.059, df = 20, p = 0.001) associated positively with satisfaction level at 95 % confidence level (*Table 6*). This, therefore, indicated that there was a significant positive relationship between the age of the respondents and the satisfaction level of the benefits accruing from MMNR.

Education level (x^2 = 32.985, df = 16, p = 0.007) had a positive association with satisfaction level at a 95 % confidence level. This meant that there was a significant positive relationship between the education level of the respondents and their satisfaction level with the benefits from MMNR. Distance from MMNR (x^2 = 98.010, df = 28, p = 0.000) indicated an association between it and the satisfaction level at 95 % confidence level. It, therefore, indicated that there was a positive relationship between distance from MMNR and the satisfaction level of the benefits resulting from MMNR.

Table 6: An association between age, education, distance, and satisfaction level

		Value	df	Asymp. Sig. (2-sided)
Age	Pearson Chi-Square	45.059[a]	20	.001
	Likelihood Ratio	41.307	20	.003
	Linear-by-Linear Association	.418	1	.518
	N of Valid Cases	281		
Education	Pearson Chi-Square	32.985[a]	16	.007
	Likelihood Ratio	33.832	16	.006
	N of Valid Cases	281		
Distance	Pearson Chi-Square	98.010[a]	28	.000
	Likelihood Ratio	96.256	28	.000
	Linear-by-Linear Association	37.058	1	.000
	N of Valid Cases	281		

Source: Researcher, 2022

Livelihood Activities in Maasai Mara Ecosystem Related to Conservation Efforts

The ordinal logistics regression computed indicated that there was a significant relationship between livelihood activities and conservation efforts (x^2 = 106.401, df = 16, p = 0.000) at 95 % confidence level (*Table 7*). In this case, therefore, it indicated that there are livelihood activities in Siana, Mara and Naikara wards related to conservation efforts.

Further, *Table 7* indicates a model fitting information and depicts significance at 95 % confidence level that the model is a good fit for the outcome (dependent variable predicted). *Table 8* is the Goodness of fit computation, and it affirms that the observed data is consistent with the fitted model (estimated values) since the p-value (x^2 = 52.330, df= 48, p = 0.310) of the Pearson Chi-square was insignificant at a 95 % confidence level.

Table 7: Model fitting information for livelihood activities in MME related to conservation efforts

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	242.962			
Final	136.561	106.401	16	.000
Link function: Logit.				

Source: Researcher, 2022

Table 8: Goodness of fit for livelihood activities in MME related to conservation efforts

	Chi-Square	df	Sig.
Pearson	52.330	48	.310
Deviance	50.561	48	.373

Source: Author, 2022

CONCLUSION AND RECOMMENDATIONS

In conclusion, there are livelihood activities related to wildlife conservation in the Siana, Mara, and Naikarra Wards of MME. These activities are not well established, supported nor adequately funded which conceals their proper place in the whole concept of wildlife conservation. This paper, therefore, recommends proper funding and support of these livelihood activities through the establishment of credit facilities with enhanced access. Further, the establishments within MMNR (Hotels, lodges), should partner with the locals to enhance business interactions.

ACKNOWLEDGEMENTS

REFERENCES

Akyol, A., Türkoğlu, T., Bekiroğlu, S., & Tolunay, A. (2018). Resident perceptions of livelihood impacts arising from the Kızıldağ National Park, Turkey. *Environment, Development and Sustainability*, *20*(3), 1037–1052. https://doi.org/10.1007/s10668-017-9921-0

Almalki, S., Centre, E. L., Arabia, S., & Centre, E. L. (2016). *Integrating Quantitative and Qualitative Data in Mixed Methods Research — Challenges and Benefits*. 5(3), 288–296. https://doi.org/10.5539/jel.v5n3p288

Amaja, L. G., Feyssa, D. H., & Gutema, T. M. (2016). Assessment of types of damage and causes of human-wildlife conflict in Gera district, south western Ethiopia. 8(May), 49–54. https://doi.org/10.5897/JENE2015.0543

Baird, T. D., Leslie, P. W., & McCabe, J. T. (2009). The effect of wildlife conservation on local perceptions of risk and behavioral response. *Human Ecology*, *37*(4), 463–474. https://doi.org/10.1007/s10745-009-9264-z

Bartzke, G. S., Ogutu, J. O., Mukhopadhyay, S., Mtui, D., Dublin, H. T., & Piepho, H. (2018). Rainfall trends and variation in the Maasai Mara ecosystem and their implications for animal population and biodiversity dynamics.

Bayani, A., Tiwade, D., Dongre, A., Dongre, A. P., & Phatak, R. (2016). Assessment of Crop Damage by Protected Wild Mammalian Herbivores on the Western Boundary of Tadoba-Andhari Tiger Reserve (TATR), Central India. 15–19. https://doi.org/10.1371/journal.pone.0153854

Claire Bedelian and Ogutu J. (2017). Trade-offs for climate-resilient pastoral livelihoods in wildlife conservancies in the Mara ecosystem, Kenya. 1–22. https://doi.org/10.1186/s13570-017-0085-1

Crystal, H., & Courtney, A. (2015). *Sustainable Africapitalism ? Grassroots Perceptions of Maasai Mara Conservancies and their Relationship with Development* (The University of Edinburgh). Retrieved from https://www.researchgate.net/publication/3254 85343_Sustainable_Africapitalism_Grassroots _perceptions_of_Maasai_Mara_conservancies _and_their_relationship_with_development

Fausto O. Sarmiento. (2011). *Sustainability and the Biosphere Reserve: A Compromise between Biodiversity, Conservation and Farmscape Transformation*. Retrieved from https://www.academia.edu/21119515/Sustaina bility_and_the_Biosphere_Reserve_A_Compr omise_between_Biodiversity_Conservation_an d_Farmscape_Transformation

Femke et al. (2021). Human-wildlife coexistence: Attitudes and behavioural intentions towards predators in the Maasai Mara, Kenya. 54(3), 366– 374. https://doi.org/10.1017/S003060531 8000091

Galanti, V., Preatoni, D., Martinoli, A., Wauters, L. A., & Tosi, G. (2006). Space and habitat use of the African elephant in the Tarangire-Manyara ecosystem, Tanzania: Implications for conservation. *Mammalian Biology*, *71*(2), 99– 114. https://doi.org/10.1016/j.mambio.2005.10 .001

GeAnge Imanishimwe, T. N., & Nsabimana, and D. (2018). Contribution of Community Conservation and Ecotourism Projects on Improving Livelihoods and Sustainable Biodiversity Conservation in and. 7(4). https://doi.org/10.4172/2167-0269.1000363

Government of Narok County. (2018). Narok County Integrated Development Plan.

Gren, I., Häggmark-svensson, T., Elofsson, K., Engelmann, M., Mariegrensluse, I., Häggmark-svensson, T., & Engelmann, M. (2018). *Economics of wildlife management — an overview*.

Halcomb, E. J., & Hickman, L. (2015). *Mixed methods research*. *29*, 41–47.

Homans, G. C. (1961). *Social Behavio: Its Elementary Forms* (R. K. Merton, Ed.). New York. Burlingane: Harcourt, Brace & World, Inc.

IEBC. (2017). *MVR_II_Kits_Distribution*. Government of Kenya.

Judith Schoonenboom and R. Burke Johnson. (2017). *How to Construct a Mixed Methods Research Design*.

Katherine M Homewood, P. C. T. and D. B. (2012). Pastoralist livelihoods and wildlife revenues in East Africa : a case for coexistence ? 1–23.

Kathleen A. Galvin, T. A. B. and M. W. L. (2018). African community-based conservation: a systematic review of social and. 23(3).

Kathleen Krafte Holland, Lincoln R. Larson, Robert B. Powell, W. H., Holland, Lawrence Allen, Moriaso Nabaala, Salaton Tome, S. S. &, & Nampushi, J. (2021). Impacts of tourism on support for conservation, local livelihoods, and community resilience around Maasai Mara

National Reserve, Kenya. *Journal of Sustainable Tourism*, *0*(0), 1–23. https://doi.org/10.1080/09669582.2021.1932927

Kelman, C. (2013). Governance Lessons from Two Sumatran Integrated Conservation and Development Projects. *Conservation and Society*, *11*(3), 247. https://doi.org/10.4103/0972-4923.121028

Kemboi, H. T. (2020). Analysis of Human Willdlife Conflicts on Livelihood Diversification of Communities Living Adjacent to Kamnarok National Reserve, Baringo County, Kenya.

Kenya National Bureau Of Statistics. (2010). The 2009 Kenya Population and Housing Census " Counting Our People for the Implementation of Vision 2030."

Kenya National Bureau of Statistics, S. for I. D. – E. A. (2013). *Exploring Kenya's inequality; pulling apart or pooling together?*

Kenya Population and Housing Census. (2019).

Kideghesho, J., Rija, A., Mwamende, K., & Selemani, I. (2013). Emerging issues and challenges in the conservation of biodiversity in the rangelands of Tanzania. *Nature Conservation*, *6*, 1–29. https://doi.org/10.3897/natureconservation.6.5407

Kothari, C. R. (2004). *Research Methodology: Methods and Techniques* (Second rev). New Age International Publisher.

Matseketsa, G., Muboko, N., Gandiwa, E., & Kombora, D. M. (2019). An assessment of human-wildlife conflicts in local communities bordering the western part of Save Valley. *Global Ecology and Conservation*, *20*, e00737. https://doi.org/10.1016/j.gecco.2019.e00737

Mekonen, S. (2020). Coexistence between human and wildlife : the nature, causes and mitigations of human-wildlife conflict around Bale Mountains National. *BMC Ecology*, 1–9. https://doi.org/10.1186/s12898-020-00319-1

Mmbaga, N. E., Munishi, L. K., & Treydte, A. C. (2017). Balancing African Elephant Conservation with Human Well-Being in Rombo Area, Tanzania. *Advances in Ecology*, *2017*, 1–9. https://doi.org/10.1155/2017/4184261

Mojo, D., Oduor, A. M. O., Fu, C., Long, H., Wang, G., & Zhang, L. (2020). *Effects of protected areas on the welfare of local households: The case of Maasai Mara National Reserve in Kenya*. (May), 856–867. https://doi.org/10.1002/pan3.10123

Mugenda, G.A and Mugenda, O. (1999). Reaserch Methods: Quantitative and Qualitative Approaches. *Nairobi, Acts Press*.

Mukeka, J. M., Ogutu, J. O., Kanga, E., & Røskaft, E. (2019). Human-wildlife conflicts and their correlates in Narok. *Global Ecology and Conservation*, *18*, e00620. https://doi.org/10.1016/j.gecco.2019.e00620

Mutanga, C. N., & Vengesayi, S. (2015). Community perceptions of wildlife conservation and tourism : A case study of communities adjacent to four protected areas in Zimbabwe. 8(2), 564–582. https://doi.org/10.1177/194008291500800218

Mutea, E., Bottazzi, P., Jacobi, J., Kiteme, B., Speranza, C. I., & Rist, S. (2019). *Livelihoods and Food Security Among Rural Households in the North-Western Mount Kenya Region*. *3*(November). https://doi.org/10.3389/fsufs.2019.00098

Mwakatobe, A., Nyahongo, J., & Røskaft, E. (2013). *Livestock Depredation by Carnivores in the Serengeti Ecosystem*, *3*(4). https://doi.org/10.5539/enrr.v3n4p46

Noe, C., & Kangalawe, R. Y. M. (2015). Wildlife Protection, Community Participation in Conservation, and (Dis) Empowerment in Southern Tanzania. 13(3), 244–253. https://doi.org/10.4103/0972-4923.170396

Nyirenda, V. R., Myburgh, W. J., Reilly, B. K., Phiri, A. I., & Harry, N. (2013). Wildlife crop damage valuation and conservation: conflicting

perception by local farmers in the Luangwa Valley, eastern Zambia. 5(November), 741–750. https://doi.org/10.5897/IJBC12.026

Nyumba Tobias Ochieng, Kimongo Nankini Elizabeth, L.-W. N. (2021). Measuring the conservation attitudes of local communities towards the African elephant Loxodonta africana, a flagship species in the Mara ecosystem. 1–19.

Obiero, K., Meulenbroek, P., Drexler, S., Dagne, A., Akoll, P., Odong, R., … Waidbacher, H. (2019). The contribution of fish to food and nutrition security in Eastern Africa: Emerging trends and future outlooks. *Sustainability (Switzerland)*, *11*(6), 1–15. https://doi.org/10.3390/su11061636

Obong, L. B., Aniah, E. J., Okaba, L. A., & Effiom, V. A. (2013). Sustainable Livelihood in the Cross River National Park (CRNP), Oban Division, Nigeria. *International Journal of Business and Social Science*, *4*(16), 219–231. Retrieved from https://www.researchgate.net/publication/263661806_Sustainable_Livelihood_in_the_Cross_River_National_Park_CRNP_Oban_Nigeria

Redmond, M. V. (2015). *Social Exchange Theory*.

Reid, R. S., Nkedianye, D., Said, M. Y., Kaelo, D., Neselle, M., Makui, O., … Kiruswa, S. (2016). Evolution of models to support community and policy action with science : Balancing pastoral livelihoods and wildlife conservation in savannas of East Africa. 113(17), 4579–4584. https://doi.org/10.1073/pnas.0900313106

Reyers, B. (2013). Conserving Biodiversity Outside Protected Areas. In *Encyclopedia of Biodiversity: Second Edition*. https://doi.org/10.1016/B978-0-12-384719-5.00359-2

Sarmiento, F. O. (2011). Sustainability and the Biosphere Reserve: A compromise between Biodiversity, Conservation and Farmscape Transformation. *Biosphere Reserves in the Mountains of the World. Excellence in the Clouds?*, (February), 19–23.

Schiess-meier, A. M., Ramsauer, S., Gabanapelo, T., & König, B. (2007). *Livestock Predation-Insights From Problem Animal Control Registers in Botswana*. *71*(4), 1267–1274. https://doi.org/10.2193/2006-177

Schleyer, M. H. (2018). Assessment of Marine Biological Diversity and Habitats. 13–14.

Shah, P. M. and M. S. (2019). Benefits of Protected Areas to Adjacent Communities : The Case of Maasai Mara Benefits of Protected Areas to Adjacent Communities : The Case of Maasai Mara National Reserve In Kenya. *Africa Journal of Physical Sciences*, (February).

Tallis, H., Goldman, R., Uhl, M., & Brosi, B. (2009). Integrating conservation and development in the field: Implementing ecosystem service projects. *Frontiers in Ecology and the Environment*, *7*(1), 12–20. https://doi.org/10.1890/080012

Walpole, M. J., & Thouless, C. R. (2009a). Increasing the value of wildlife through non-consumptive use? Deconstructing the myths of ecotourism and community-based tourism in the tropics. (January 2005), 122–139. https://doi.org/10.1017/cbo9780511614774.009

Walpole, M. J., & Thouless, C. R. (2009b). Increasing the value of wildlife through non-consumptive use? Deconstructing the myths of ecotourism and community-based tourism in the tropics. *People and Wildlife*, (June), 122–139. https://doi.org/10.1017/cbo9780511614774.009

Wittemyer, G., Daballen, D., & Douglas-Hamilton, I. (2013). Comparative Demography of an At-Risk African Elephant Population. *PLoS ONE*, *8*(1). https://doi.org/10.1371/journal.pone.0053726