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Patterns of Livelihood Diversification among Kamnarok National Reserve adjacent Communities in Baringo County, Kenya

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ABSTRACT

Evidence abounds that rural households do not only receive a significant proportion of their livelihoods from agriculture, but also from non-farm sources through diversification. The purpose of the study was to assess patterns of livelihood diversification and human wildlife conflicts among communities living near Kamnarok NR in Baringo, Kenya. A qualitative approach using exploratory research design was adopted. Questionnaire survey and observation were used as data collection tools and census sampling of the three locations of Barwesa ward in Baringo County formed the unit of analysis. Likert scale type of questionnaire provided options for scoring in the measurement of the prevailing livelihood in the study area. Cronbach's Alpha was used to test reliability of the items found with the significance level at 0.7. Descriptive statistics, Factor analysis and Pearson Correlation were used to analyze data. The findings reveals that Kamnarok NR adjacent community exhibit variations in diversified livelihood portfolios pursued as a measure to ameliorate themselves from the risks of agro climatic vulnerabilities and livelihood risks brought by wildlife. Furthermore, agro-climatic vulnerabilities, general push factors and physical asset possessions were observed to be livelihoods diversification motivational factors. Furthermore, from the six factors analyzed, the majority explained patterns of livelihood diversification. For example four factors (66.7%) explained patterns of diversification and at least a third of the factors (33.3%) were insignificant in explaining livelihood diversification. General pull factors thought to be the main motivational factor for livelihood diversification was insignificant. Physical asset possessions and contextual factors however were the most important factors in explaining patterns of livelihood diversification. Physical asset possession was more significant than wildlife related factors suggesting that the existence and possession of an array of assets such as land, livestock, buildings and machinery, human labour and adequate capital are the principle motivating factors for diversified livelihoods in Kamnarok NR adjacent areas. Quantifying and characterizing factors driving patterns of livelihood diversification among communities living in biodiversity rich rangelands can complement livelihood risk data and result in a robust human wildlife mitigation strategies.

1. Introduction

According to Ellis (1998) livelihoods are activities, assets and the access that jointly determine the living gained by an individual or household, but according to Inskip and Zimmermann (2009) livelihood diversification are the processes by which households construct diverse portfolios of activities and social support capabilities for survival and in order to improve their standard of living. Moser (1998) further argued that the linkage between people's access to assets and livelihood diversification can be traced back to 1980's were livelihood diversification was pursued as a coping strategy in response to seasonality and famine. However, in the recent past livelihood diversification has been a livelihood system which is gaining ground among pastoral nomadic communities in semi-arid and arid lands of Kenya.

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Multiple motives (push factors and the pull factors) in the contemporary society in Kenya has prompted households and individuals to diversify livelihood (Wargute, 2016). While some households diversify because they have little choice, better-off households diversify because they have a lot of choices (Ellis, 2000). Diversification may occur either as a deliberate household strategy or as an involuntary response to the crisis like those caused by HWC as it can act both as a safety valve for the vulnerable households (Adi, 2007). Likewise, the reasons behind diversification as a livelihood strategy, according to Ellis (2000), are often divided into two principal considerations: necessity (involuntary and desperation reasons) or choice (voluntary and proactive reasons). While diversification of livelihoods into non-farm is widespread in rural Kenya, not all households enjoy equal access to attractive non-farm opportunities (Reid et al., 2014).

For several decades and more particularly in the 1990's and the era of Structural Adjustment Programs (SAPS) advanced by donor institutions especially the World Bank (WB) and International Monetary Fund (IMF), many communities have been diversifying their livelihood portfolios because of economic hardships imposed by the donors. Furthermore, with the liberalization of world economies communities have been seeking ways of improving their living standards (Ogutu et al., 2011) by expanding their livelihood portfolios through diversification and Kamnarok National Reserve adjacent community is no exception. The scale of diversification within the adjacent areas is considered a serious threat to Kamnarok NR and the entire Kerio Valley basin ecosystem (Wesonga et al., 2011). In the Kerio Valley Basin, many ecosystem are currently threatened as is the case with Lake Kamnrok an important crocodile habitat in Africa. Despite increased efforts by both Kenya Wildlife Service (KWS) and the Baringo County government livelihood diversification by the adjacent community has continued to escalate human wildlife conflicts and cause species decline and extinction (Togoch et al., 2018).

The discourse on livelihood diversification and issues of wildlife conservation in Kamnarok NR revolve around the contested land ownership, the generated human wildlife conflicts and the natural resource exploitation from the Wildlife Protected Area (WPA) where local community livelihoods are tightly linked to. Therefore, it is imperative to know the factors that drive community livelihood diversification and the manner in which these activities have impacted Kamnarok NR from the point of view of the prospects of community livelihood promotion and the conservation of the wildlife protected area.

1.2 The Study Background

Kamnarok NR adjacent areas are inhabited by the Tugen and Marakwet people, sub ethnic tribes of the Kalenjin community who mainly practice pastoralism and mixed farming as their main stay livelihoods. Kamnarok NR adjacent areas in the last few decades has been characterized by heavy human disturbance especially from excessive logging, firewood collection and clearing for cultivation. The protected area has been acting as the source for wildlife whereas the adjacent communal lands has been their sinks (Western et al., 2009). While the local communities living in the adjacent areas are expected to utilize and manage natural resources within their boundaries in a sustainable manner. It has been observed that these expectations has been to the contrary as the community have been noted to pursue livelihood activities (diversification) where some are incompatible with conservation efforts.

Some of the livelihood diversification programmes are responsible for the increased HWCs in the reserve adjacent areas and extinction of some wildlife species. Furthermore, human population growth has exacerbated encroachment into the reserve natural resources for livelihoods causing conflicts between the local community, wildlife and the reserve management authorities which have been on increase both in frequency and intensity. Given the above scenario, there has been a spike in the Human Wildlife Conflict (HWC) incidences as wildlife are inclined to crops grown by the adjacent communities for domestic consumption and for commercial purposes in lands neighbouring Kamanarok NR. These interactions initiate and amplify human wildlife conflicts. This study aimed at analyzing the patterns of livelihood diversification, their underlying drivers and the magnitude of HWCs by applying rural participatory approach (RPA). Understanding patterns of livelihood diversification their key drivers interactions can help in better management of the conflicts and reduce the negative impacts on the livelihoods of the rural communities who co-exist with wildlife in these wildlife rangelands.

1.3 Rationale for the Study

The general aim of the study was to ascertain livelihood diversification opportunities being pursued and human wildlife conflicts coping strategies being adopted by Kamnarok National Reserve adjacent communities. The objectives of the study were to discuss the patterns of livelihood diversification opportunities pursued by communities adjacent to the protected area and assess the types, level of HWCs and motivations for livelihood diversification.

2. Literature Review

Many rural communities living in wildlife rangelands who are victims of human wildlife conflicts (HWCs) diversify their livelihood portfolios because they feel they have no other or better options. However, according to Ellis (2000) diversification strategies adopted by these communities are largely determined by variety of factors such as the household size and demography, the need for long term income stability, resource constraints and food security. The choice of livelihood diversification strategies is also dependent on types of livelihood activities and assets within the household such as the division of roles, education levels, size, age and gender, relations to the social institutions, experience and land endowment which makes individual households within a community different. Barret et al., (2001) argued that community households have different income generating activities including adaptions which make management of the natural resources in wildlife rangelands more complex, for both conservation purposes and for the sustainable community livelihoods.

Livelihood diversification by households living in wildlife areas has been observed as a mechanism of coping with shocks and stress associated with human wildlife conflicts. When connecting income diversification to rural livelihood strategies, off- farm and non- farm activities become key words. Off- farm and non-farm activities describe the various ways of making a living in addition to self- sufficient, subsistent farming. Off-farm activities are activities that are carried out away from one's own farm and are often farm related. The non- farm has no relation to husbandry.

According to Galvin (2009) and Reid et al., (2014), the effects of livelihood diversification in wildlife rangelands by communities existing inside and adjacent to wildlife protected areas though beneficial to them, are likely to compound those of other transformations taking place in pastoral livelihood systems such as human and livestock population growth, conflicts, competition for land and rangeland fragmentation. Economic changes, policies, institutional change and human wildlife conflicts are drivers of livelihood diversification in wildlife range lands causing land fragmentations resulting in land use change, habitat modification and land subdivision which fuel HWCs (Hobbs et al., 2008, Galvin et al., 2014). Livelihood diversification and human wildlife conflicts synergy in wildlife rangelands will continue to increase and intensification in livelihood diversification by local communities restrict the flexibility and mobility of wildlife which will end up fueling localized conflicts thus the need for appropriate interventions and coping mechanisms.

As an effort towards improvement of wildlife and biodiversity conservation, Kenya currently has established 28 national reserves, 22 national parks, 4 national marine parks 6 national marine reserves and a number of wildlife sanctuaries occupying 12.3% of the Kenya's land mass (Ministry of Tourism, 2018). Ogutu et al., (2016) and Mukeka et al., (2018) attributed major causes of livelihood diversification among communities living in wildlife rangelands to climate change, rising human and livestock population sizes, heightened economic activities and land-use changes as major cause of livelihood diversification among communities living in wildlife rangelands.

However, both livelihood diversification and HWCs are more pronounced in wildlife rangelands where local communities share common resources and the rural communities whose dependency on livestock and crop husbandry for livelihoods are declining. Homewood et al., (2009) and Mukeka et al., (2018) attributed intensification of livelihood portfolios in regions with abundance of wildlife to inadequate benefits from wildlife resources and the inability of wildlife resources to pay for their costs of conservation.

3. Research Methodology

The study adopted an exploratory research design aimed at assessing the patterns of livelihood diversification and human wildlife conflicts in Kamnarok NR adjacent areas in Baringo County. A questionnaire survey was conducted in the three locations covering the two predominant sub ethnic communities (Tugen and Marakwets) who live in and adjacent the Kamnarok NR and households living within a distance range of 3.5kms from the boundary of the National Reserve. A total of 384 questionnaires were administered for the study but 360 were actually returned for data analysis representing a response of 93.7%. The selection of this study area was dictated by the existence of extensive livelihood diversification and human wildlife conflicts where the management authorities of the protected area and the local communities are in frequent contestation over land ownership and the associated resources.

An attempt was made to cover an average of 15% of households in the three locations of the study area and at least over 10% of the households living inside the PA were interviewed. Household's numbers were obtained from the locational administrators (Chiefs) and households were selected randomly by walking through the selected villages and interviewing the respondents. Attempts were made to interview household heads, but in their absence, then either the spouse or the oldest person in the household was interviewed. Individual study households (n=384) were selected using simple random sampling from a list of resident households within Kamnarok NR adjacent areas with the help of local informants where every 12th household responded was selected for interview. The questions in the questionnaire required indication of either "yes or no" on the motivational factor influencing diversification and a score on the likert scale questions. Reliability was tested using Cronbach's alpha at a level of 0.7 and the limit fell within the acceptable threshold in exploratory studies. Descriptive statistics and chi -square were used to describe the data. Factor analysis was used to reduce the measurement items while Pearson correlation was used to test the relationships between items.

3.1 The Study Area

The study was conducted in Barwesa Ward of Baringo County, Kenya. Kamnarok NR is located in the Baringo County east of Elgeyo Marakwet County bordering Rimoi NR another wildlife protected area. In Kerio Valley, Kamnarok National Reserve is situated in an areas covering 15000 km2 of mostly arid and semi-arid rangelands straddling along Kerio river riverine. Kamnaok NR is a wildlife protected area established in 1983 vide a legal notice V2091/83 and lies between 200 4N and 000 46N and 350 3 and 360 2 East (Figure 1). An overall rainfall gradient in the valley floor is 500 mm p.a with the influence of Kerio river, rugged hills and escarpments on both ends of the valley The Kamnarok NR extends into three locations which comprise of Lawan, Kabutie and Kerio Kaboske.

Kamnarok NR occupies an area of 87.7km2 forming a narrow and long strip of land of approximately 80 km along the Kerio river in the great Rift Valley (Njogu, 2003). The protected area was under the defunct Baringo county council and currently under county government of Baringo. The main reason for the establishment of the PA was its strategic position to hold and conserve the endangered species of savannah elephants, Black Rhino and Rothschild giraffe (Njogu, 2003) and as part of migratory corridor for migratory wildlife between Mau forests in the south and Rimoi, Nasalot and lake Turkana South National Reserves in the north (Wasonga et al., 2011). The study area lies in semi-arid and savannah ecosystem and support a wide variety of large herbivore species.

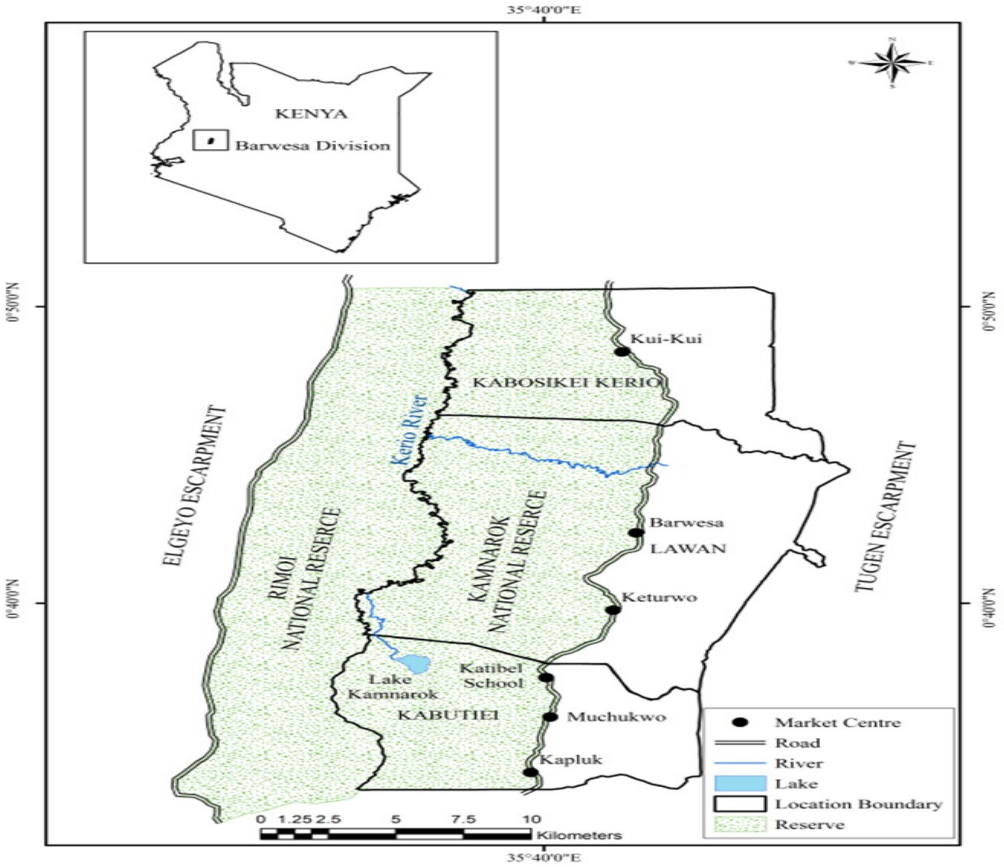

Figure 1: Map of Kamnarok National Reserve in Kenya

Source: University of Nairobi Geography and Environmental Department, 2018

4. Results and Discussion

4.1 Socio-Economic characteristics of the respondents

The results of the socio-economic characteristics shows that a majority of Kamnarok NR adjacent residents who have diversified livelihood portfolios are male headed households (68.1%), married (49.3%), have a college education (13.2%), have farm size of between 5 and 10 hectares (66.7%), have access to credit facilities (69.0%) and have been victims of human wildlife conflicts (76.9%). The study findings revealed that gender difference (X2=3.641: p 0.016) had an impact on livelihood diversification activities in the study area. Male headed households in rural Kenya control resources and so have more access and participation in decision making regarding diversification activities. Furthermore, the results of chi-square test revealed a significant difference in the education level and farm size of the diversified and undiversified households (X2=5.92: P 0.068) and (X2=5.849: P 0.042) in the diversification of livelihoods, however, marital status had no significance. In addition the study findings reveal that there are more men (46.9%) in gainful employment than women (23.3%) in the study area as this can be attributed to low literacy level among the women populace of the study area.

The mean age of household head was found to be 42.7 years (Table 1), with farm size mean of 12.73Ha ± 1.73. Household heads whose source of livelihood were derived from mixed agricultural activities (pastoralism and farming), the outcome of their socio- economic activities revealed that they have not diversified (53.7%) as compared to business entrepreneurs and those in formal employment who have diversified livelihoods at (54.5%) and (90.1%) respectively Table 1. Furthermore, the study findings reveal that household heads who have above college education, were in formal employment and have access to credit facilities and those who have small farm acreage were observed to have diversified livelihoods at (81.3%), (90.1%), (53.7%) and (66.7%) respectively (Table 1). This finding is synonymous with the finding of Sisay (2010) who reported a positive impact of small farm size increasing chances of household diversification to non-farm activities. Furthermore, in some studies, smaller landholdings have been found to positively and significantly impact on non-farm diversification.

Furthermore, the above results indicate that households who are more educated have diversified livelihoods because they are in formal employment and thus have enhanced incomes. In addition, most residents of Kamnarok NR adjacent areas are still in their productive years and are able to engage themselves in multiple income generating activities which enhance their household purchasing power and consequently their household welfare status. Households closer to the protected area boundaries had diversified livelihoods as compared to those further from the protected area. However, it was observed that households who had diversified livelihood had been victims of human wildlife conflicts as compared to undiversified and statistically significant difference was found (X2=7.051: p 0.031).

Table 1: Description of Socio-Economic Characteristics of Respondents

Variable	Freq.	% of respondents	Diversified households	Non-Diversified households	X^2	P –Values
Age of household		42.7yrs				
Gender						
Male	276	46.9	68.1	31.2	3.641**	0.016
Female	84	23.3	40.5	59.5		
Marital status						
Married	177	49.3%	65.5%	34.5%	7.464	0.664
Single	117	32.4%	35.9%	64.1%		
Other (widows/widowers)	66	18.3%	63.6%	33.3%		
Educational level						
No formal education	108	30.9%	34.3%	34.6%	5.921**	0.068
Up to primary level	122	33.9%	36.1%	36.1%		
Secondary	82	22.8%	78.0%	78.0%		
College and above	48	13.2%	81.3%	18.7%		
Farm size						
< 5ha	67	18.6%	59.7%	40.3%	5.849**	0.042
5-10ha	144	40.0%	66.7%	33.3%		
>10ha	149	41.2%	28.2%	71.8%		
Livelihood systems						
Mixed agriculture (pastoralism and farming)	190	52.8%	46.3%	53.7%	8.219**	0.033
Business entrepreneurs	99	27.5%	54.5%	36.4%		
Formal employment	71	19.7%	90.1%	9.9%		
Victim to human wildlife conflict (HWC)						
Yes	277	76.9%	53.7%	46.2%	7.051**	0.031
No	88	23.1%	39.8%	60.2%		
Credit facilities						
Access	155	43.1%	69.0%	31.0%	4.862**	0.026
No access	205	56.9%	22.9%	77.1%		
**Significant at 5%						

Source: Field data analysis by Author, 2019

Thus it can be said that HWCs influence diversification of household livelihoods. The findings further reveal that households who had fallen victims to human wildlife conflicts had diversified their livelihoods as a coping strategy to the problem and this is in agreement with the findings of Bezu et al., (2012) and Hoang et al., (2014), who argued that diversification insulate households from risks and shocks and allows families to improve financial status and increase production and cope with environmental stress and shock such as those caused by wildlife and natural causes such as climate change. Mojo et al., (2014) also posited that livelihood diversification is an essential strategy employed by households in order to move from subsistence and poverty to commercial and prosperity.

4.2 Household Diversified Livelihood activities

Results in figure 2 presents diversified patterns of livelihoods adopted by households in the study area. The main activities performed by the households were pastoralism (53.6%) and farming (27.7%).

Pastoralism and farming accounted for 81.3% (Figure 2), signifying that both pastoralism and farming are key household economic activities contributing immensely to the Kamanrok NR adjacent resident household's livelihoods. According to ministry of Tourism and Wildlife (2018), Kenya's economy is characterized by a large traditional rural sector and small urban sector where farming and livestock (pastoralism) are primary economic activities in arid and semi-arid regions where Kamnarok NR adjacent community is part of. Galvin et al., (2014) observed that both pastoralism and farming account for about 20% of the Kenya's gross domestic product (GDP) and 22% in foreign exchange earnings. Other diversified livelihood activities pursued by the residence of the study area include engagement in diversity of entrepreneurial businesses (15.6%) while others are employed (3.1%).

The study identified livelihood diversification areas where the local households were involved in such as entrepreneurial businesses which included curio shops, selling of farm products and transport while others were professional service fields such as in motor vehicle maintenance (Mechanics), tailoring, agro vet, health clinics, pharmaceutical and agro vet shop outlets Figure 2. However, like in many rural areas in Kenya it was observed that the local peoples at Kamnarok NR adjacent areas also rely for their livelihoods on hunting, fishing, valorization of Non Timber Forest Products (NTFPs) and handicraft, while the main crops grown in the area included maize (Zea mays), finger millet (Eleusine coracano), sorghum (Sorghum bicolor), beans (Pheseoluas vulgaris) and cassava (Manihot esculenta), though maize, millet and sorghum crops were the main contestation of conflicts between the adjacent households and the management authorities of Kamnarok NR. The poor condition of roads is not favorable for the commercialization of agricultural products in the area and as a result, a high proportion of the harvest is mainly for local consumption and the remaining part is sold locally at a low prices.

The study findings further revealed that residence of Kamnarok NR adjacent areas who households location are in the range of 3.8kms and beyond have diversified their livelihoods and are involved in more than one economic activity. A further interview with the local County government officials provided a general picture that the public sector employees especially those from Kamnarok NR adjacent areas own big farms and some were involved in major businesses within the main centres of the study area.

4.3 Motivational factors influencing livelihood diversification

The underlying drivers and motivational factors for livelihood diversification in Kamnarok NR adjacent areas were assessed as a set of continuum factors directed towards understanding the underlining reasons for community livelihood diversification. Cronbach's alpha was used to test reliability of indicators of factors influencing diversification items of which a value of 0.739 was obtained hence the indicators used were reliable in explaining the reasons for livelihood diversification because according to Heirs et al., (2005), the generally acceptable lower limit for cronbach's alpha is equal or greater than 0.70, and may decrease and be lower to 0.60 in exploratory research. As this study was partly exploratory, the attained threshold of 0.739 was therefore within the acceptable limits. The livelihood diversification factors assessed were in terms of testing the alternative livelihood activities and methods of income generation by the local community due to the high risks brought by wild animals from Kamnarok NR. Explanatory factor analysis (EFA) was used to examine motivational factor items which influence livelihood diversification. Kaiser Meyer Olkin (KMO) measure of sampling accuracy of 0.721 was obtained and was found to be within the acceptable minimum of 0.70 measurement of sampling accuracy. According to Kaiser (1974), value greater than 0.70 for exploratory research is acceptable. Bartlett's Test of Sphericity yielded a value of 983.704 at a significance level of 0.000. This implied that the adequacy of the test for correlation matrix and the outcome results were satisfactory for the study.

Eigenvalues were obtained after motivational factor indicators for livelihood diversification were analyzed as shown in table 2. By applying the criteria of selecting and picking factors elements whose eigenvalues are greater than one, only six components were obtained. Physical asset possession 32.67%, contextual factors was 27.74%, general push factors 17.41%, general pull factors 10.09% while wildlife related factors and agro-climatic vulnerabilities were 7.47% and 4.59% respectively. The six factor components had a cumulative variance of 100% implying that the component indicators influencing livelihood diversification in Kamnarok NR adjacent areas is adequately described by the six variables. Furthermore, the reliability test conducted on the six component variables showed that all attained the acceptable level of 0.60 with the lowest being 0.649 and the highest 0.881.

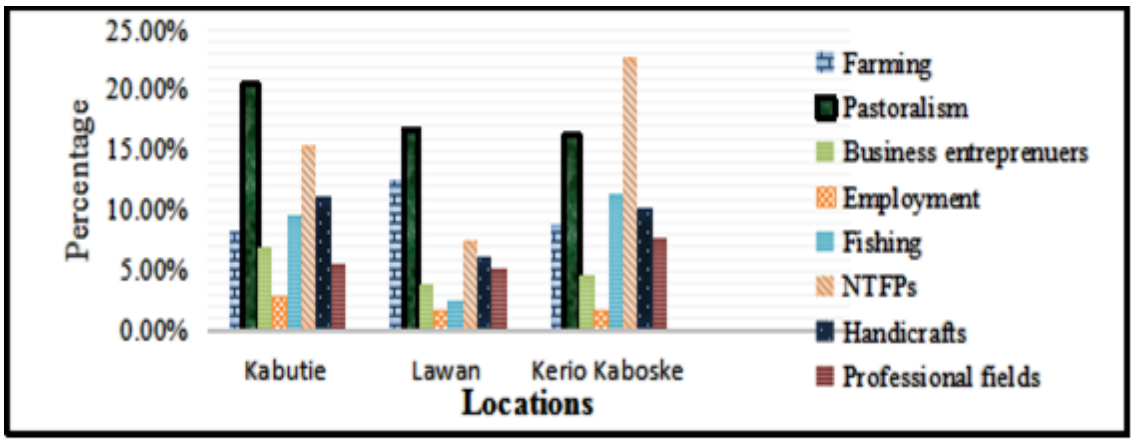

Figure 2: Household Diversified Livelihood activities

Table 2: Total Variance Explanation

Factors	Initial eigenvalues			Rotation sum of squares loadings			
	Total	% variance	Cumulative %	Total	% variance	Cumulative %	Cronbach alpha
Physical assets possession	9.485	39.400	39.400	7.017	32.671	32.671	0.794
Contextual factors	6.169	22.916	62.316	6.057	27.746	60.417	0.881
General push factors	4.916	16.447	78.763	4.777	17.418	77.831	0.781
General pull factors	2.810	9.574	88.337	3.192	10.094	87.929	0.742
Wildlife related factors	1.964	7.922	96.219	2.976	7.475	95.404	0.649
Agro-climatic vulnerabilities	1.422	3.741	100.000	1.873	4.596	100.00	0.681
Extraction method: Factor Analysis							

Source: Field data analysis by Author, 2019

Kaiser Normalization Varimax rotation was performed where the rotated component matrix had six factors as indicated in table 3. The six components variables explained livelihood diversification motivation factors after the factor analysis was done as the rotation converged in six iterations.

Table 3: Rotated Factor Matrix

Variable	1	2	3	4	5	6
	AGCV	CTXF	PHYA	GPSF	GPLF	WRLF
Drought	0.851					
Floods	0.770					
Crop Disease	0.792					
Lack of rural planning policies		0.701				
Socio-political issues		0.762				
Poor access to markets		0.913				
Fluctuations in product prices		0.894				
Poor infrastructure		0.726				
Lack of land tenurieship		0.931				
Severity of poverty		0.804				
Land			0.679			
Livestock			0.773			
Machinery and building possessions			0.674			
Availability of human labour (casuals)			0.911			
Adequate capital			0.882			
Economic hardships				0.819		
Management regime of Kamnarok NR				0.851		
Land fragmentation				0.694		
Declining agricultural production				0.631		
Policy readjustment decreasing community support for wildlife conservation				0.839		
Availability of food aid agencies					0.682	
Availability of credit loan facilities for entrepreneurial start ups					0.886	
Improved infrastructure					0.709	
Proximity and emergence of urban centers					0.847	
Damage to crops by wildlife						0.781
Property destruction by wildlife						0.894
Livestock predation						0.911
Human injury by wild animals						0.672
Human deaths from wild animals						0.639

Extraction Method: Factor Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

Source: Field data analysis by Author, 2019

4.4 Pearson Correlations

From the finding in table 4 below, it indicates the correlations between the six factors that measured motivations influencing livelihood diversification and also the significance of the association among the variables. The number of the elements under the study were six (6) which emanated from the six unit factors where data was collected using the likert scale structured questionnaire.

4.5 Relationship Tested

Agro-climatic vulnerabilities and wildlife related factors was noted to be statistically insignificant (r >0.3) with weak positive relationship (0.229; 0.682), agro-climatic vulnerabilities and general push factors was insignificant (r >0.5) with a moderate positive relationship (0.542; 0.277). Agro-climatic vulnerabilities and physical asset possession was also insignificant (r >0.8) with a strong positive relationship (0.838; 0.231), while, agro-climatic vulnerabilities and general pull factors was also insignificant (r > 0.3) with weak positive relationship (0.384; 0.492) and agro-climatic vulnerabilities and contextual factors was insignificant (r > 0.3) with weak positive relationship (0.492; 0.262).

General push factors and general pull factors was observed to be insignificant (r > -0.7) with strong negative relationship (-0.778; 0.984), general push factors and physical asset possession was also insignificant (r > 0.5) with moderate positive relationship (0.508; 0.174) and general push factors and contextual factors was insignificant (r > 0.8) with a strong positive relationship (0.805; 0.277), general pull factors and physical asset possession was further observed to be insignificant (r > 0.7) with a strong positive relationship (0.778; 0.229) and general pull factors and contextual factors was insignificant (r > 0.8) with a strong positive relationship (0.881; 0.427). Physical asset possession and contextual factors was statistically significantly (r =1.0) with a perfect positive relationship (1.000; 0.000). It can therefore be concluded that out of the six variables relationships tested physical asset possessions and contextual factors was statistically significant.

Table 4: Correlation of components of motivations factors influencing livelihood diversifications

		AGCVs	WRLFs	GPSFs	GPLFs	PHYA	CTXFs
Agro climatic vulnerabilities	Pearson correlation	1	0.229	0.542	0.384	0.338	0.494
	Sig. (2 tailed)		0.682	0.272	0.492	0.231	0.161
	N	360	360	360	360	360	360
Wildlife related factors	Pearson correlation	0.872	1	0.549	0.489	0.882	0.668
	Sig. (2 tailed)	0.174		0.221	0.239	0.292	0.277
	N	360	360	360	360	360	360
General push factors	Pearson correlation	0.345	0.727	1	0.778	0.805	0.489
	Sig. (2 tailed)	0.247	0.448		0.984	0.247	0.362
	N	360	360	360	360	360	360
General pull factors	Pearson correlation	0.499	0.776	0.681	1	-0.541	0.528
	Sig. (2 tailed)	0.522	0.229	0.427		0.942	0.255
	N	360	360	360	360	360	360
Physical asset possession	Pearson correlation	0.458	0.684	0.552	0.693	1	1.000
	Sig. (2 tailed)	0.491	0.341	0.162	0.427		0.000**
	N	360	360	360	360	360	360
Contextual factors	Pearson correlation	0.414	0.793	0.181	0.687	0.394	1
	Sig. (2 tailed)	0.279	0.321	0.264	0.478	0.246	
	N	360	360	360	360	360	360

** correlation is significant at the 0.001 level (2 tailed)

Key: AGCVs= Agro climatic vulnerabilities, **WRLFs**- Wildlife related factors, **GPSFs**- General push factors, **GPLFs**- General pull factors, **PHYA**- Physical asset possession, **CTXFs** –Contextual factors

Conclusion and Recommendation

This study assessed six livelihood diversification motivational factors among Kamnarok NR adjacent community. Using factor analysis, the six studied motivational variables included agro-climatic vulnerabilities, wildlife related factors, general push factors, general pull factors, physical asset possessions and contextual factors. The first motivational component named agro-climatic vulnerabilities comprised of drought, floods and crop diseases. Second component was wildlife related factors comprising of property and crop damages, livestock predations, human injury and deaths from wildlife. The third component was general push factors comprising of management regimes of Kamnarok NR, land fragmentations, declining agricultural production, non-community supportive policy on wildlife conservation and economic hardship. Fourth component was pull factors which comprised of availability of food aid agencies, availability of credit facilities for enterprise set ups, improved infrastructure and emergence of urban centres.

The fifth component was named physical asset possession which comprised of land, livestock, machinery and buildings, human labour and capital while the last component was contextual factors which comprised of planning policies, socio-political issues, poor access to markets, poor infrastructure, poverty severity and lack of land tenureships. From the components analyzed, the findings attribute livelihood diversification in Kamnarok NR adjacent areas to physical asset possessions, agro-climatic vulnerabilities, general push factors and contextual factors.

Based on the components studied and results of Pearson correlation tests. The relationship between physical asset possession and contextual factors was significant while all others were not. This finding could mean that the existence and possession of assets such as land, livestock, machinery and buildings, human labour and adequate capital are the principle motivating factors for livelihood diversification among Kamnarok NR adjacent community. Moreover, it was also in the relationship between agro-climatic vulnerabilities and physical asset possession, general push and general pull factors and general pull factors and contextual factors that had a strong positive relationship whereas all the rest of the relationships were positively moderate and positively weak.

Furthermore, the study findings demonstrate that livelihood diversifications among households in the Kamnarok NR adjacent areas occurred due to the availability of key essential assets. Thought diversification may also have developed as a coping and risk management response to other economic constraints including human wildlife conflicts, site specific opportunities such as the emergence of new urban areas and new infrastructural developments were some of the factors pulling local households towards diversification. The study therefore recommends that the local households should be allowed to diversify their sources of livelihoods so as to improve their standards of living and Kamnarok National Reserve management authorities need to obtain community support and participation in conservation of wildlife and explore new conservation and management strategies which endeavors to integrate biodiversity conservation efforts and the local community diversified livelihoods.

References

Adi, B. (2007). Determinants of Agricultural and Non-agricultural Livelihood Strategies in Rural Communities: Evidence from Eastern Nigeria. The Journal of Developing Areas 40 (2): 93–109.

Barrett, C.B, Reardon, T. and P. Webb (2001). Non-Farm Income Diversification and Household Livelihood Strategies in Rural Africa: Concepts, Dynamics and Policy Implications. Cornell University. Theca. USA.

Bezu, S., Barrett, C. B and Holden, S. T. (2012). Does the nonfarm economy offer pathways for upward mobility? Evidence from a panel data study in Ethiopia. World Dev. 40 (8): 1634- 1646.

Ellis, F. (1998). Survey article: Household strategies and rural livelihood diversification. The Journal of Development Studies. Vol.35, No.1, pp.1–38.

Ellis, F. (2000). The Determinants of Rural Livelihood Diversification in Developing Countries. Journal of Agricultural Economics 51 (2): 289–302.

Galvin, K.A. (2009). Transitions: Pastoralists living with change. Annual Review of Anthropology 38: 185–198.

Galvin, K.A., R.S. Reid, R.H. Behnke, and N.T. Hobbs. (2014). Fragmentation of semi-arid and arid landscapes: Consequences for human and natural systems. Dordrecht: Springer.

Heirs G. (2005). Indigenous and local communities and protected areas: Towards equity and enhanced conservation, IUCN, Gland, retrieved on 23 January 2018, from http://plateauperspectives.org/pubs/ Indigineous% 20peoples.pdf.

Hoang, T. X, Pham, C. S and Ulubasoglu, M. A. (2014). Nonfarm activity, household expenditure and poverty reduction in rural Vietnam 2002-2008 world Dev. 64: 554-568.

Hobbs, N.T., K.A. Galvin, C.J. Stokes, J.M. Lackett, A.J. Ash, R.B. Boone, R.S. Reid, and P.K. Thornton. (2008). Fragmentation of rangelands: Implications for humans, animals, and landscapes. Global Environmental Change 18(4): 153-168

Inskip, C., & Zimmermann, A. (2009). Human-felid conflict: A review of patterns and priorities Worldwide. Oryx, 43(1), 18–34.

Mojo, D., Rothschuh, J., & Alebachew, M. (2014). Farmers' perceptions of the impacts of human wildlife conflict on their livelihood and natural resource management.

Mukeka, J. M., Ogutu, J. O., Kanga, E., & Roskaft, E. (2018). Characteristics of human-wildlife conflicts in Kenya: Examples of Tsavo and Maasai Mara Regions. Environment and Natural Resources Research, 8(3), 148. doi:10.5539/enrr.v8n3p148.

Moser, C. (1998). The asset vulnerability framework: reassessing urban poverty reduction strategies. World Development 26(1): 1-19.

Homewood, M. (2009). Property-rights and the marginal wildebeest- an economic analysis of wildlife conservation options in Kenya." Biodiversity and Conservation 5 (12): 1557-1577.

Njogu, J. G. (2003). Community Based conservation in an entitlement perspective. Wildlife and forest biodiversity conservation in Taita, Kenya. PhD Thesis University of Amsterdam.

Ogutu, J. O., Piepho, H. P., Said, M. Y., Ojwang, G. O., Njino, L. W., Kifugo, S. C., & Ogutu, J. O., N., Owen-Smith, H. P. P. and Said, M. Y. (2011). Community wildlife population decline and range contraction in Mara region of Kenya during 1977 – 2009. J Zoology 285:99-104.

Reid, R.S., M.E. Fernández-Giménez, and K.A. Galvin. (2014). Dynamics and resilience of rangelands and pastoral peoples around the globe. Annual Review of Environment and Resources 39: 217–242.

Sisay, W. A. (2010). Participation into Off-farm activities in rural Ethiopia who earns more? A research paper in partial fulfillment of the requirements for the attainment of the degree of Masters of Arts in development studies. International Institute of Social Studies, the Hague, Netherlands.

Togoch, H. K., Irandu, M. E. and Thenya, T. (2018). Human Wildlife Conflicts and livelihood diversification among Kamnnarok National Reserve adjacent communities in Baringo County, Kenya. Africa Environmental Review Journal, Vol. 3, No.1 pp 51-64.

Wargute, P. W. 2016. Extreme wildlife declines and concurrent increase in livestock numbers in Kenya: What are the causes? PloS One, 11(9), e0163249. Doi: 10.1371/journal. Pone. 0163249. Accessed 12-4-2019.

Wesonga, V.O., Nyariki, D.M. and Ngugi, R.K. (2011). Assessing socio-ecological change dynamics using local knowledge in the semi-arid lowlands of Baringo District, Kenya. Environmental Research Journal 5(1), 11-17. World Health Organization.

Western, D., Russell, S., & Cuthil, I. (2009). The status of wildlife in protected areas compared to non-protected areas of Kenya. PloS One, 4(7), 1 –6. doi:10.1371/journal.pone.0006140. Accessed 7-9-2019.