

ASSESSING EFFECT OF LAND TENURE SYSTEMS ON MAASAI LIVELIHOOD IN A WILDLIFE DISPERSAL AREA NAROK COUNTY, KENYA

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Abstract

The pastoral Maasai Indigenous Peoples (IP) are shifting to a private land tenure in community group ranches to improve livelihood outcomes. A study sought to establish linkage(s) between Maasai (IP) land tenure systems and livelihood outcomes in the Masai Mara wildlife dispersal area. A total of 404 questionnaires were administered to the study respondents in; Ololulunga, Mara and Osupuko study sites. The study hypothesized that there is no significant linkage between the land tenure system and Maasai IP livelihood outcomes in the study area. Respondents were randomly selected using cluster random sampling from 3 outer group ranches in Ololulunga, Mara and Osupuko wards. Spearman's rank correlation co-efficient analysis shows that; a positive correlation in the model of agro-pastoralism and casual off-farm income sources rank high ($r=0.814$). Similarly, farming and casual-off farms also rank negatively high ($r= - 0.895$). Change in the number of livestock was strongly related to access to water sources. Chi-test of independence was further used to test the association of land tenure system, livelihood strategies and livelihood outcomes. The study established that land tenure affects livelihood strategies and outcomes. As an example; private land tenure is expanding agriculture activities and, impedes livestock herding. In conclusion; land tenure is significant ($p<0.05$) linked to livelihood outcomes. Private land tenure farming's income generation strategies hinder human-wildlife connections. This study recommends households' equitable access to selected livelihood sources regardless of land tenure regimes. Further studies on the impacts of natural resource tenures on livelihood outcomes is recommended.

Keywords: *Maasai indigenous people, private land, community land, wildlife dispersal area, livelihood outcomes, land tenure, access*

Introduction

Globally Indigenous Peoples (IP) adopt a private land tenure to manage a community territory where both appear similar (Wily, 2018). The phenomenon of a mixed tenure system is threatening natural resources depended livelihoods in a wildlife territory (Republic of Kenya, 2022). This

phenomenon has encouraged competitive workforces dispossessing pastoral community tenure systems with effects (DESA, 2009; Kameri-Mbote, 2002). In Africa, the non-dominant attribute of IP is characterized by their ways of life as hunter-gatherers and pastoralists. In a group ranch territory, this organization is increasingly

threatened by competing land uses for economic growth (Fratkin, 1997). In Central, Eastern, and Southern Africa, agriculture and large-scale cattle farming has become the dominant way of life defensively locking out seasonal livestock and wildlife access to pasture and water points. Alongside, pastoral habitual movements, in search of water and pasture are vilified (Global Environment Facility, 2012; Turner & Schlecht, 2019). Without a clear livestock herding and cropping co-existence strategy in a wildlife dispersal area, competition ensues. Maasai IPs who practice pastoralism are seen as “backward” and not modern enough to improve economic growth (Fratkin, 2001).

Maasai community in Kenya, entered into Anglo-Maasai 1904 and 1911 treaties for an occupied indigenous Maasai territory as if they were a sovereign State (Barume, 2014). Kenya became administratively divided into provinces, districts, divisions and locations as early as 1920s when native communities settled (Kanyinga, 2014). Chiefs’ administration enforced new land relations in post-independence Kenya (Cotula, 2007; Neves, 2007). Historically; land scarcity was voiced during the 1952 Mau Mau uprising. The claims were led by impoverished squatters and tribal communities over; failed resettlement schemes (Okoth-Ogendo, 1991). To counter the resentment, the 1955 Swynnerton Plan proposed individualization of land ownership. Planned collective land consolidation and registration provided a setting for, improved agricultural production (Ssekandi, 2002). The Swynnerton Plan relegated pastoralists to a group ranch land system. Swynnerton’s agricultural objective to create family holdings as labour units was later replicated in the 1990s pastoralists’ group ranches sub-division. The landholdings were expected to be large enough to

keep the family self-sufficient in food. Similarly, Maasai households were to access a field to provide pasture and nurture a herding labour force. In the process, a strategy of extensive use of communal grazing in pastoral districts commenced (Kameri-Mbote, 2019). For a pastoral Maasai IP, the finite physical environment and livelihood sources were shared with wildlife. The human-nature relationship that ensued changed under an intensive farming expansion strategy in private land (Fratkin, 2001).

Swynnerton Plan of 1954- 1959 regime expanded agricultural practices in native territory. The plan also led to smallholder colony of priority cash crops (Omwoma, 2018). The Swynnerton Plan has been maintained over the decades and revised by several legislations, such as the; Land Consolidation Act of 1959 (Cap 283), the Land Registration (Special Areas) Act of 1959, and post-independence Registered Land Act of 1963. These Acts have been revised to meet the requirements of the Kenya 2010 constitution (ROK 2012a, ROK 2012b, ROK 2012c, ROK 2016). The private, public and community land tenure systems’ competition and its effects to livelihood strategies have persisted over time. Planning criteria such as pasture and water availability and, subsistence living conditions fail to secure livelihoods. In addition, land sizes and access to livelihood sources influence accruing benefits. Citizens who fail to capture natural resource benefits express effects (Kateiya et al., 2021).

The land tenure reform wave of the 1990s ignored variability in community natural resources. There exist special tribal county areas with indigenous people’s land issues that require special attention (Omwoma, 2018; ROK, 2010). The primary source of Maasai communal tenure vulnerability is the locality and functional nature of grazing fields

(Bedelian et.al., 2017; Lambin et.al., 2012). Proper environmental planning and management in pastoral areas require that households access land-based resources. Some locations require access mainly during the dry season for livestock herds. Wildlife and livestock struggle to access grazing fields, salt licks and water points even within private land (Bedelian, 2014; Johnson et.al., 2018; Seernel & Lambin, 2001). At a near natural area territory extends cropping expansion. A legitimate land use intensification strategy forces herders to go around fences to access water points.

Kenya Vision 2030 has proposed the cultivation of 1.2 million hectares of newly opened lands to increase yields; this directive expands crop production catchment (ROK, 2008). Ayantunde et.al. (2011), study shared Public Sectors administrators' experiences on the land reform regime's effects on communities. Group ranches in Kenya are under exceeding threat from land tenure systems' pressure to subdivide land (Nkedianye et.al., 2020). Masai Mara's strategic dry season grazing land territory is sequentially changing into mixed land uses. Wildlife plans and farming systems compete with livestock herding (Johnson et.al., 2018; Tamou, 2017).

The predominantly pastoralist Maasai IP's livelihood strategies were livestock heavily dependent (Ameso, 2018). Earlier studies by Burnsliver et al. (2007), found that failing group ranch management systems and land loss pushed group ranches to subdivide land. Ayantunde et al. (2011), attribute *natural resources available*

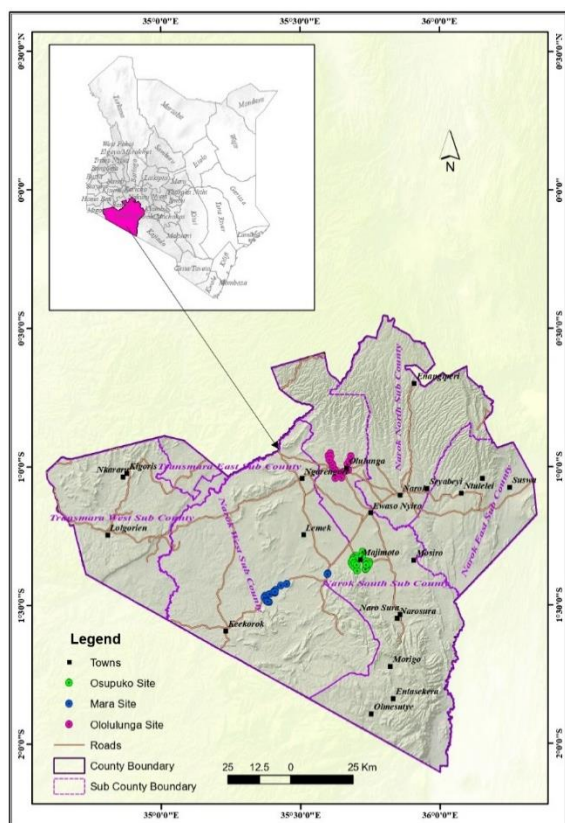
variables to the territorial status of wildlife fields. Later, Bedelian (2014) confirmed that farming in the Mara dispersal area has transitioned to be a significant livelihood source. Nelson (2009) cautioned that a private tenure system excludes Maasais from specific livelihood source locations. Nkedianye et.al., (2020) associated land tenure change with livelihood diversification. Gaps in understanding of the extent of land tenure linkage to livelihood outcomes in the Masai Mara ecosystem exist. The objective of this study was to establish the land tenure systems linkages with livelihood strategies and outcomes in Ololulunga, Mara and Osupuko study sites in Narok south sub-county.

Material and Methods

The study was done in Narok County (580 367 km²) located in South-Western of Kenya and neighbouring the Maasai Mara National Reserve. According to Kenya National Bureau of Statistics (2009), Narok County had a population size of 850 920 people The study area consists of South sub-county wards of Narok County namely; Ololulunga, Osupuko and Mara. Maasai Mara National Reserve (MMNR) designated as a wildlife dispersal area lies within the Narok South sub-county and carries a total population of about 52, 974 people. The study area was intended to be a buffer zone between the national game reserve and the northern farming areas although it is not marked on the ground (Mukeka et al., 2019). Below is a GIS-generated map of the study area showing the study site locations (Figure 1).

Figure 1

Map of Narok South; Ololulunga, Mara and Osupuko divisions, data collection Sites of Extent of land tenure linkage, livelihood strategies and outcomes in Narok County in Kenya.



Source: Resource Survey & Remote Sensing (2023).

Figure 1 identifies relevant household settlement clusters, approximate scale, and interactions. The Ololulunga, Mara and Osupuko study sites are closely connected through clusters of Maasai IP *Manyattas* within the outer group ranches.

Research Methodology

Primary data was collected using questionnaires, interviews and observations. The probability cluster random sampling procedure was used to select household heads within each study site in order to obtain a reliable comparison (Niewohner et al., 2016 and Leung, 2015). The study respondents were randomly selected from a sampled cluster from a population of all Maasai IP households who reside in 3 outer group ranches in the Narok South sub-county. The 3 study sites were the administrative ward or locations that are the avenues of decentralisation and connect to the study sites (Figure 1). Clusters are important random sampling points in obtaining trends by repeatable procedures to understand how to improve the Maasai IP's productivity and livelihoods in the Masai Mara dispersal area. Probability cluster random sampling was ideal because the group ranches' fields lie within existing wards that have clusters of settlements. Simple random sampling targeted all Maasai IPs in Ololulunga, Mara and Osupuko sites in Narok south sub-county. The ward site forms a pattern across 3 outermost group ranches. A sample size of 441 household heads was selected for the study. This was made up of sample sizes of 135, 152, and 154 household heads for the Osupuko, Ololulunga, and Mara, sites respectively (Table 1).

Table 1

Study area response rates; Ololulunga, Mara and Osupuko wards in Narok

Study area	Target		Actual	
	Frequency	Percentage	Frequency	Percentage
Osupuko	135	30.7	122	90.4
Ololulunga	152	34.6	138	90.8
Mara	154	35.0	144	93.5
Total	440	100	404	91.8

Source: Field data (2018)

Both primary and secondary data were collected. Primary data was collated by administration of a questionnaire, informal conversations, observations and photography. Questionnaires were administered to clusters of household heads in settlement locations in the 3 wards of the study (Appendix 1).

Secondary data was obtained from published and unpublished sources. These included documentary analysis of research reports, public laws and regulations, published papers, unpublished research theses and organization websites. Data analysis was carried out using both descriptive and inferential data tools and techniques guided by an excel sheet and SPSS data analysis tool (Meulman & Heiser, 2012). The key descriptive data tools were frequencies and percentages. Chi-square test of independence and a correlations matrix showing the Spearman rank correlation coefficient were the main inferential data analysis tools (Mc Bride, 2005).

Results and Discussions

The first part of the section presents data linking land use type and livelihood strategies in the study sites (figure, 1). The first section provides data and a brief discussion of linkage of the land tenure system and Maasai IP livelihood strategies. This is followed by results of data on Maasai IP perception

of change in selected livelihood variables. Lastly, the results of a linkage between land tenure and livelihood strategies with livelihood outcomes are established and discussed. The models of presentation follow similar sequential study data presentations in the literature on; land tenure change processes that affect livelihood outcomes (Berman et al., 2017; McCuster et al., 2013).

Correlation between Land Uses and Livelihoods Strategies

To determine the statistical significance of the research findings on the correlation between land uses and livelihood strategies, the *null hypothesis* that;

H₀ There is no correlation between land uses and livelihood strategies in the 3 study sites; was tested using spearman’s rank correlation coefficient. The result is shown below (Table, 2).

A list of land use types and livelihood strategies shows a comparison of two types of samples taken from the three study sites as shown (Table, 2).

Agriculture land use variables used in Table 2

- V1 Farming
- V2 Mixed farming
- V3 Subsistence farming
- V4 Large scale cropping
- V5 Agro-pastoralism

- Livelihood strategies variables
- V6 Formal employment
 - V7 Casual-off farm activities
 - V8 Business

Table 2

Spearman rank(r) Correlation matrix for land use types and livelihood strategies

	Farming	Formal employment	Casual off-farm activities	Business	Mixed farming	Subsistence Farming	Large scale cropping	Agro-pastoralism
Farming	1							
Formal employment	-0.085	1						
Casual off-farm activities	-0.895	-0.369	1					
Business	-0.390	0.224	0.823	1				
Mixed farming	0.179	0.365	-0.599*	-0.038	1			
Subsistence farming	0.977*	-0.292	-0.780*	-0.997*	-0.033	1		
Large scale cropping	-0.033	0.298	-0.315	0.174	0.377	-0.244	1	
Agro-pastoralism	0.814*	-0.510*	-0.988*	-0.724	-0.717	-0.673*	-0.553*	1

*Significant correlation coefficients at $p=0.05$.

Source: *Fieldwork data (2018)*.

These calculated values of Spearman's rank correlation coefficient are between ± 1 and $+1$ limits of acceptance at $p=0.05$ (Table 3). The correlation coefficient lies in the interval $(-1,1)$ with zero implying there is no correlation. A positive correlation is likened to a linear correlation between x and y where x tends to increase as y increases and vice versa (Mc Bride (2005)

A correlation matrix showing Spearman's rank correlation coefficients for land use types and livelihood strategies was computed using SPSS statistical tests (Meulman & Heiser, 2012) and

results are shown in Table 2. The results show that there exist positive correlation models in a set of *land use types and livelihood strategies (Table 2)*

As shown in Table 2, similar models of land use types and livelihood strategies exist in the same locations under a changing land tenure process that competes (McBride et.al. 2005). The livelihood strategy of doing *business* and *subsistence farming* rank positively high($r=0.997$). Similarly, *agro-pastoralism* and *casual off-farm* rank high ($r=0.814$). The coefficient of correlation does not mean that they are associated in nature. It means

that there exists a diversity of seasonality or trends in the models (Mc Bride, 2005).

Some negative models correlate negatively (Table, 2). *Subsistence farming* and *business* rank negatively high at ($r = -0.977$). *Casual-off farms* and *farming* also rank high at $r = -0.895$. Negative correlations like those between mixed farming and casual off-farming (-0.599) depict an inverse relationship. A negative rank means that the land use type and livelihood strategies may change over time in a cyclic nature (seasonal cycles). The negative correlation shows the existence of vulnerability of selected models on the ground (Mc Bride, 2005).

The Spearman table values are, $r_{critical} = 0.643$, at $p = 0.05$. Hence the calculated values are highly significant. The hypothesis that *there is a significant relationship between land use type and livelihood strategies in the study sites is rejected*.

In conclusion; there exist competing land use models correlating with livelihood strategies in the sample.

From observations and interviews made; a private landholding cropping and livestock rearing regime is ongoing in the 3 study sites. At this level, persistent pastoralists are discouraged, they move to seek menial jobs in sub-urban areas where such casual jobs pay poorly. This inverse correlation shows a connection between rural and urban living. Livelihood strategies are growing to build one another regardless of how far apart the locations that host them are. Demand for labour and products influence the direction of the land use regime and livelihood strategies.

In the Engoshuani business center found in the Osupuko ward, a weakly busy livestock market exists. The business in the market varies, some are weekly business such as livestock trade, while

others support periodic harvesting of cereals. These trends provide evidence that a previous Maasai community that kept livestock is changing and making decisions on land. Some decisions made include; adopting livelihood strategies that have external influences such as farming. Some models' choices involve behaviour change. This mostly involves distant movements to adopt casual off-farm employment.

To establish the relationship between Maasai IP livelihood strategies and land use types in the three study sites (figure, 1), the hypothesis that there is no relationship between the land use types and livelihood strategies was rejected. There is a correlation in the ranked data on; livelihood strategies and land use types (on-farm, non-farm or off-farm).

The on-farm, non-farm and off-farm connections that are often negotiable reflect a weak link between land use types and a nature-based livelihood. Therefore, development occur under an environment of competition for land and water in locations where Maasai IP farmers and herds converge (Williams, 2013).

The Maasai IP relation with the environment in a dry season grazing land is not clearly distinct (Fratkin, 2001 and, Oren & Newman 2006). Access to pasture in Osupuko has no observed change; it is available for seasonal access because the dry season grazing land was being managed by a council of elders. However, this was not the case in Ololulunga and Mara where land ownership is more certain and so were most affected by land privatisation and fencing for farming; and town business purposes respectively.

Under a community land tenure arrangement, it was easier for Maasai households to respond to a change in the environment (Fratkin, 2005). Previously, when environmental resources

dwindled, settlement *manyattas* also shifted to a nearby dry season grazing land. Maasai IPs in a sedentary lifestyle persistently herd in a dry season grazing land to supplement their smaller land sizes. Previously indigenous people enjoyed the security of pastoralist rights to natural pasture resources that were linked to rights of way across territorial borders (ROK, 2009). Maasai IPs have a right to run their affairs (Fratkin, 2001, Fratkin, 2003). The Maasai IP households use their right-based approaches to claim access to available resources and access to livelihood sources (Nelson, 2009 ed). This study analysed the extent of land tenure linkage with livelihood sources and availability and access to communal (environmental) resources to understand human-nature indicators signifying change and effect in a group ranch environment (Brondizio, et.al. 2021).

Large scale farming was observed to be more capital intense as compared to mixed farming and agro-pastoralism. In a study on the impacts of land use changes on the livelihood of the Maasai Community in Kajiado County, Kombo and Ekisa (2015) noted that changes in land use from pastoralism to agriculture had elevated agriculture to a main livelihood source followed by pastoralism and agro-pastoralism. This is indicative of a strong relationship between land uses and livelihood strategies.

Linkages between Land Tenure System and Maasai IP Livelihood Outcomes

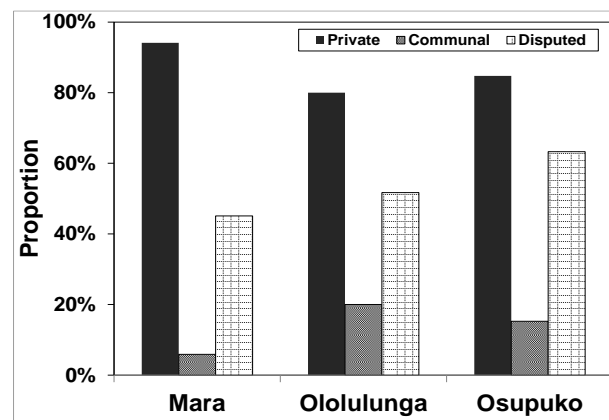
Land tenure defines the rights a land owner has. Resource tenure refers to how the land based natural resources such as forests, minerals and salt lick locations are held, accessed and controlled (ROK, 2009). To establish the main land tenure type (s) in the study area, the study respondents were asked to state the nature of ownership of their land. Three land ownership regimes were

identified; private, communal and 'disputed' public tenure. The result of how the multiple land tenure system competes at the regime level is shown below (Figure 2).

The private ownership regime referred to land whose ownership rights were legally vested in individuals or private entities through land registration or a land title. The communal ownership regime referred to land ownership rights that were vested in the group ranch community land. Group ranch land is governed by consensus through a Council of Elders. The key variable in the land management regime in the public land tenure that is disputed is access to livelihood sources (Figure, 2).

Figure 2

Result of competing private and community land tenure regimes; Ololulunga, Mara and Osupuko.



Source: Field data (2018)

On the other hand, the disputed public land ownership regime referred to the land whose ownership was vested in the State and indigenous peoples are not compensated for it. According to land tenure regime data results (Figure, 2), the largest proportion of land in the three study sites was under the private ownership regime. The Mara site had nearly .95 percent of the total land area under the private ownership regime, while Osupuko and Ololulunga had approximate land

holdings in the range of 85 percent and 77 percent respectively (Figure, 2). Under 22 percent disputed land ownership tenure was observed in the Ololulunga site (Figure, 2). The State and Narok County Governments had annexed land to provide public service centres and sub-urban amenities in the Ololulunga site.

Mara study site had the least disputed public land (Figure, 2). A Maasai IP community land is leased to Olkinyei Private Conservancy. The IP community runs a parallel community tented camp business facility that overlaps with the Olkinyei private conservancy area. Kenya Wildlife Service also runs a Wildlife Conservation Area space that also hosts Engoshuan administration facilities. Observed competition between Olkinyei private conservancy business, Kenya Wildlife Service amenities and Maasai IP community tented camps exist. Locally,

the distinction between land tenure and natural resource tenure is not clearly distinct (ROK, 2009). In actual sense, public areas fall in dry season grazing land areas that look empty and hence disputed. A dry season grazing is expected to have a restricted area status (*Maa: Derinko nkisbu*) to be only accessed during drought. Further studies on management problems associated with natural resource tenures in a group ranch is recommended.

The Relationship between effects of competing land use variables and Study Sites

To establish the relationship between the effects of competing land uses and livelihood strategies; the respondents were asked to state whether they have experienced changes in selected livelihood variables in the three study sites (Table, 3).

Table 3

Frequencies of competing land use effects on Maasai IP livelihoods outcomes in 3 study sites.

Livelihood variable	Study sites											
	Osupuko (n=122)				Ololulunga (n=138)				Mara (n=144)			
	Yes		No		Yes		No		Yes		No	
	F	%	F	%	F	%	F	%	F	%	F	%
Changes in occupation	58	47.5%	64	52.5%	61	44.2%	77	55.8%	24	16.7%	120	83.3
Changes in income	116	95.1%	6	4.9%	69	50%	69	50%	0	0		100%
Changes in number of livestock	120	98.4%	2	1.6%	117	84.8%	5	15.2%	141	97.9%	3	2.1%
Changes in capital intensity	0	0	0	0	104	75.4%	34	24.6%	120	83.3%	24	16.7%
Changes in farm technology	0	0	0	0	118	85.5%	20	14.5%	72	50%	72	50%
Changes in the location of livelihood production	0	0	0	0	114	82.6%	24	17.4%	72	50%	72	50%
Changes in access to water	118	96.7%	4	3.3%	108	78.3%	30	21.7%	138	95.8%	6	4.2%
Changes in access to pasture	0	0	0	0	120	87%	18	13%	88	61.1%	56	38.9%

n=404 respondents

Source: Field data (2018).

Changes in the number of livestock were strongly correlated to access to water across the three study sites (Table, 3). The changes in the number of livestock were most evident in Osupuko and Mara with 98.4% and 97.9% respectively. Change in pastoral movements has made the sources of income and occupation change significantly across the three study sites (Table, 3).

Access to pasture in Osupuko has no observed change; it is available for access throughout the year because the dry season grazing land was still being managed by a council of elders. However, this was not the case in Ololulunga and Mara; this is where land ownership is more certain and so were most affected by; land privatisation and fencing for farming; and town business purposes respectively. In Osupuko, new urban centre amenities and roads are reducing pastureland extending land use Wildlife Conservation Area and changing the protection status of some key areas that were hitherto only accessed during dry seasons. A review of historical data reveals that the Maasai have been traditionally pastoralists who had dry season livestock concentration areas (Fratkin, 2001). Incidences of an expanding fenced cultivated area restrict the movement of livestock in Ololulunga (87%) and Mara (61%) in a Maasai IP territory. This finding confirms that location primacy as culturally defined assists to conserve a dry season grazing area (Table, 3).

From the literature; Maasai IPs enjoyed traditional pastoralist rights, including rights to water and pasture resources, rights of way for their livestock, including across international borders as well as the right to run their affairs (Fratkin 2001, Baxter 1993 and Hogg 1992, Scoones 2021).

In a study on the impacts of land use changes on the livelihood of the Maasai Community in Kajiado County, Kombo and Ekisa (2015) noted that

changes in land use from pastoralism to agriculture had elevated agriculture to a main livelihood source followed by pastoralism and agro-pastoralism. This is indicative of a strong relationship between land uses and livelihood strategies. However, just as in this study, they observed that there are other emerging livelihood strategies such as engagement in merchandise business and employment, which are not tied to land uses. Accordingly, this is due to the desire of the Maasai Community in Kajiado to diversify their livelihoods due to declining water and forage resources associated with drought occurrence and intensity.

In conclusion, a change in the land tenure system from communal to private has motivated a sedentary lifestyle; a practice associated with the practice of agriculture. Crop expansion restricts access and free movements of livestock herding especially on private land. This confirms a previous study by Akall (2021) in Turkana County that land tenure affects livelihood outcomes. As a result, the productivity of vulnerable pastoral livelihood has been negatively affected due to the long distances traveled to water points and sources.

Linkage between land tenure, livelihood strategies and Livelihood outcomes

To establish the linkages between land tenure and livelihood strategies and outcomes, respondents across the three study sites (figure, 1) were asked to state whether specific land tenure had affected their livelihoods. Six land tenure effects variables and five livelihood outcome variables were chosen (Table 4).

Land tenure effects variables used in Table 4

- V1 Erection of permanent boundary
- V2 Human-wildlife conflicts
- V3 Non-access to communal resources

V4	Non-access to private natural resources	Livelihood outcome variables used in Table 4	
V5	Issuance of title deeds	V7	Income security
V6	Provision of public amenities affecting dry season grazing	V8	Wellbeing
		V9	Status in society
		V10	Land disputes
		V11	Asset accumulation

Table 4
Frequencies of land tenure effects on livelihood outcomes

Variable	V7		V8		V9		V10		V11		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
V1	5	1.2%	2	0.5%	7	1.7%	5	1.2%	4	1%	23	5.6%
V2	40	9.9%	21	5.2%	8	2.0%	62	15.3%	50	12.4%	181	44.8%
V3	53	13.1%	49	12.1%	51	12.6%	56	13.9%	61	15.1%	270	66.8%
V4	9	2.2%	11	2.7%	23	5.7%	30	7.4%	27	6.7%	100	24.8%
V5	15	3.7%	17	4.2%	3	0.7%	53	13.1%	7	1.7%	95	23.4%
V6	14	3.5%	13	3.2%	10	2.5%	15	3.7%	19	4.7%	71	17.6%

n=404 respondents

Source: Field data (2018).

Based on the data analysis, land tenure affects livelihood outcomes in the 3 study areas in various ways (Table 4). Accordingly, the variables ‘non-access to communal resources’ and ‘human-wildlife conflicts’ had the most significant effect on livelihood outcomes. They were cited by 66.8% and 44.8% respectively by all of the respondents in the three study sites (Figure, 3). Impeded access to communal resources as well as human-wildlife conflicts may have led to reduced access to critical resources for an agro-pastoral lifestyle and sedentary agriculture, namely, water and pasture across the study sites. Impeded Maasai IP asset (livestock) accumulation, led to land disputes and affected livestock accumulation; a wealth status symbol of Maasai IP men (Table, 4). In cases where

the respondents said they relied on their livestock and agriculture for livelihoods, income security and wellbeing are compromised by non-access to a wildlife dispersal area. The variables ‘non-accesses to private natural resources’ and ‘issuance of title deeds’ accounted for a combined total of 48.2% of respondents (Table, 4).

Land tenure change without engagement in Ololulunga, Mara and Osupuko results in disputes (Table, 4). The variables ‘provision of public amenities’ are linked effects of excision of a ‘dry season grazing area’ (17.6%) and ‘erection of permanent boundaries’ (5.6%). The disputes arose out of reduced access to natural resources. Private land is obtained by incursions for farming,

agriculture and, infrastructural development. 'Public school' and 'permanent boundaries' are considered a new normal in public land in the three study sites (Table 4).

To establish further risk land tenure risks Maasai IP households face; there is an apparent decline in pastoralism. To improve the rural areas, the Narok County government has prioritized the availability of solar energy/electricity equipment and electricity transmission. Study respondents consider the amenities to settle at Olmanae (Kimani villages) in Majimoto. To push out of pastoralism; respondents cited living under a less seasonally coordinated movement like before. To prevent falling deeper into poverty Maasai IP occupants of Mara indicated that they fully reverted to year-round access to natural water sources such as Siana Springs in Olchorro Losoit in Lamek in Mara. Several household's water access routes to Siana springs

were observed at Kinjinjir (Mara division) and depict a year-round water availability perception in the Mara site.

In conclusion, natural resource tenures under the land tenures give rise to disputes in the three study sites.

Statistical Analysis of Land Tenure System Effect on Livelihood Outcomes

To determine the statistical significance of the research findings on the land tenure effects on livelihood outcomes, the *null hypothesis* that, *H₀: land tenure effects do not significantly affect livelihood outcomes in the study sites* was tested using a chi-square (χ^2) test of independence. Table, 5 shows; observed and expected values and an excel sheet showing the chi-square (χ^2) calculated value using Excel (Appendix, 2).

Table 5

Observed and expected values for land tenure effects and livelihood outcomes.

Variable	V7		V8		V9		V10		V11	
	O	E	O	E	O	E	O	E	O	E
V1	5	4.23	2	3.51	7	3.17	5	6.87	4	5.22
V2	40	33.26	21	27.64	8	24.99	62	54.06	50	41.09
V3	53	49.62	49	41.23	51	37.22	56	80.63	61	61.29
V4	9	18.38	11	15.27	23	13.78	30	29.86	27	22.70
V5	15	17.46	17	14.51	3	13.09	53	28.37	7	21.57
V6	14	13.05	13	10.84	10	9.79	15	21.20	19	16.12

Source: Field Data (2018).

The expected frequencies were calculated and then compared with the table value of chi (χ^2). By comparing it with the expected χ^2 value, a decision was made for rejecting or accepting the null hypothesis (*H₀*). A calculated chi-square (χ^2) statistic

value of 93.68, $p=1.675$, that exceeds table chi (χ^2) critical value 31.41 was obtained. Chi (χ^2) critical is less than the statistic value point-null hypothesis (*p*-value) of 0.05, the null hypothesis is rejected. (Appendix, 2). This implies that the land tenure

effects do affect livelihood outcomes in the study area (Table, 5). From the statistical analysis farming extension towards specific patches not fit for farming contributes to land tenure effects. From observations, for poorer households living in dry areas of Mara division and Osupuko there is hardly a perfect sedentary settlement without dependence on occasional pastoral movement. Preferred human engagement opportunities depend on community formed networks. Regulation of occasional movement community land area is worsened by boundary fencing. From the researcher's observation; much of the community land was not fenced. The fencing portion of the community do not guarantee the group's availability of grass and water during drought periods. There was no defined rule on the extent of fencing around water points at the time.

Discussion

After land subdivision, the available natural resources do not march the opportunities to create a livelihood income. Old sharing modes are done away with and new sharing modes of water resource and pasture sourcing for settlements are not efficient. Thompson, Seernels, Kaelo et.al. (2015) researched the effects of land privatization on wildlife decline in Loita plains (former Lemek, Olkinyei and Majimoto). Using surveys undertaken in 1998-2000 and 2004 he described the livelihood strategies characterizing the Mara and documented their patterns. Land tenure value variables triggering and shaping livelihood change and their outcomes were identified. Key livelihood strategies identified were livestock, wildlife enterprises, off-farm employment and on-farm cultivation. To explain the livelihood outcomes the study concluded that Maasai lease more of their private land to the investors since they are restricted by weather patterns and poor technical investments to

practice intensive agriculture. In the absence of farming prohibition as an illegal activity in Mara plains investors practice little crop rotation and fallow.

Comparable findings from selected studies of; private land effects on communal livelihood activities that have been carried out in the Narok area were reviewed. Apart from an empirical study; other study methods used in similar studies include: multispectral satellite remote sensing; in-depth fieldwork surveys; and Sustainable Livelihood Framework respectively (Boyd, et al 1999, Duraiappah, *et al* 2000, Seernels and Lambin, 2001, Mundia, *et al*, 2009, Besley, *et al* 2010, Snider 2012). A key finding of these studies is that; rapid agriculture expansion is a preferred land use strategy by private entities in a traditional livestock and wildlife dispersal area. Immigrants and indigenous Maasai IP are expanding crops and concentrating on sedentary Manyatta settlements

The limiting available dry season grazing land that was previously a pastoral livelihood resource has therefore triggered changes in significant livelihood outcomes. The land tenure is further enforced by enclosures that hamper underlying pastoral communal rules and customs that maintain communal land in favour of private land. To moderate the use of private land; land tenure has made t households to choose; either farm or devise non-farm tourism related businesses or, off-farm earning models for better living. Maasai IPs amalgamate their tenured private land and, collectively lease it out to tourisms businesses in exchange for monthly stipends. This market practice of obtaining commercial land is popular amongst the Conservancy Managers. During the research interviews; when asked what areas they wanted to improve; a Conservancy manager in Mara cited that he wanted to *lease more land*.

Elsewhere in Kenya, Maasai land owners whose grazing land falls within the Kitengela wildlife dispersal area have entered into land leasing agreements with conservation groups who lease land from households in return for commitment to maintain the land unfenced and open to both wildlife and livestock. In Tanzania, the Simanjiro district scheme land owners are compensated to prevent agricultural encroachment (Mcgahey *et al* 2014). The Kenya government compensates Maasai IP households for solving human-wildlife conflicts. Since compensations are determined by committees, adequate resources are required in the administration of a compensation scheme in Kenya. From the Managers perspectives, from KWS Officer in Ewaso Nyiro Office, compensation claim was lagging by two years.

Previously pastoral living was understood as an environmentally responsible lifestyle. Hitherto, a group of Maasai IP labour prioritizes income security. Individually, Maasai IP joins land markets. Leasing more land for intensive farming prevents Masaai IP pastoralists from claiming residual rights to land. This practice exposes Maasai IP households to disputes and smallholder land overuse contrary to sustainable land management principles in settlements. In effect, shifts in land use are in part a response to land tenure management restrictions decreasing active pastoralism (Bown, et al 2013). The Kenya government favours private land tenure (Snider 2012, McGaney, *et al* 2014). Possibilities of overlaps in land access disrupt wildlife dispersal and Maasai IP livelihoods more than at any previous time. This competition exposes Maasai IP's primary livelihood assets, ability, and knowledge (Department for International Development (DFID, 2000; Lundy & Adebayo, 2016).

Livelihood strategies such as access to natural resources are not to be achieved through group

ranch open spaces alone; it requires institutional changes in land use reform that lie outside of environmental institutions to become a national sustainable development strategy (DFID, 2000).

Competition over land is at the core of the policy challenges actors face in realizing sustainable development goals under competing claims (schneider *et.al.* 2020). Alongside, connections between actors who make decisions over access shape land-use changes. From a land policy change for Maasai IP pastoral community in a group ranch; the linkage between land tenure system, new land use behaviour; and its implication to vulnerable livelihoods is complex (Nkedianye *et.al.* 2020). For example, ecosystem services can decline while human well-being increases (Schneider *et.al.* 2020).

Ranches' environmental management under a land tenure regime is rife with modification of human settlements and infrastructure without the engagement of indigenous peoples (Kariuki, *et.al.* 2018, UNEP 2012, Metternicht, 2017). Arguing from the position of marginalization; the state that IP suffers from the institutional root cause of weakened livelihoods in pastoral areas (Norton, 2005, Ford, King, Galappaththi *et.al.* 2020, Lind,Wheeler, Caravani, *et.al.* 2020, ROK, 2021). Competing land uses is the lens through which environmental planning and management actors learn the diffusion of land' socio-political issues across tenure regimes to improve dry season grazing land. Land tenure is thus linked not only to livelihood security, but also to food security, ecosystem services, and human wellbeing (Schneider *et.al.*2020

The transformation of expansive Maasai group ranches to livestock development schemes and prominent wildlife sanctuaries brought change. An assumption that Maasai IPs are predominantly pro-

environment fails to capture who they have changed to when they farm. A cropping expansion is seen in their settlements and the emergence of competing land uses in Masailand is rife (Oyugi, 2014). Learning about seasonality and new trends that Maasai IP adopt in their way of life moves our understanding towards a more sustainable world (Collins, Coughlin, & Randall, 2019).

At the regime level of organisation mixed land tenures and mixed income sources or land use activities such as; mixed farming or agro-pastoralism relations across the 3 study sites. This trend continues from agro-pastoralism towards private owned land farming regimes with apparent overlaps in a wildlife territory. These changes imply that nomadic pastoralism is developing towards sedentary agro-pastoralism. The Maasai IP labour exploitative behaviour is apparent. New types of skills are employed to join crop cultivation.

From the data finding of the study; land privatization leads to Maasai IP who own land to open a previous pasture land to farming related activities and settlements. As they fence around their territories the free movements to a dry season grazing area is hindered. As the community settles the crop land activities require that individuals keep off the parcels until after harvest. The new arrangement hinders pastoral routine movements to access natural resources in a dry season grazing land.

The transformation is confirmed by a correlation in the cyclic ranked data on; livelihood strategies and land use types (on-farm, non-farm or off-farm). A new land tenure system if unmitigated is causing harm to the broader local pastoralist society. Further study on land tenure system and Maasai IP livelihood outcomes is desirable.

Conclusion

The study established that land tenure affects, livelihood strategies and outcomes. Land tenure is linked to diverse strategies, off-farm, farm and non-farm livelihood strategies. As an example; private land tenure is expanding cultivation and reversing routine pastoral livestock herding.

There exist off-farm business connections with local mixed-farming. Mixed livelihood strategies do not prioritize land management as open space. The changes in livelihood strategies are in disregard of Maasai IPs livelihood strategy of accessing water, pasture and salt licks areas at specific locations. Previous pastoral communities are adopting agriculture that influenced Maasai IP households to exploit more land for farming activities. Maasai IP's new livelihood roles as farmers influence land use strategies in a group ranch. Household farming labour expands into open communal spaces. An excision of public land is regarded as a dispute.

From the summary of the findings the study concludes that; private land tenure farming significantly displaces community human-wildlife connections, especially during drought. The Maasai pastor herding labour skill redundancy is apparent as they settle to farm. Vulnerable pastoral households in Masai territory would benefit from behaviour change model interventions at; land use type and livelihood strategy level. Further study on Maasai IP perspectives on competing land use effects on environmental resources and community livelihood benefits is recommended.

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