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Drivers of Conflict between Pastoralists and Wildlife Conservation Authority: A Case of Muhesi Game Reserve

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Conflict between pastoralist and wildlife in Tanzania becomes the issues of discussion by different stakeholders at different levels, this study state general objective that assesses the effects of conflict between pastoralist and wildlife conservation in Muhesi Game Reserve (MGR). Data collection methods included interview, documentary review, Focus Group Discussion (FGD)) and observations. A sample of 98 respondents was surveyed. Analysis involved descriptive and inferential statistics (chi square) for quantitative data and content analysis for qualitative data. The study revealed that, the main existing conflict was pastoralist-wildlife conservation conflict apart of other conflicts. Results further revealed that major causes of the conflict includes grazing cattle in game reserves, shortage of land for grazing, large number of cattle, low knowledge in relation to

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wildlife conservation and legal framework related to the management of wildlife. Study revealed that, conflict between pastoralist and wildlife conservation posed effects to the surrounding community, wildlife game reserve, pastoralists and wildlife managers. In community, it leads deterioration of relationship among the community members, wildlife managers and communities surrounding the villages. Pastoralist reported loss of their life also cattle through forfeitures and death. In game reserves, a mainly effect revealed was decrease of ecosystem functions. To address the conflict and its effects, conservation education and population controls are taken into account. However, there are challenges facing conflict management includes scarcity of resources, cultural barriers, corruption and political interest. Study concluded that pastoralist-wildlife conflicts exist and should not be ignored. The study recommends that, in order to manage the conflict and their effects; the Central Government in collaboration with relevant stakeholders should establish proper village land use plan which will accommodate different land users, also controlling immigrant of pastoralist.

Keywords: Drivers of conflict; pastoralists; wildlife conservation authority.

1. INTRODUCTION

The pastoralist-wildlife conflict is experienced throughout the globe in regions where people and wildlife co-exsist and share both limited resources and boundaries [1,2] Human- wildlife conflict is fast becoming a critical threat to survival of many globally endangered species including the large and rare mammal [3,4]. It has been observed that globally, wildlife in protected areas are subjected to conflict with pastoralist-wildlife conflicts, primarily focused on access to grazing and water [5,6]. Competition for scarce grazing and water resources is increasing, and the potential for conflicts between wildlife managers and livestock owners is growing as pastoralists and agro-pastoralists move into new areas and/or live in the vicinity of protected areas [7]. The main factors driving this transformation are increasing demographic pressure, the expansion of cultivation, and the reduction in rangeland resources, through privatization for commercial agriculture and ranching, and nationalization for conservation [3].

Africa contains the largest groupings of pastoralists in the world, it about 60-70% of total pastoralist in the world [8]. In sub Saharan Africa, about 16% of the population relies on pastoralism [8]. Sudan has the highest pastoralist percentage globally, Somalia and Ethiopia rank second while Tanzania rank third [9]. In different region of Africa, pastoralist communities share limited resources such as water and grazing areas with wildlife [7,8] This situation leads conflict between pastoralists and wildlife managers [10]. Wildlife managers in protected areas insure all resources are maintained for wildlife while pastoralists see the protected areas as new opportunity for their livestock to have ample grazing ground [11]. In competition of resources found in wildlife areas. Some conflicts between pastoralist communities and wildlife conservation, such as raiding and cattle-rustling, have a long history and have to some extent become an aspect of traditional pastoralist culture [7].

However, such conflicts in Africa have become increasingly destructive and less manageable [12,13]. Conflicts between pastoralist and wildlife conservation activities arise due to number of reasons such as inadequate land tenure policies, weakening and undermining of traditional governance systems, small arms proliferation. In addition, it includes inadequate arrangements to cope with droughts, political and socio-economic marginalisation of pastoralists and inadequate engagement with traditional governance systems [13].

Savannas in East Africa support the richest variety of wildlife on earth [14]. However, these areas are also under pressure due to increase of livestock and other anthropogenic activities, about 70% of East African wildlife populations overlap with pastoralists when they disperse outside protected areas to the community land [15]. Since the beginning of 2000 over half of this wildlife disappeared caused by habitat destruction, population growth, poaching, and insecurity [16].

Traditional life style of pastoralists poses conflict to wildlife conservation through their movement from one area to another area to secure pasture depending on drought situation [17]. The conflict of pastoralist and wildlife pose number of effect on wildlife conservation such as habitat loss,

fragmentation and introduction of alien species in wildlife protected areas [18].

In order to make resolutions best to both human and wildlife on this conflict, drivers of conflict between pastoralists and wildlife conservation must be identified, with the same interest ways should be sought to either minimize or mitigate these factors and sources of human-wildlife conflict [19].

Since the effects of conflict between pastoralists and wildlife conservation differs from one region to another in Tanzania, this different necessitate assessment of conflict and their effects in the study area through research, the knowledge gaps on the factors and sources of these conflict, likewise through extension people's perception could be changed to favour wildlife.

2. METHODOLOGY

2.1 Study Area

This study was conducted in the Northern part of Rungwa/Kizigo which is Muhesi Game Reserve. Muhesi game reserve is situated at Latitude 06^0 30' 47.7" S and Longitude 03^0 40' 13.7" E Manyoni District with approximately 2,300 square kilometres of area. On Eastern side MGR bordered with Itigi thicket; and on Northern is bordered with Doroto, Muhanga, Chimatu and Ipululu villages, while in the Southern part is bordered with Kizigo Game reserve [9] (Fig. 1.).

2.2 Data Collection

The field surveys were conducted between February and May 2017, in three villages namely Lulanga, Doroto, Muhanga in Manyoni district. The villages were selected on based that they are closed proximity to MGR and they have large number of livestock than other villages. This study applied the multi stage sampling. The first stage involved identification and selection of villages which were selected through purposive sampling. The second stage involved selection of respondents. In selection of respondents, simple random sampling was adopted where by 98 respondents were selected from selected villages. In addition, purposive sample was used

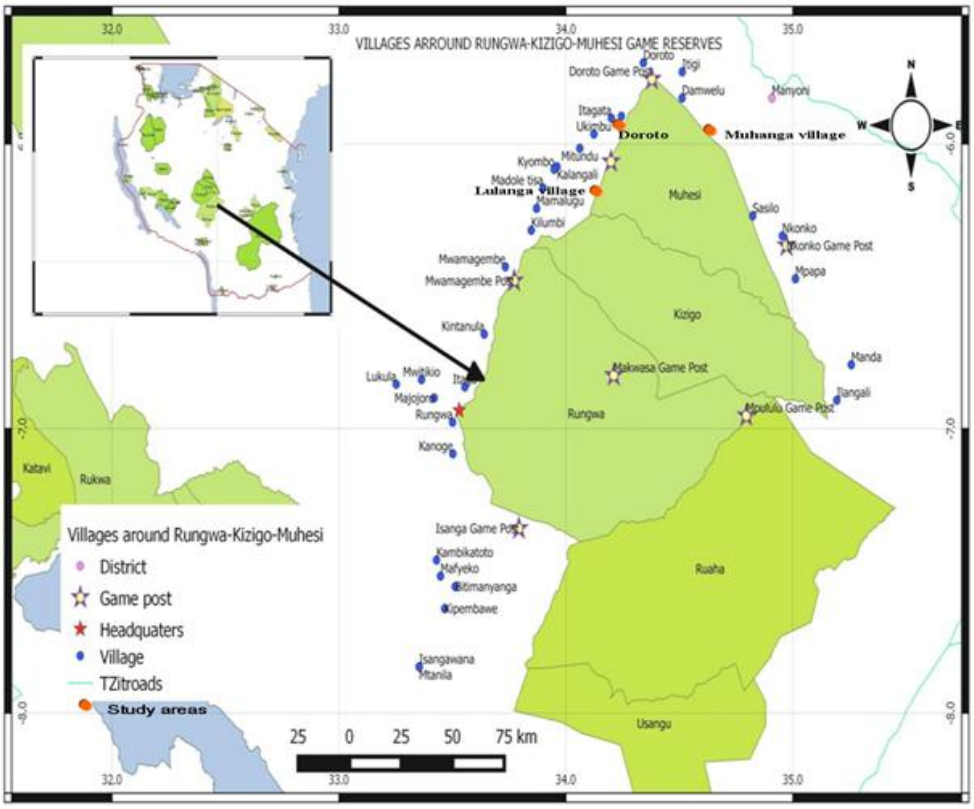

Fig. 1. Map of rungwa/kizigo/muhesi game reserve showing study areas
Source: [9]

to select key informant, such as Marera hunting Safari Company, Head of Muhesi game post, Ward livestock officer. Data were collected using a semi-structured questionnaire. The questionnaire for this study consisted of four parts; background information of respondent, causes of pastoralist-wildlife conflicts, effects of conflict between pastoralist, wildlife in and around Game Reserve and measures taken to solve the conflict. In addition three (3) FGD were carried out in three villages, one from each village, with numbers of 10 members. The combination of methods helped in cross checking reliability and validation of information collected from other methods [20,21]

2.3 Data Analysis

Data obtained from questionnaires were edited and coded to detect errors and omission, and thereafter data were classified and entered into computer software namely Statistical Package for Social Sciences (IBM-SPSS) version 20 for analysis. The main analysis of the data was descriptive statistic analysis, inferential statistic analysis and content analysis. Descriptive statistics analysis involved generation of central of tendency such frequency, percentage and means. In addition, chi-square analysis was used at 5% level of significant in order to establish significant differences or relationship between categories on responses. SPSS was used to derive both descriptive statistic and inferential statistic (chi square) while Content Analysis (CA) was used to analyze qualitative data collected from FGDs, and key informants interview.

3. RESULTS AND DISCUSSION

3.1 Characteristics of Respondents

Age of the respondents range from 18-80 years. Majority of respondents (51.2%) fall in 18-40 years of which is working class while 40.8% were aged between 41-80 years. 76.5% of respondents were males, while 23.5% were female. Furthermore, Results in Table 1 shows that 55.1% had informal education while 28.6% of the respondent attended primary school and 12.6% of respondents attended secondary school education. With regard to ethnicity Table 1 indicate, majority were Sukuma (32.7%), followed by Taturu (27.6%). Furthermore, Results in Table 1 indicate that 67% of respondent were engaged in Pastoralism while 62% of respondents were farmers growing different types of crops.

3.2 Pastoralist and Wildlife Conflict within the Study Area

The conflict between pastoralist and wildlife within the study areas emerged in different parts of the villages which surveyed. It was found that conflicts between wildlife and pastoralist seen as game of the day, both part play the role in existence of this kind of conflict. The results from the study indicate that, all respondents perceived that pastoralist and wildlife conservation is the main conflict. However 98.9% of respondents agree strongly on existence of conflict in the study area (Table 2).

Data based on multiple responses FAO (Food and Agriculture Organization) [22] reported that, conflict between human and wildlife have occurred since dawn of humanity. They occur on all continents, in developed as well as developing countries, yet the problem vary according to the particular environment and people's way of life. According Kaswamila [23], conflict between pastoralist and wildlife have become more frequent and severe over recent decades as a result of human population growth, extension of transport routes and expansion of agricultural which together have led to increase human encroachment on previously wild and uninhabited areas.

3.3 Causes of Pastoralist and Wildlife Conflicts

This study focused on assessing this kind of conflict which revealed by community have high rate than any other within the study area. It found that, this conflict was caused by two kinds of causes including direct causes and indirect causes.

3.3.1 Direct causes of pastoralist and wildlife conservation conflict

Direct causes mean all reasons that have direct contribution to the conflict. Results from Table 3 shows that overwhelming majority (90.8%) of respondents reported that, shortage of arable land were the main reason for wildlife and pastoralist conflicts. Findings indicates that about (69%) of respondents revealed that, conflict were main caused by cultural beliefs while 59.2% of total respondents reported that conflict were caused by presence of good pasture in Game

Reserve and about 58.3% of total respondents reported that, events of carnivores to attacks cattle were reason for the emerging of conflict. It was revealed that, 42.9% of respondents reported that, conflict were caused by low knowledge among the community members, while 16.3% of respondent mentioned presence of large number of cattle as another cause of the conflict.

a) Shortage of land for grazing: Results showed that 90.8% of the respondents claimed that a shortage of land for grazing was one of the causes of conflict (Table 3). The area has different economic and social activities including farming and other social activities. These activities dominates large portion of the land, which affecting livestock keeping in term of land for grazing of which accelerating pastoralist to graze their livestock inside Muhesi Game reserve.

According to Simbarashe [24], conflicts over shortage of land especially between wildlife conservation and livestock keepers in the country are contributed by land tenure contradictions between customary and granted land rights. Furthermore, other study done by Chachage [25] of the land acquisition in Tanzania (Morogoro, Iringa and Pwani) showed that, accumulation of land in the hands of big national and multinational companies, leaving small-scale producers landless. These two problems have affected local pastoralists more than other resource users. Almost everywhere in the country, pastoralists are now losing their traditional grazing lands to sedentary farming and national reserves.

Table 1. Characteristics of respondent (n=98)

Characteristics of respondents	Mean	Minimum- Maximum	Frequency	Percent
Household size	6	Min 4- Max 16		
Household cattle	43	Min 15- Max 179		
Age	38	Min 23-max 73		
▪ 18-30			27	27.6
▪ 31-40			31	31.6
▪ 41-50			16	16.3
▪ 51-60			15	15.3
▪ 61-80			9	9.2
Sex				
▪ Male			75	76.5
▪ Female			23	23.5
Education				
▪ Informal			54	55.1
▪ Primary			28	28.6
▪ Secondary			12	12.6
▪ Tertiary			4	4.1
Occupation				
▪ Farming			62	63.3
▪ Business			17	13.3
▪ Civil servant			7	7.1
▪ Pastoralist			66	67.3
Tribe				
▪ Sukuma			32	32.7
▪ Nyiramba			8	8.2
▪ Ngoni			2	2.0
▪ Massai			5	5.1
▪ Gita			2	2.0
▪ Taturu			27	27.6
▪ Gogo			5	5.1
▪ Nyaturu			17	17.3

**Results on occupation of respondents were based on multiple responses*

Table 1. Pastoralist and wildlife conflict (n=98)

Agreement on existence of Conflict	Frequency	Percent (%)
Agree strongly	97	98.9
Agree	1	1.1

Table 2. Direct causes of wildlife and pastoralist conflict

Direct causes of wildlife and pastoralist conflict	Responses	
	Frequency	Percent (%)
Shortage of land for grazing	89	90.8
Cultural belief	68	69.4
Presence of good pasture in Game Reserves	58	59.2
Carnivores attacks cattle	57	58.2
Low knowledge	42	42.9
Water for animal drinking	29	29.6
Large number of cattle	16	16.3

**Results were based on multiple response (cases=359)*

Fig. 2. Pastoralist with cattle in muhesi game reserve
Source:[9]

b) Cultural belief: Historically, the community members who were engaged in pastoralist activities owned some of the wildlife areas before evicted. Due to that, some of them still want to graze their animal to the areas where they have displaced. Cultural practice of other tribe in the study area inspire them to have large number of cattle while there is no land available for such large herds therefore grazing in protected area is inevitable. According to Fratkin [26] having big herd of livestock is cultural prestige to most of pastoral communities. Furthermore during FGD it was revealed that having large herds of cattle is prestige to those who own the cattle.

During interview one of the Rangers said;

"Pastoralist group like Sukuma and Taturu always own large herds of livestock and it is something of great cultural value or prestige to them. Henceforth, it is hard for them to destock their livestock. This culture, leads to increase in number of livestock in the community which exceed carrying capacity of the village land therefore grazing in protected area which cause conflict between pastoralist and wildlife conservation".

c) Presence of good pasture in GR: Presence of good pasture in GR is among of the factor, which leads to the conflict between pastoralist and wildlife. Protected land is under constant supervision to maintain pastures to wildlife animals and minimizing negative impact which will affect them, therefore remain stable. Meanwhile village land is under overgrazing with minimal or no supervision, which concur with theory of tragedy of the common. Study revealed

that, presence of good pasture within the wildlife area was among of the main sources of conflict between wildlife and pastoralist. Wildlife areas are characterized by good kind of pasture, which attracts pastoralist to graze their animal within. Furthermore, even during rainy season where pasture available in village land still pastoralist direct their cattle in the protected area to avoid substantial fight among themselves in village land which is already surpass its carrying capacity (Fig. 2).

d) Water for animal drinking: Shortage of water is the range sixth among the factors which lead to conflict between wildlife and pastoralists (Table 3). Study area is located in semi- arid area (Central Tanzania) where there is serious problem of water scarcity. Water scarcity leads to the competition between and among villagers. Competitions over the use of water between the sides lead pastoralists to seek water from different parts and consequentially the most vulnerable area is wildlife area. This finding are supported by URT (United Republic of Tanzania) [27] who argues that, there is very scarcity of water for livestock especially during the dry season particularly in central zone of Tanzania including study area. This leads to conflict between pastoralist and wildlife conservation in wildlife protected areas as in the case of Muhesi Game Reserve. Moreover Hariohay et al. [28] reported that, shortage of water for livestock is the reason for conflict in many protected areas which are surrounded by pastoralist communities.

e) Large number of cattle: Large number of cattle within the study areas also revealed to cause conflict between pastoralists and wildlife (Table 3). According to URT (United Republic of Tanzania) [40], Manyoni District (study area) is leading among all districts in Singida which has large number of cattle 767,273 equivalent to 48.3% of all cattle found in the region. Existence of large herds within the study that exceed carrying capacity leads to stiff competition over the use of land for grazing. Study revealed that, in order to avoid conflict among themselves pastoralists seek new area for grazing. It noted that as herd size per capita increase and range area dwindle, as access to and movement between key resources become limiting and pastoralist option are more constrained [29]. This implies that, pastoralist opt to drive their cattle in protected area to reduce competition for the resources. Even though there are land use plan in some villages in study area However, challenges remain as to provision of water and communal ownership of grazing vis á vis stocking rates and land carrying capacity. These challenges need to be addressed [42].

3.3.2 Indirect causes of pastoralist and wildlife conflict

Indirect causes to pastoralist and wildlife conservation conflict are the causes that influence or perpetuate the direct causes to the conflict. Study revealed that environmental factors, legal framework, and population increase were among of indirect factors accelerate the conflict in the study area.

a) Environmental forces: Environmental forces include all factors from the environment which influence pastoralist and wildlife to compete over the use of environmental resources within the community also within the wildlife areas. Results from Table 4 show that, 69.4% of respondents reported conflict between pastoralist and wildlife were much influenced by drought, while 68.4% of respondents reported that, soil effects within the study play great role in enhancing conflict. Furthermore, findings indicate that, respondents (48%) reported that shortage of water in the study area of which accelerate pastoralist to enter in Game Reserve looking for water for their livestock.

b) Pasture shortage: Shortage of pasture was much influenced by large number of cattle and also due to erratic rainfall and drought as well as unplanned land use. During Focus Group Discussion participant from Doroto village said, "*Pastoralist in Doroto suffers from shortage of pasture particularly in dry season hence they try to look pasture beyond village boundary in the Game Reserve".*

Table 4. Environmental forces lead the conflict

Environmental causes	Responses	
	Frequency	Percent (%)
Pasture shortage	90	91.8
Drought	68	69.4
Soil effect	67	68.4

**Results were based on multiple response (cases=225)*

Table 5. Social effects of conflict to pastoralist

Social effect to pastoralist	Responses on occupations (%)			
	Farming	Business	Civil servant	Pastoralist
Physiological effects (disabled)	5 (8.1)	3 (17.6)	0 (0.0)	17(25.8)
Psychological effects	12 (19.4)	6 (35.3)	0 (0.0)	18(27.3)
Death to human	19 (30.6)	3 (17.6)	0 (0.0)	35(53.0)
Injuries to human	12 (19.4)	6 (35.3)	0 (0.0)	34(51.5)
Imprisonment	8(12.9)	4 (23.5)	0 (0.0)	29(43.9)
Poor relationship with community	38 (61.3)	7 (41.2)	7(100.0)	7(10.6)
Poor support from village leaders	34 (54.8)	6 (35.3)	5(71.4)	14(21.2)

χ^2=333.346, df=28, (P<0.05), Note; numbers in parenthesis are respective percentages

Table 6. Economic effects of conflict to pastoralist (n=98)

Economic effect of pastoralist	Responses on occupation (%)			
	Farming	Business	Civil servant	Pastoralist
Loss of money	33.9(21)	82.4(14)	42.9(3)	80.3(53)
Loss of cattle	46.8(29)	58.8(10)	28.6(2)	42.4(28)
Loss of properties	27.4(17)	70.6(12)	28.6(2)	63.6(42)
Loss of employments	43.5(27)	9.4(52)	28.6(2)	31.8(21)

χ^2=152.245, df=16, (P<0.05), Note; Numbers in parenthesis are respective frequencies

Table 7. Measures taken to resolve conflicts

Measures to resolve conflicts	Responses	
	Frequency	Percent of cases (%)
Education provision	93	94.9
Assistance from wildlife manage (control)	59	60.2
Meetings	51	52.0
Resettlement of the people living in wildlife areas	48	49.0
Legal framework implementation	46	46.9
Land use planning	24	24.5
Community participation in conflict	12	12.2

**Results were based on multiple response (cases=333)*

Table 8. Challenges in conflict managements (n=98)

Challenges in conflict management	Responses	
	Frequency	Percent of cases (%)
Financial constrains	85	90.4
Scarcity of land	85	90.4
Cultural barriers (destocking)	65	69.1
Knowledge of the people	63	67.0
Corruption	42	44.7
Political interests	36	38.3

**Results were based on multiple response (cases=376)*

c) Drought: Study found that, drought were the major factor, which contributes to the decline of grazing area in term of pasture, and water availability. Occurrences of drought within the study areas were much influenced by decline of rainfall also the presence of unpredictable rainfall due to climate change. According to Mary and Majule [30], Manyoni district located in semi- arid

central zone of Tanzania that experiences low rainfall and short rainy seasons which are often erratic with fairly wide spread drought in one year out of four. Total rainfall ranges from 500mm to 800mm per annum with high geographical, seasonal and annual variation. The study revealed that, due to the existence of drought in the study area; accelerate shortage of water for livestock use as well as shortage of pasture for livestock grazing. The result pastoralist looks for other areas outside village boundary which might have enough water and pasture for animal survival especially during dry season. Despite of unpredictable rain that affect both water availability and pasture there is no substantial efforts to address the problem.

d) Soil effects: Study revealed that, there are different soil effects, which found within the study area. Soil effects that are revealed by the study include soil erosion and declined of soil fertility (Table 4). Most of these effects were caused by anthropogenic activities. The result of this effects leads to occurrences of bare land in different part of the village. Existence of soil erosion, low soil fertility and bare land reduce grazing area within the study area, due to that most of pastoralist forces to graze their cattle within the wildlife area for the aim of securing grazing areas.

According to URT (United Republic of Tanzania) [31], the proportion of households with soil erosion was the highest in Singida Rural (16,416 households, 19% of the total agricultural households in the district) followed by Iramba (8,990 household, 12%), Singida Urban (1,223 household, 8%) and Manyoni (1,955 household, 5%),

e) Legal framework: Survey revealed that, some of the community claims that, legal framework play great role in maintaining the conflict within the study areas. Study revealed that weak punishments to the violators of law caused pastoralists to continue to graze their cattle within the game reserve. Furthermore study revealed that, sometime, when pastoralists are captured with their cattle in game reserve they are released instead of forfeiture their cattle and imprisonment. This contributed by political pressure and corruption among Rangers and other institute, which dealt with implementation of Laws. (Marcely, P. personal communication, 2017).

Furthermore, Legal framework particular wildlife policy and wildlife Act no 5 of 2009 do not define clearly the benefit which local community members surrounding the game reserves can interact and benefit with the existence of resources within the Game Reserve (Chisanza, F. personal communication, 2017).

f) Population: Population within the study area plays a great role in influencing the conflict between pastoralists and wildlife. Population change particular the increase of cattle and human was among of the causes which lead the occurrences of conflict. The study revealed that Doroto village have square km^2 37 and human population were 3207 in 2002, in 2012 human population increased to reach 5398 and in 2016 human population were 7695. In terms of cattle population, it was also revealed to increase. For instance in 2002 cattle population were 4677 and in 2016 cattle population reach 6885. The increase of population within the study area is much influenced by immigrants. Similar observation was reported by IUCN [32] which found out that, human population growth and social changes place more people in direct contact with wildlife: as human populations grow, settlements expand into and around protected area. In Africa, human population growth has lead to encroachment into wildlife habitats, constriction of species into marginal habitat patches and direct competition with local communities Siex and Struhsaker [33].

g) Political interest: Political interest is contributing factor to the conflict between wildlife and pastoralist within the study areas. It reported that, some of the politician within the study areas owned cattle, by that weakened the efforts to manage the conflicts. Furthermore, some of politician support pastoralist for the aims of gaining political influence and votes during the elections, also it mentioned that corruption among politician stand as one factor fueling conflict. This result concur with URT (United Republic of Tanzania) [34] and Kideghesho et al.(2015) who found out that, efforts to resolve pastoralist and wildlife conflict are also fueled by political interference when political interests seem to override the professionalism. Furthermore, over 75% of the staff working in Tanzania national parks and in Game reserves described politicians as a constrain to conservation efforts, accusing them of unfair condemnations and false allegations (Kideghesho et al. 2015).

3.4 Effect of Conflict to Game Reserve, Pastoralist and Community

Effects of pastoralist- wildlife conflict to GR were mainly reported through key informant interview such as District Game Officer of Manyoni, Head of Muhesi Game Post, Head of Doroto Game Post and Head of anti-poaching department in Rungwa/Kizigo/Muhesi. Also field observation revealed a number of effects.

3.4.1 Ecological to game reserve

Conflict between pastoralist and wildlife led to several ecological effects to the wildlife. Among the effect includes existence alien invasive species, hydrological impact, loss of habitat, habitat fragmentation and increase of competition on remain habitat.

a) Existence alien invasive species: Wildlife area have already experience the occurrences of invasive species in different part of the game reserve. Most area affected is the buffer zones and on the boundary of the game reserve. However, some invasive species were observed within the game reserve. The common invasive species observed were marijuana (*Cannabis sativa*) and maize *(Zea maize).* This species occurs under the facts that some of the pastoralist use marijuana and in some extent throw away the seed within the reserve which grow up during the rainfall period, similar to maize which used as food during the activity. On the other side, invasive species occurs from cattle feed some species outside the reserve but they defecate within the reserve.

The introduction of alien species inside Game Reserve leads to destruction of indigenous plant species which provide feed and good habitat to wildlife ungulates, indigenous plant species fail to compete invasive species. According to Kideghesho et al. [35] destruction or loss of wildlife habitats reduces their potential utility which accelerated by the existence of alien species. Furthermore (*ibid*), state that human activities such as livestock grazing, deforestation, bushfire and cultivation are the principle cause of habitat destruction. This means that livestock grazing in Game Reserve accelerating introduction of alien species which in one way cause wildlife habitat destruction by suppressing indigenous species.

b) Hydrological impacts: Study revealed that the reserves were affected in term of water quality and quantity as result of pastoralist and wildlife conflict. The most area affected within the reserve was Itwaga dam where by most pastoralist leads their cattle toward the dam for water drinking (MGR report, 2015). The results of this action of pastoralist were to decrease of quality and quantity of water, at the end wild animal suffer due to the water shortage particular during the severe dry season. Indeed, shortage of water in Game Reserve necessitates wildlife to come outside the reserve, hence accelerate the conflict.

3.4.2 Economic and social effects of wildlife and pastoralist conflict to game reserve

a) Increase of budget in conservation activities: Conflicts between wildlife and pastoralist increase cost for conservation of wildlife. It found that among of the cost include, cost for field patrol and security, remuneration for workers, budget for education provision as well case prosecution. One respondent argued that "*Conflict between wildlife and pastoralist increase the cost on us in management of game reserve, most of the time we carried field patrol, and the aim of the patrol is to ensure no animal grazed within the game reserve. In addition we conducted conservation education to the community, all program demanded a lot of money since we have more than 20 village surrounding the protected area*".

This result supported by ESPA (Ecosystems Services for Poverty Alleviation) [36] who reported that, Tanzania's Community Wildlife Management Areas (CWMAs) – originally called Wildlife Management Areas (WMAs) – were intended to benefit both people and wildlife. However, for the decades, CWMAs have been characterized by high administration costs, a management committee to meet its running costs (administration and personnel costs for game guards and resource monitors) usually retains a small portion of the income.

b) Decline of tourism activities within the wildlife area: Survey found that, hunting tourists were much discourage when they found cattle within the wildlife area, because they expect to observe and enjoy, landscape, wild animal. This situation reduces tourism activities in terms of the number and time they spend in tourism. Decreases of tourism activities within the wildlife

area affect revenue to the wildlife management also reduce operation activities.

According to hunting safari company report (2016) show that, number of tourist hunters decreased in Muhesi hunting block, in the year 2014 sum of 7 tourist hunters did their safari in the block, in 2015 only 4 tourist did hunting safari in the block, while in the year 2016 only 3 tourist did their safari in Muhesi hunting block. Hunting Safari Company pointed out livestock grazing in Muhesi Game reserve as one factor which causes the reduction of wildlife animals in the area.

3.4.3 Effects of pastoralist and wildlife conflict to pastoralist

Conflict between wildlife and wildlife lead number of effects to pastoralists, effects faced pastoralists grouped into social and economic effects as discussed in sub section below.

3.4.3.1 Social effects

It was found that, several social effects with different magnitude faced pastoralist as a result of pastoralist-wildlife conflict. Findings from Table 5 indicate that, there was significant association between occupations of respondents and social effects of conflict (χ^2=333.346, P<0.05). Findings show that, the major social effects according to pastoralists respondents includes physiological effects (25.8%) followed by psychological effects (27.3%), death and injuries to cattle and human (53%), imprisonment (43.9%), poor support from village leaders and community (21.2%). It was found that, with exception of poor reluctance of village leaders to support pastoralists in resolving conflict which was largely perceived by farmers, the rest of social effects were mainly perceived by pastoralists.

a) Psychological effect: Psychological effects reveled by study to be among of the effects posed by conflict to the community members. Reasons for psychological effects emerged as result of loss their cattle due to forfeiture, cattle killed, and also losing their property. It revealed that some pastoralists were forced to sell their property for the aim of paying penalties and charges imposed to them when they found with cattle within the wildlife area.

b) Death and injuries human: Survey revealed that pastoralists were faced with death and some were suffer from injuries (Table 5). Death occurred when wild animal attacks pastoralists when they graze their cattle within the wildlife area. Furthermore, it happened when pastoralist try to defend their cattle when were attacked by carnivores outside the wildlife area. This situation was led number of pastoralists to suffer against injuries caused by conflict between wildlife and pastoralists. According to Mayengo et al. [37]; Nyhus [38] in Africa Large mammalian carnivores are responsible for numerous fatal attacks on humans, and large herbivores, such as elephants, are also involved in human deaths every year. Elephants and hippopotamuses will rarely deliberately attack humans; in most cases deaths occur while people are protecting their animals in game reserve. Apart from animal attack.

During Focus Group Discussion participant from Muhanga village revealed that "*some few pastoralists have been killed by lion within Game reserve while they were grazing their cattle"*.

c) Imprisonment or fined: Imprisonment was among of the reward given to pastoralist when they are found with cattle within the wildlife area. It was revealed that some of the pastoralists were imprisoned because of grazing their cattle within the wildlife area. According to Wildlife Conservation Act (WCA) number 5 of 2009 livestock grazing inside Game Reserve is an offence contrary to Sec 18 (2) provide that "Any person shall not graze any livestock in a game reserve or wetland reserve''. Furthermore, wildlife conservation Act Sec 18 (4) stipulate that "Any person who contravenes subsection (2) commits an offence and on conviction shall be liable to a fine of not less than three hundred thousand shillings but not exceeding five million shillings or imprisonment for a term of not less than two years but not exceeding five years, or both." In additional, study done by Schieltz and Rubenstein [39]; Campell et al. (1999) reported that cattle enter in protected areas and destroying wild plant and habitat for wildlife, sometimes leading to bloodshed or imprisonment. According to MGR anti-poaching reports (2014) reported that one pastoralist in Muhanga village was sentenced 2 years in jail when he was found grazing cattle inside Muhesi Game Reserve.

3.4.3.2 Economic effects to pastoralist

Conflict between the pastoralists and wildlife left several economic effects to pastoralist.

Economic effects to pastoralists reported by respondents indicated in the Table 6.

a) Loss of money and Loss of properties: Survey revealed that, pastoralist lost their money and properties as result of conflict. It happen when their cattle seized by wildlife managers and they are demanded to pay fines and charges. Furthermore, charges from court case led pastoralists to sell their property for the aim of obtaining income for payment to the charges and penalties.

b) Loss of cattle: Loss of cattle occurred as result of death of cattle due to the attacks from carnivores from, as result of forfeiture of cattle when they are found within the wildlife area. Study found that, cattle are fundamental resource for pastoralist in earning their lives, therefore loss of cattle affect pastoralist economically. For example, case no CC.189/ 2017 pastoralist was accused for illegal livestock grazing and destruction of vegetation in Muhesi Game Reserve contrary to Section 18 (2), (4) of Wildlife Conservation Act number 5 of 2009. The Pastoralist was sentenced one year in jail or he was required to pay fine of two hundred thousand and he was confiscated his one hundred herd of cattle.

3.5 Measures Taken to Resolve Conflict between Pastoralist and Wildlife Conservation and their Challenges

3.5.1 Measure taken to resolve conflict

In conflict management community member in collaboration with different stakeholders such as wildlife managers developed a number of measures to ensure there is no conflict between pastoralist and wildlife. Measures which were developed to handle the conflict were indicated in Table7.

a) Education provision: Provision of conservation education to the pastoralists and community surrounding was most outreach program provided by wildlife managers in collaboration with non-government organization such as Wildlife Conservation Society and Marera hunting safaris. According to MGR report (2015) conservation education provided four times per year, for the aim of ensuring even immigrants have awareness about their responsibilities to ensure conservation of wildlife resources. Conservation educations were focusing on educating people about all related conservation legal framework issues. Village meetings stand as platform for education provision also for dialogue discussion about existing conflict.

b) Assistance from wildlife managers: Community member particular pastoralist within the study area avoids killing carnivores while kill their cattle instead they seek assistance from wildlife managers. This prevents conflict due to the facts that pastoralist not allowed to kill wild animal [41].

c) Resettlement of the people living within 500 m from GRs boundary: Resettlement of the people living within 500 m from GR boundary was taken to reduce the conflict. According to MGR report of [43] reported that, most of the people established their settlement within 500 m form Game Reserves boundary which is contrary to Sec 74 of WCA no 5 of 2009. These people own large number of cattle. Study noted that most of the people which lived these areas were immigrants and has little knowledge about the conservation of game reserve. This measure was taken several times per year as one way of solving conflict between pastoralist and wildlife conservation. Furthermore, resettlement of people living within 500m from GRs boundary supported by implantation of various related legal frameworks and land use planning. During Focus Group Discussion participant from Lulanga village said, "*The village government in collaboration with village members within the study areas develops areas for grazing which is far away from wildlife areas. In some extent, this measure reduces conflict between the sides*".

d) Field patrol: Results from key informant said that*, "rangers from wildlife conservation camp make number field patrol around different part around the game reserve. The aim of this exercise is to ensure there is no pastoralists graze their animal within the wildlife area, also it aim at raising attention to the pastoralist about the security of game reserve. In other side field patrol practiced by rangers aims at ensuring villagers especial pastoralists do not face the problem of carnivores to attacks their cattle. Gathering information about the events of pastoralists to graze their animal in grazing area was among of the duty performed in field patrol. Frequency patrols around the game reserve reduce the conflict, hence seen as effective method for controlling conflict within the study by wildlife managers."*

3.6 Challenges in Resolving Conflict

Study revealed that, there are number of challenges which faced stakeholders in developing measures to address conflict and therefore hinder effective's implementation of measures which have already been developed. Results from Table 8 indicate that majority (90.4%) of respondents declared that financial resources were the huge challenges in resolving the conflict, about 90.4% of respondents declared that scarcity of arable land stand as challenge in planning and implementation of conflict management plan. Furthermore, it was found that, 69.1% of respondents argue that culture also stand as challenge in conflict management while 67.0% of respondents reported that knowledge of the people hinder effective implementation of measure. Result implies that financial constraints and lands resources are the major challenge which hindering management of conflict between pastoralist and wildlife.

In detail challenges faced stakeholders in address conflict and implementing measures are.

4. CONCLUSION AND RECOMMENDATIONS

Study revealed that, the conflict between pastoralist and wildlife close to MGR stand as an order of the day compared to other conflict raised in the study area, there are several kinds of conflicts including, farmer to pastoralists, farmer and farmer, pastoralists and pastoralists, village to village conflict and pastoralist and wildlife conflicts. The study found that, conflict between pastoralist and wildlife were caused by several factors such as shortage of land for cattle grazing, increase in number of cattle. Furthermore, other conflict was caused by low knowledge on wildlife conservation issues and wild carnivores attack cattle. Study revealed these causes were much fuelled by environmental factors, political factors, legal framework and population. Low knowledge among pastoralists in conservation issues and legal frameworks related to the management of wildlife resources revealed to force pastoralist to graze their cattle within the wildlife area.

It is recommended that, Wildlife conservationist in collaboration with stakeholders like District livestock office, Village government and pastoralist themselves should construct charco dam in each village of the study areas, so as to harvest rain water which will eradicate the problem water scarcity for livestock use, during drought season. In addition to that Local Government Authority in collaboration with village government should make sure that there is proper land use plan in Lulanga and Muhanga village which will accommodate grazing land in the village and land use plan should be administered so as to avoid unnecessary conflict that might happen between and among land users. Lastly District Livestock department in collaboration with MGR, should train pastoralist on how to establish pasture and its management technique in order to ensure pasture availability in the village land for livestock use.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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