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Determinants of Conflicts Coping Strategies among Farmers and Pastoralists in Kilosa and Kiteto Districts, Tanzania

Parit L. Saruni[1], Justin K. Urassa[2] and George C. Kajembe[3]*

[1*]Department of Development Studies, College of Social Sciences and Humanities (CSSH), Sokoine University of Agriculture, P. O. Box 3024, Chuo Kikuu, Morogoro, Tanzania
[2]Department of Policy, Planning, and Management, College of Social Sciences and Humanities (CSSH), Sokoine University of Agriculture, P. O. Box 3024, Chuo Kikuu, Morogoro, Tanzania
[2]Department of Forest Resources Assessment and Management, College of Forestry, Wildlife and Tourism, Sokoine University of Agriculture, P. O. Box 3013, Chuo Kikuu, Morogoro- Tanzania
*Corresponding author: Email: paritsaruni@gmail.co

Abstract

Natural resource use conflict is a global issue. In sub-Saharan Africa, such conflicts can be extreme; even resulting into deaths of individuals. There is a plethora of literature exploring the causes and effects of such conflicts. The study explored farmers-pastoralists coping strategies to natural resource use conflicts and determinants of these strategies. To answer the above objectives, key informant interviews and focus group discussions were conducted with stakeholders in Kilosa and Kiteto Districts in Tanzania to establish the understanding of the issue and its local context. A stratified random sample of pastoralists (n=143) and farmers (n=230) was selected to quantify responses to conflict. The finding show that conflicts were quite extreme and included cases of physical violence including setting fire on the farms. Those affected were forced to buy food or rely on relatives and wider social networks (including local government) to provide practical support. Emotional support from relatives and social networks and from religious organisations was also important. Male-headed, larger, and younger households were more likely to use coping strategies ($p < 0.05$) than female-headed, smaller, and older households. Also, land ownership is likely to increase the use of strategies for coping with conflicts among households. Therefore, it is recommended that people in the areas affected by conflicts should be encouraged to own land, have proper land planning and use in order to minimize natural resource use conflicts among actors especially farmers and pastoralists. Additionally, the design of rules and regulations should be informed by the actual coping strategies adopted by farmers and pastoralists.

Key words: Conflict, coping strategies, farmers, pastoralists, Kilosa, Kiteto

1.1 Introduction

Natural resource use conflicts have occurred in Tanzania and elsewhere in the world. Though, those conflicts in Tanzania exists in various forms such as neighbour about field boundaries; men, women, and generations about their respective land rights; pastoralists and farmers; states and indigenous peoples as well as companies and local populations about rights to exploit mineral and gas and other

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natural resources (Odgaard, 2006). In addition, Worldwide, violent conflicts are partly a result of competition over agricultural and grazing land (UNEP, 2007). The concept of conflict in the context of this study refers to the misunderstanding, disagreement, or divergence of ideas, which result into coercive measures that suggest forceful victory on either party (Norman, 2013). In Tanzania, conflicts largely involve misunderstanding or disagreement between farmers and pastoralists over resource use (Tenga *et al.,* 2008). In this paper, farmers are defined as individuals who cultivate land and grow or plant various crops (Norman, 2013). Pastoralism refers to a phenomenon of earning part of a households' livelihood from livestock and livestock products (Rata and Sperandini, 2009). Therefore, pastoralists are people who derive more than 50 per cent of their income from livestock and livestock products with mobility being a key feature of pastoralism. According to Nassef *et al.* (2009), livestock is a major source of income for pastoralists, but the significance of livestock is more cultural than economic to people connected to pastoralism.

Long standing conflicts and clashes between farmers and pastoralists are now a serious national challenge which has taken both political and humanitarian dimensions in Tanzania. The most notable bloody clashes pitting farmers against pastoralists occurred in Kilosa District in December 2000, whereby 38 people among them women and children lost their lives (Brehony *et al.,* 2003). Similar clashes occurred in Kiteto, on 12th January 2014 leaving 10 people dead and 20 people injured. Among the damaged property, including 60 houses, which were burnt down and a number of properties including six motorcycles and 53 bicycles were destroyed (Benjaminsen *et al*., 2014). Moreover, notorious clashes have been repeatedly reported in Kilindi, Mvomero, Kilombero, and parts of Lake Rukwa Basin (Benjaminsen *et al*., 2009). Generally, farmers and pastoralists' conflicts cause a lot of harm to people involved, both physically and psychologically. Psychological and emotional effects of violent conflicts may include lack of sleep, anger, anxiety, and depressions (Adisa, 2011a), thus, requiring a remedy in terms of coping strategies at post conflict period. Moreover, UNEP (2007) pointed out that, the socio-economic and environmental consequences of conflicts include rural-urban migration and over exploitation of natural resources, all of which have a negative impact on the development of the communities concerned, and the country at large. They also affect planning and management of resources leading to unsustainable use patterns and degradation of the resources.

Generally, researches have established association between conflict and stress (Oboke, 2011; Oyok and Akello, 2011; Turyahabwa *et al*., 2011). For example, when individuals encounter stress, they adopt different ways of managing it, as they cannot afford to continuously live in a state of tension. Stress management enables individuals to cope with stress. According to Lazarus and Folkman (1991), Moos and Schaefer (1993) and Marquez-Arrico (2015), coping strategies are efforts made by an individual to manage internal and external demands of stressful situations. However, King (2008) describes coping as a specific term for problem-solving strategies. Generally, coping is used to manage stress through the use of emotional-focused coping strategy or to solve a stressful problem itself. In the study context, coping is seen as a life skill of overcoming stress caused by natural resource use conflicts. Studies on coping strategies on resource use conflicts among natural resource users in sub-Saharan Africa have established that in mitigating the effects of conflicts, a

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combination of coping strategies is necessary for farmers, pastoralists, and other resource users (Adisa, 2011b).

Although there has been much emphasis on the drivers and effects of resource use conflicts between farmers and pastoralists in a post conflict era (Mwamfupe, 2015; Benjaminsen *et al.*, 2014; Kircher, 2013; King, 2013; Saruni, 2011; Benjaminsen, 2009; Kisoza, 2007; Tenga *et al.*, 2008; Brehnoy *et al*., 2003; Kajembe *et al*., 2003; Kizima, 2003; Mwamfupe and Mun'gon'go, 2003), coping strategies in the aftermath of these conflicts have not been documented in the scholarly literature in Tanzania. Moreover, empirical literature in Tanzania has not addressed coping strategies on resource use conflicts, instead the focus of scholarly literature has been more on the coping strategies against food insecurity (Matunga; 2008; Ngongi, 2013; Rakundo *et al*., 2016; Tumaini and Msuya, 2017), HIV and AIDS (Semali *et al*., 2011) and climate change (Mongi *et al*., 2010; Mwakalila, 2010).

Despite several studies having been done on conflicts between farmers and pastoralists in Tanzania, empirical data on the post conflict coping strategies are lacking. However, few studies in Nigeria (Adekunle and Adisa 2010; Adisa and Andekunle, 2010; Adisa, 2011b; Umar and Umar, 2014) and in Sudan (Yahia *et al*., 2015) have addressed the manner in which farmers and pastoralists cope with the aftermath of conflicts. These strategies include problem` oriented (POCS), emotional oriented (EOCS), and social support seeking oriented coping strategies (SSCS) (Folkman, 2013; King, 2008; Lazarus, 2006; Folkman and Lazarus, 1984; Lazarus and Folkman, 1991). The objective of this paper is to identify farmers-pastoralists coping strategies to natural resource use conflict and, their determinants in Kilosa and Kiteto District, Tanzania.

The study is guided by the Lazarus's Cognitive Appraisal Model of coping strategies. Generally, in this paper, natural resource use conflicts are perceived as a stressful situation to actors in the conflict which is determined by the individual's feelings of vulnerability and ability to cope. According to King (2008), stress and coping strategies are developmental processes and ways by which individuals go through life experiences. According to Folkman and Lazarus (1984), individuals use three kinds of appraisal to analyse situations namely: Primary appraisal which involves the process of evaluating the significance of stressors or threatening events such as conflicts; secondly, the process of conceiving a potential response; and thirdly, the process of resource appraisals (i.e. actual strategies which are used to mediate primary and secondary appraisals). There are three ways by which people cope with stress (see Anbezhagan and Rajan, 2013). The first way is "emotion-focused" coping strategies which help individuals adjust to stress more easily. These involve increased social support as well as having friends and colleagues who are supportive in an event of a problem. The second approach involves the use of "escape/avoidance strategy" in which the stress is perceived as a challenge hence, increasing the capacity of dealing with it. The third way involves the use of negative strategies which attempt to reduce the feeling of stress through the use of alcohol, drugs which are part of maladaptive coping strategies against stress. The Lazarus's Cognitive Appraisal Model of coping strategies is deemed appropriate for this study in addressing natural resource use conflicts among farmers and pastoralists in Kiteto and Kilosa Districts. This is

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especially so because the extent to which households are affected by conflicts determines the type of coping strategies that need to be used to overcome the stress.

2.1 Methodology

2.1.1 Description of the study areas

The study areas were Kilosa and Kiteto Districts in Morogoro and Manyara regions respectively as shown in Figure 1. The selection of the districts was based on the prominence, persistence, and severity of conflicts between farmers and pastoralists in these districts (Makoye, 2014). Similarly, the areas have high population densities of farmers and pastoralists which have led to stiff competition on natural resources use. Moreover, as Benjaminsen *et al.* (2009) argue, in the government development reports and in the national newspapers, the two districts are often referred to as areas of land scarcity and natural resource use conflicts.

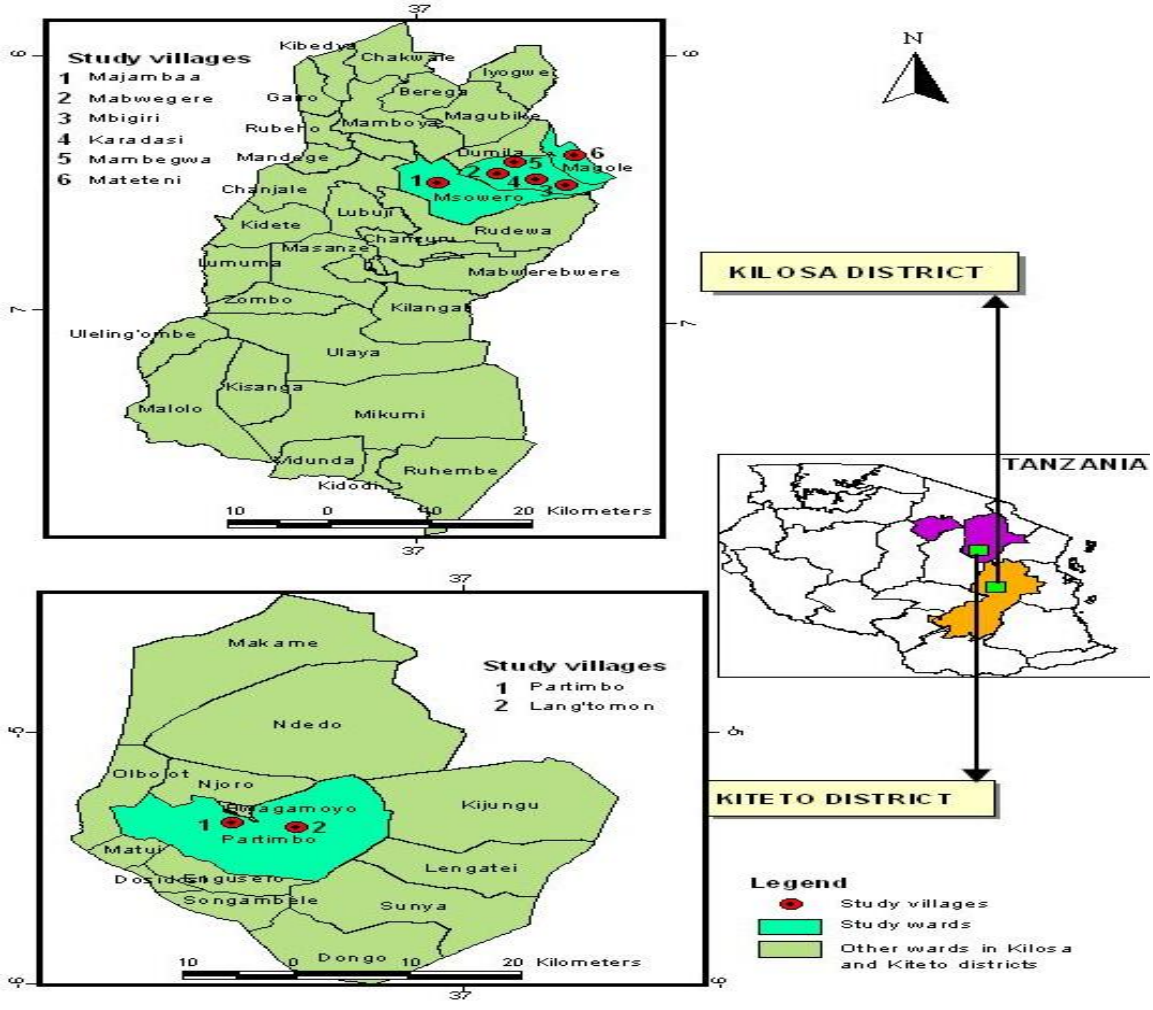

Figure 1: Map of the study area

Kilosa is one of the six districts in Morogoro Region, Tanzania. The district covers 11 774 km^2 out of which 4 286 km^2 are reserve areas (KDC, 2012) with Mikumi National Park covering 3 230 km^2

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or 22.7 per cent of the district, and forest reserves covering 1 056 or 7.4 per cent of the District (Brehony *et al*., 2003). Kilosa borders Kiteto and Kilindi Districts to the North, Mvomero and Morogoro Districts to the East, Mpwapwa and Kongwa Districts to the West and Kilombero and Kilolo Districts to the South (Wassena *et al*., 2013). Kilosa is located 300 km west of Dar es Salaam and is found between latitudes 50 55′ and 70 53′ South and longitudes 360 30′ and 370 30′ East. As reported by the National Bureau of Statistics (NBS) 2016-2017 population projections, Kilosa district had 492 879 people (NBS, 2016). Rainfall in the district varies substantially from year to year. The rain falls in two seasons, short rains from November to December, and long rains from mid-February through April (Benjaminsen *et al*, 2009). The ethnic groups in the District include Kaguru, Sagara, Vidunda, Parakuyo Maasai, Barabaig, Gogo and Sukuma (Benjaminsen *et al.*, 2009). The major farming systems include maize-rice, agro-pastoralism, and pastoralism (Wassena *et al*., 2013).

Kiteto District, in Manyara Region, Tanzania, has semi-arid conditions. The District covers over 12 944.72 km^2 (KDP, 2012) with an average rainfall of between 450 and 650 mm per annum (URT, 2013). Kiteto is surrounded by five districts; Simanjiro to the North, Kilindi, and Kilosa to the East, and Kongwa and Dodoma Rural to the West (SchÖpperle, 2011). The inhabitants in the district mainly deal with crop farming and maize is the main crop yielding up to 15 bags (1 500 kilograms) of grains per hectare. Rainfall regimes are bimodal, with a short and long rain seasons. The short rains begin in October and end in December while the long rains start in February and end in May (Counlibaly *et al*., 2015). According to the National Bureau of Statistics (NBS), 2016-2017 population projections, Kiteto District had 286 741 people in (NBS, 2016). The existing land use conflicts between farmers and pastoralists in the district started way back in 2003, and ever since, at least 30 people have been killed and about 200 have been injured (Ubwani, 2014).

2.2.2 Sampling, data collection, and data analysis

The sampling frames were the lists of all households in the study villages. The sample size determination formula was adopted from Kothari (2004). From each of the districts, five wards that had frequent and severe incidents of natural resource use conflicts between farmers and pastoralists were purposively selected. Therefore, on the basis of these criteria, three wards in Kilosa, namely Msowero, Kitete and Magole, and two wards in Kiteto namely Partimbo and Lolera were selected. In addition, purposive sampling was done to select local organizations and key informants involved in the study. The respondents from each district were determined using a proportionate sampling procedure formula in Appendix 5 (Kothari, 2004). A random sampling technique was used to select 230 farming households and 143 pastoral households. Structured interviews were used to collect data on conflict coping strategies and their determinants among the respondents. Interviews with individuals were performed after getting clearance from the Local District Authorities (LGAs). Likewise, secondary data were obtained from various authentic sources such as government reports, policy briefs, and newspapers.

2.2.3 Data analysis

The Statistical Package for Social Sciences (SPSS) and STATA soft wares were used for descriptive statistical analysis. Scores on coping strategies used were obtained using a 4-point Likert-type scale with 20 items adopted from Adisa (2012) with the following options: often used (3), somehow used (2), not used (1) and not applicable (0). Out of the twenty (20) items, 10 represented the problem oriented coping strategies (POCS), 6 emotional oriented coping strategies (EOCS), and 4 social support seeking coping strategies (SSCS) as presented in Table 1. A combined score of the coping strategies was computed and used in determining the factors influencing coping strategies using the ordinal logistic regression model. The reliability analysis test for coping strategies was measured using Croubach's alpha values. According to Nunnlly and Bernstein (1994); Bland and Altman (1997); DeVellis (2012); Mohsen and Reg (2011) acceptable values of an alpha range from 0.70 to 0.95. The scale reliability coefficient for coping strategies in this paper was 0.73 which is acceptable. This is a type of logistic regression analysis which is applied when the response variable has more than two categories that have a natural order or rank (Reddy and Alemayehu, 2015; Haghjou *et al.,* 2013). The model was preferred because the dependent variable (coping strategy with resource use conflicts) was presented in terms of ordered levels: often used (4), somehow used (3), not used (2) and not applicable (1). These levels were used to compute an overall score for the use of the coping strategies.

The ordered logistic model was specified as follows: the categories of coping strategies were defined based on the assumption that there was a set of j coping strategies for natural resource use conflicts. When j = 0 there was no strategy chosen. The choice of a coping strategy is dependent on the following factors:

$$x_1 + x_2 + x_3 + \dots\dots\dots\dots\dots\dots x_n \quad \dots\dots\dots\dots\dots (1)$$

It was assumed that an ordinal logistic regression model is adequate to define the probability of choice of strategy j = 0

$$p[y_1 = j / x_i] = \frac{e^{\beta_1 x_i}}{1 + \sum_{k=i}^{j} \ell^{\beta_k x_i}} + \varepsilon_{ij} \quad \dots\dots\dots\dots\dots (2)$$

$p(y) =$ The probability of the success, e = the natural log, α = the intercept of the equation and $\varepsilon_{yi} =$ Random error in Y_i for coping strategy i. $\beta_1 to \beta_k$ = coefficients of the predictor variable, $x_1 to x_k$ = predictor variables entered in the ordered logistic regression model. In this study, $p(y) =$ the probability of the household is in the highest category of coping strategies with resource use conflicts. Where: x_1 = Age of the household head in years, x_2= Sex: (Male = 1, Female = 0), x_3= Size of farm owned in hectares (ha), x_4= Ethnicity: (Maasai = 1, Non-Maasai = 0), x_5= District: (Kilosa = 1, Kiteto = 0) x_6= Production purpose: (Subsistence =1 Commercial = 2, Both = 3), x_7= Years of residence: (1-4 years = 1, 5-9 years = 2, 10-14 years = 3, more than 15 years = 4), x_8= Land tenure system: (Title deed=1, Customary = 2, Village offer = 3), x_9= Land use type: (Agricultural

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use = 1, Land for speculation = 0), x_{10}= Household size: (Actual number of people living in a household), x_{11}= (Land ownership; Owned = 1 Rented = 2 Does not owned = 3,) and x_{12}= Proximity to the farm: (Homestead = 1, Away from the homestead = 0). The choice of the Maasai pastoralists in the study area over other pastoral ethnic groups is because the Maasai were always the ethnic group reported to be in constant conflicts with farmers (Mwamfupe, 2015: Benjaminsen *et al*., 2009).

3.1 Results and Discussion

3.1.1 Farmers' and pastoralists' coping strategies for managing natural resource use conflicts

The results in Table 1 show that both farmers and pastoralists use a mixture of strategies to give them a sense of relief from resource use conflicts.

Table 1: Farmers-pastoralists coping strategies for managing natural resource use conflicts in Kiteto and Kilosa Districts (n=373)

Coping strategies	Variable	Often used	Used somewhat	Not Used	Not applicable
Problem oriented coping strategies (POCS)	Using of charms	5.2(19.6)	14.8(28.0)	65.7(42.7)	14.3(9.7)
	Tightening farm/herd security	38.3(61.5)	20.0(11.9)	22.6(14.7)	19.1(11.9)
	Looking for another alternative livelihood option	29.6(16.8)	30.0(32.1)	19.1(46.9)	21.3(13.3)
	Sowing less/reduce stock	38.7(19.6)	24.8(25.2)	18.7(46.9)	17.8(29.3)
	Buying food	43.9(49.0)	33.5(34.3)	16.1(14.0)	21.1(2.8)
	Selling farm	6.5(27.3)	27.8(47.7)	54.3(26.6)	11.3(9.8
	Preparing for the worst scenario	37.4(49.7)	37.8(31.5)	18.3(21.0)	6.5(6.3)
	Borrowing money from relatives	28.7(43.4)	37.4(28.0)	28.7(20.3)	5.2(8.4)
	Use of experience	41.7(40.6)	50.9(53.8)	7.0(5.6)	0.0(0.0)
	Working harder	42.2(31.5)	35.7(42.0)	19.6(24.5)	2.6(2.1)
	Average %	56.0	12.1	26.1	5.9
Emotional oriented coping strategies (EOCS)	Appeasing others	36.9(21.0)	7.8(55.2)	48..3(21.7)	70(2.1)
	Use of drugs/alcohol	18.3(20.3)	24.8(16.8)	42.6 (49.0)	14.3(14.0)
	Revenging/Aggression	12.6(11.2)	30.0(44.1)	48.3(42.7)	9.1(2.1)
	Pretending it was not bad	80.8(3.5)	27.5(18.2)	51.3(65.0)	13.9(13.3)
	Praying for peace	74.3(82.5)	13.3(7.0)	9.1(9.8)	7.7(0.7)
	Accepting as it is	23.5(44.8)	50.4(42.0)	16.5(8.4)	24.1(4.9)
	Average %	57.5	16.1	21.4	5.0
Social support seeking oriented coping strategies (SSCS)	Seeking for litigation	41.3(26.6)	31.7(50.3)	16.5 (14.7)	10.4(8.4)
	Seeking help from local leaders	24.3(67.1)	30.4(21.7)	41.3(9.8)	3.9(1.4)
	Looking help from local Government	58.7(62.9)	20.9(26.6)	16.5(7.7)	3.9(2.8)
	Looking for help from relatives	35.2(69.9)	37.8(18.2)	24.3(11.2)	2.6(0.7)
	Average %	65.1	11.0	19.8	4.0
	Overall %	54.3	7.6	33.2	4.9

Note: Numbers which are not in parenthesis represent scores of farmers in percentages; and the numbers in parenthesis represent scores of pastoralists.

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The use of different types of coping strategies depicts the uniqueness of challenges encountered by actors in the conflicts thus, necessitating the use of different strategies to deal with the conflicts. Similar findings are reported by Yahia *et al.* (2015) in Sudan and Umar *et al*. (2013); Adisa and Andekule, (2010) in Nigeria. According to the findings in Table 1, the often used problem oriented coping strategies (POCS) by farmers in the post conflicts stage include; buying food for household's use, working harder, using one's own experience to manage the conflicts, and sowing less and tightening farm security. For pastoralists, the most used POCS were tightening herd security, preparing themselves for the worst to revenge against their enemies, buying food, borrowing money and the use of one's experience to deal with the conflict situation. Buying food as a conflict coping strategy implies that the respondents were food insecure, due to the destruction of their crops by livestock (see Table 1).

In this paper it is argued that, although food security can be achieved by producing and or purchasing it, among other means, access could be highly hampered by poor relations between the parties in conflicts. According to Makoye (2014), natural resource use conflicts are responsible for food insecurity among farmers because they (farmers) become unable to harvest crop products for fear of revenge attacks from angry pastoralists. Also, the tightening of security around the herd implies that pastoralists are more sensitive to security issues than would be the case with farmers. Furthermore, the most often use of preparedness for the worst as a coping strategy among pastoralists, reflects their militant behaviour which is one of the likely things that worsen the conflict situation. Overall, farmers, as opposed to pastoralists, used problem oriented coping strategies to deal with conflicts, suggesting that farmers perceived natural resource use conflict as a problem deterring their success in agricultural activities. Again, it shows that pastoralists suffer less from the effects of natural resource use conflicts than would be the case of farmers.

Other often used POCS by each group include the use of charms, selling of farm land and seeking alternative livelihood options apart from crop and livestock production. The least often used POCS by farmers include the use of charms and selling of land. Land in Tanzania as in other Sub-Saharan African countries is regarded as a primary asset for survival and a major source of income and livelihoods among the rural population. In addition, land carries with it cultural and spiritual attachments (Maksi, 2013). Therefore, this perspective makes the selling of land difficult as a coping strategy for natural resource use conflicts.

The results of EOCS are summarised in Table 1. The majority of farmers and pastoralists often conduct prayers for peace as a coping strategy to manage the conflicts. This implies that adherence to religious principles plays a key role as a coping strategy among the respondents. Most of the farmers were of the opinion that the conflicts were not as bad as the pastoralists would wish to believe. This implies down playing the conflicts, by making this conflicts coping strategy appear less important. Despite the use of positive EOCS to deal with the situation, negative coping strategies were also reported among the respondents. According to the study findings, some of the negative strategies of coping with resource use conflicts as reported by respondents include poisoning of livestock, excessive alcohol consumption, and revenge attacks. Similar findings are reported by King (2008) Holton *et al*. (2015) who revealed that negative coping strategies involved

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the use of drugs/alcohol and carrying out of revenge attacks. While the rate of the use of revenge attacks was higher among farmers, alcohol consumption and drugs use was higher among pastoralists. The use of revenge attacks as a coping strategy reflects a latent tension and mistrust between the conflicting parties, which may ultimately hamper the productive economic activities among the people in the study areas. According to Yahia *et al.* (2015), alcohol consumption/drugs use as a coping strategy in natural resource use conflicts among farmers and pastoralists may result into serious health problems which consequently threaten agricultural production.

Table 1 also shows the use of social support coping strategies. Generally, the results show that seeking help from the government was often used by farmers and pastoralists as a strategy for managing conflicts. Pastoralists also often sought help from relatives, which signifies the existence of strong family bonds, which may eventually give them a sigh of relief in the aftermath of conflicts. Also, seeking for help from the government suggests that both parties in the conflicts have confidence in government institutions. However, the rate of the use of litigation was higher among farmers than was the case among the pastoralists. This could be due to the fact that farmers were more knowledgeable on laws governing land matters than were the pastoralists. These findings contradicts those by Adisa (2011) who reported that in Nigeria lack of use of litigation as a coping strategy by the vast majority of farmers compared to pastoralists despite the existence of regulations regarding use of agriculture land was a result of their "lack of awareness" of their legal right or a result of lack of resolve leading to the acceptance of their situation as their "fate". Seeking for help from local leaders was the least used coping strategy by farmers and pastoralists in the study area. This is because local leaders are regarded as corrupt and responsible for land disputes among the people, as they tend to receive bribes from perpetrators of criminal offences so as to bend the rules leading to miscarriage of justice. To exemplify the prevalence of corrupt practices among government officials, one of the district resident magistrates had this to say;

> *"We have heard of cases of pastoralists being asked for bribes of up to five hundred thousand Tanzanian shillings (USD, 225) to have their cases against them for damaging crops resolved quietly*" (field interviews).

Similar findings are reported by Abroulaye *et al.* (2015) in Senegal who found that local leaders abuse their authorities in order to seek for bribes from the parties in conflicts. On the same token, Umar *et al.* (2013) in their Nigeria study found that corrupt tendencies by local leaders revolve around overestimation of the amount of the crops damaged by livestock in order to elicit some amount of money from farmers in the form of bribes.

The average scores for the coping strategies both in Kiteto and Kilosa districts are summarised in Table 2. The Table provides a summary of the findings of the average scores regarding the three coping strategies discussed so far for farmers and pastoralists. The results show that, among the pastoralists, the use of problem oriented coping strategies had an average score of 45.5%, while among farmers it had an average score of 54.5%. On the average, therefore, farmers mostly use POCS as opposed to pastoralists.

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Table 2: The mean score of use of coping strategies among farmers and pastoralists in Kiteto and Kilosa Districts (n=373)

Strategy	Kilosa		Kiteto		Overall	
	Farmers (n=139)	**Pastoralists (n=91)**	**Farmers (n=91)**	**Pastoralists (n=54)**	**Farmers (n=230)**	**Pastoralists (n=143)**
Average use of POCS score (%)	53.4	56.6	55.0	45.0	54.5	45.5
Average use of EOCS score (%)	56.0	44.0	49.0	51.0	51.2	48.8
Average use of SSCS score (%)	53.8	46.2	52.2	47.8	52.7	47.3
Combined coping strategies score (%)	53.1	46.9	49.1	50.9	50.0	50.0

This suggests that farmers encounter more problems related to natural resource use conflicts than pastoralists. Moreover, the findings also show that farmers are more aggressive in trying to address problems related to natural resource use conflicts than pastoralists. The same applies to the use of EOCS. In addition, the use of SSCS scored higher among farmers (52.7%) than it did among the pastoralists (47.3%). The implication here is that, in the event of natural resource use conflict between the two groups, pastoralists sought help from external sources more including the government and relatives as a coping strategy to manage conflicts than did the farmers. On the other hand, one half of each group often used a combination of coping strategies. This implies that there is no single coping strategy that works best in dealing with negative effects of resource use conflicts (Yahia *et al.*, 2014; Umar *et al.,* 2013; Adisa, 2011).

3.1.2 Factors influencing the use of coping strategies among actors in conflicts

An ordered logistic regression was used to determine the socio-economic factors that influenced the use of coping strategies among farmers and pastoralists. The dependent variable, coping strategies, was regressed on the 12 covariates shown in Table 3. The regression was carried out in order to determine the influence of each of the variables on the probability of a household is in the highest category of using a strategy for coping in a conflict situation. The likelihood ratio chi-square 107.2 with a p-value of 0.000 indicates that the model was statistically significant compared to the null model with no predictors. According to Louviere *et al.* (2000), a model with an R^2 of 0.2 and above is considered as an excellent fit. Since proportional odds were assumed, a single coefficient was estimated for each predictor.

Table 3 presents the coefficients, their standard errors, z-tests and associated p-values, as well as 95% confidence interval of the coefficients. The results show that one's district, sex, ethnicity, location of the farm, land ownership, and production purpose significantly ($p < 0.005$) influenced a household's choice of coping strategies. The rest of the predictors particularly age, household size, land size, land hoarding, land tenure system and years of residence had no significant influence. These results differ from those reported in a study by Adisa (2012) which showed that socio-economic factors such as age, family size, and farming experience significantly influenced the choice of coping strategies to resource use conflicts.

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Table 3: Factors influencing the use of coping strategies to resource use conflicts in Kiteto and Kilosa Districts

Variable	Coef.	Std. Err.	z	P>z	95%Conf.	Interval
District of domicile	-1.688	0.281	-6.01	0.000*	-2.238	-1.137
Age of household head	-0.013	0.010	-1.30	0.194	-0.033	0.007
Household size	0.025	0.036	0.69	0.492	-0.046	0.096
Sex of the household head	-1.451	0.329	-4.41	0.000*	-2.095	-0.806
Ethnicity of the household head	-1.472	0.276	-5.33	0.000*	-2.014	-0.931
Proximity to the household farm	-0.001	0.000	-2.94	0.003*	-0.002	0.000
Land size in acres	-0.003	0.003	-1.00	0.318	-0.009	0.003
Land ownership of the household	0.829	0.312	2.66	0.008**	0.217	1.440
Production purpose	-0.608	0.272	-2.23	0.025**	-1.141	-0.075
Land tenure system	-0.478	0.300	-1.59	0.111	-1.065	0.110
Land hoarding	0.020	0.313	0.07	0.948	-0.592	0.633
Years of residence	-0.428	0.288	-1.49	0.137	-0.993	0.136
/cut1	-8.811	1.156			-11.078	-6.544
/cut2	-8.295	1.158			-10.565	-6.025

Number of observations =372:Wald Chi^2 (12) =107.72: Prob> chi^2 =0.000:Log pseudo likelihood = -265.12104: Pseudo R^2=0.2092: **=p<0.005, *p<0.001

As shown in Table 3, one's district of residence highly ($p < 0.001$) influenced one's choice of a coping strategy. The respondents in Kilosa were more likely to cope with natural resource use conflicts compared to their counterparts in Kiteto District. Literature (Pedersen, 2016; Pedersen, 2018) also shows that conflicts in Kiteto are less frequent and are a more recent phenomenon than is the case with Kilosa. Therefore, having fewer coping strategies in Kiteto could be attributed to the low frequency and relatively shorter duration of the occurrence of these conflicts. The descriptive statistical analysis in Table 1 show that over 40% of both farmers and pastoralists have been reported to have been often using their experience to cope with resource use conflict. In this paper, it is further argued that one's place of origin played a key role in the choice of a coping strategy to natural resource use conflicts. For example, in Kilosa, the Maasai are immigrants, thus, this explains why they are more restraint compared to people in Kiteto who are perceived as migrants of other ethnic groups and farming communities.

Males were less likely to be in the highest category of choosing a coping strategy to natural resource use conflicts. This implies that there was a negative correlation (Coef. -1.451) between coping strategies and sex of the respondents and this was highly statistically significant ($p < 0.001$). In other words, in the study areas, males stood a better chance of coping with natural resource use conflicts than females. Similarly, Chandra *et al.* (2017) found that, in conflict-prone areas of Philippines, men and women were affected differently in a case where women were subjected to forced migration, increased discrimination, loss of customary rights to land, resource poverty and insecurity, thus, making them to coping less with natural resource use conflicts. This argument is supported by results from focus group discussions which revealed that during conflicts women, children, and the elderly are either left at home or hidden in bushes while the men assume the responsibility of guarding the properties and fighting back the attackers.

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Table 3 shows that Maasai were less likely of being in a higher level of choosing coping strategies to resource use conflicts, implying that ethnicity is negatively correlated (Coef.-1.472) with coping strategies, and this was highly statistically ($p < 0.001$) significant. This also implies that the ability to cope with resource use conflicts varies across ethnic groups. Therefore, a non-Maasai pastoralist has a better chance of coping with resource use conflicts than his Maasai pastoralist counterpart. The plausible explanation for this is that non-Maasai have more than one income generating activity which guaranteed them survival even after the destruction of their crops by livestock; this is unlike the Maasai pastoralists who are primarily engaged in livestock production as their major and the only source of livelihood. These findings are confirmed by the findings of Yahia *et al*. (2014) in Sudan which show that farmers' possession of more than one income generating activities enhance their chances of coping with natural resource use conflicts as opposed to their pastoralists' counterparts who solely depend on livestock for their survival.

The proximity of the household to the farm had a negative correlation (Coef.-0.001) with coping strategies to resource use conflicts and this was statistically significant ($p = 0.003$). This suggests that a household with their farms far away from the homestead are less likely to be in the highest level of choosing coping strategies to natural resource use conflicts than the homestead whose farms are closer. This could be explained by the fact that farms located far away from the homestead are prone to damage by livestock, as most of these would likely be closer to grazing areas than is the case with farms closer to the homesteads.

The results from the regression analysis show further that the household's production purpose was had negative (Coef.-0.608) and this was statistically significant ($p = 0.025$). This implies that the more the respondent put his/her farm to different production options the less the likelihood for him/her to be able to cope with resource use conflicts. This means that if a farmer engages in subsistence, commercial production or both, the likelihood of experiencing more crop damage due to conflicts is likely to be high. This is not the case with pastoralists who would always migrate to other areas whenever conflicts occur to avoid confrontation with farmers, only to return back during the dry season when crops have already been harvested. These frequent migrations deny them a chance to engage in commercial livestock production (Salzman, 2018; Rain, 2018).

Land ownership had positive (Coef.0.829) and statistically ($p = 0.025$) significantly associated with natural resource use conflicts coping strategies. The finding is consistent with the findings by Deressa *et al.* (2010) in Ethiopia who reported that individuals with land ownership and land tenure security are likely to cope better with natural resource use conflicts than those without the security of tenure. The results in Table 3 show that one unit increase in land ownership is likely to lead to a 0.829 increase of a household's ability to cope with resource use conflicts. This is further supported by results in Table 5.1 that show that only 6.5% and 27.3% of farmers and pastoralists respectively, sold their farms as a strategy of coping with conflicts. The finding simply that if land ownership procedures are properly followed, most farmers and pastoralists will have access to land ownership security and hence minimize natural resource use conflicts in the study areas. According to UNEP (2007), land ownership increases farmers' and pastoralists' chances of coping with conflicts.

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Therefore, land ownership is an important aspect if both farmers and pastoralists' land tenure security is to be guaranteed as this will reduce conflicts as a result of land grabbing and trespassing.

4.1 Conclusions and Recommendations

Natural resource use conflicts between farmers and pastoralists are prevalent in Tanzania. Generally, farming and pastoralism in the study areas are male dominated activities, specifically because of the prevailing conflicts between farmers and pastoralists. The negative effects of these conflicts have been manifested through threats of food insecurity resulting from abandonment of farms. Thus, coping strategies become a necessary aspect for sustainable development in the aftermath of a post conflict era. Generally, there is no single strategy which is completely adequate in bringing the necessary remedy in the aftermath of conflicts. Thus, the actors employ a portfolio of coping strategies in order to address the effects of resource use conflicts. Though there were slight differences in the adaptation of coping strategies against resource use conflicts, both farmers and pastoralists use emotional focused coping strategies mainly praying for peace, which shows their strong adherence to God. Moreover, despite the allegation of corruption, the parties in the conflicts still sought help from the local government for social support seeking as a coping strategy hence demonstrating trust in the government. The study concludes that land ownership and land use planning are important aspects of actors in conflicts in minimising further conflicts.

Based on the study findings and conclusion, it is hereby recommended that Kiteto and Kilosa District Councils, through the Land Department, should ensure that farmers and pastoralists who are in the conflict-prone areas are encouraged to own and manage their land sustainably in order to minimize natural resource use conflicts among and between them. Also, the coping strategies to resource use conflicts adopted by farmers and pastoralists should be mainstreamed in the designing and enforcement of rules and regulations governing strategies of coping with natural resource use conflicts in the study areas. In addition, there should be co-management committees' at all administrative levels in the districts to ensure that farmers and pastoralists observe rules and regulations governing natural resources use on a daily basis. Finally, more research on the addressing effects of post-traumatic stress and resilience among farmers and pastoralists in conflict-ridden areas in Tanzania should be undertaken.

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