Water Scarcity Impact of Rural Livelihood Choices in Kieni Sub Counties, Kenya

Fred K. Wamalwa

Catholic University of Eastern Africa, Kenya

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ABSTRACT

Poverty in developing countries escalates environmental predicaments among rural populations in arid and semi (ASAL) communities. A key understated outcome of livelihood occupations on human wellbeing is their consequence on water scarcity. Yet, most studies involving poverty and the environment overlook implications of rural livelihood options on the environment in marginal areas. The objective of this study was to examine water scarcity impact of household livelihoods in Kieni East and West sub counties of Nyeri County in Kenya. This was essential as rural ASAL populations are most affected by scarcity of water resources. The study adopted cross sectional mixed method approach that applied household survey for quantitative data collection. The qualitative data gathering techniques included semi structured interviews, focused group discussions and desk reviews. Proportionate stratified random sampling technique was used to inaugurate a 400 sample size from a targeted population of 51,304 households. The study used independent T-Test to test statistical significance at $p<0.05$ for the two sites. Multiple regression techniques were applied to determine the influence of livelihood options on water scarcity in the study area. Based on the analysis, the study found linkage between livelihoods and water scarcity to be significant. Overall results at the two sites revealed water scarcity as predominantly instigated by household participation in forest based activities [B=0.264], livestock activities [B=0.184], and crop based activities [B=0.169] respectively. The results also demonstrated a higher impact of forest activities on water scarcity in Kieni East [B=0.313] than in Kieni West [B=0.231] at $p<0.001$; while livestock activities impact on water scarcity was more substantial in Kieni West [B=0.233] at $P<0.05$, compared to Kieni East [B=0.154] at $p<0.05$. The study concluded with some recommendations for policy and research consideration.

Key words: Arid and Semi-Arid lands; Cropping activities, Forest activities; Household Livestock activities; Off farm activities.

INTRODUCTION

In general, poverty is associated with the rural populations because they are largely deprived of both basic and economic livelihood opportunities. Present day concerns about the level of poverty in rural areas have caused significant interests in research. In an effort to improve living standards of populations in developing countries, rural development objective over the last decades has been closely associated with the continuous evolution of development strategies. These include poverty reduction strategies, food security programmes, sustainable agriculture and rural development, the Millennium Development Goals (MDGs) and from 2015, sustainable development goals (UN, 2015). However, poverty remains a significant issue (Shepherd, *et. al.*, 2014).

For some time now, promotion of rural livelihoods to enhance household welfare by rural development agents has mainly focused on simplistic universal approaches of adopting sustainable livelihoods in developing countries. Consequently, a lot has been learnt about poverty reduction and environmental conservation in the last decade (2014 -2024), in terms of the relationship between poverty and environmental degradation and vice versa. Regardless of advances in the development and promotion of sustainable development, rural households' motivation to take up new sustainable livelihoods has remained minimal. This has led to the realization that livelihood adoption is not only a technical problem but also a socioeconomic problem, which in recent times, has directed attention to the influence of socioeconomic and behavioural factors in rural households' livelihood choices. Like in most contemporary developing countries, the fundamental characteristic of rural households in

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Kenya is the ability to adapt, through rural livelihoods diversification. Rural livelihoods diversification is a survival strategy in which factors of both threat and opportunity cause the rural household to adapt intricate and diverse livelihood strategies in order to survive (Ellis, 2000). While participation in multiple activities by rural households is not new, there is relative neglect of diverse dimensions of rural livelihoods other than access to farming until mid-1980s. The dominant strategy for improving rural welfare was therefore small farm output growth.

World Bank (2007) showed that poverty reduction in sub-Saharan Africa can be achieved through livelihood diversification in rural areas. Coherent with this finding, rural households have four possible options to choose livelihoods for their wellbeing. They practice farming, raise livestock, and engage in small businesses. The last option though not appealing to the poor households is the access to common forest resources when the need to survive arises. As an active social process, livelihood diversification involves the maintenance and continuous adaptation of diverse portfolio of activities over time in order to secure survival and improve living standards (Ellis, 2000b). However, livelihood diversification has consequences for the rural communities, and therefore the overall process of structural transformation impacts on the use of resources and the environment in general (Loison, 2015). Since the environment is a critical input for rural households, environmental degradation in turn implies a shrinking input base for the poor households that increases severity of poverty. From this discourse, it has been argued that poor people are concentrated in fragile land (Barbier, 2008, 2010), consistent with evidence that poverty has positive correlation with fragility of lands (Dasgupta, et. Al., 2005); and that the role of environmental resources in the share of aggregate income of the poor is strong (Hogarth, et. al., 2012; Kamanga, et. al., 2009).

According to Babbier (2010, 2013), poverty is the main obstacle to promoting environmental conservation and some of the environmental problems faced in developing countries are water shortage and contamination, deforestation, land degradation, air pollution and the loss of biodiversity. Over the last decades, interest in sustainable development (Babbier, 2003) has been out of above concerns. Although current economic development may be leading to enhanced rural household welfare, it is at the expense of excessive depletion and degradation of natural capital. Moreover, human development and environmental issues have generally been articulated as separate issues (Nunan, et. al., 2002). For instance, in a study on poverty and environmental links, Comim, et. al., (2009) demonstrate that although many studies have focused on poverty as an impediment for economic development, the debates on poverty reduction often concentrate on the concept of poverty and its measurement.

Although poor environmental condition is a determinant of poverty (Shyamsundar, 2002), environmental degradation such as deforestation, land degradation and limited water supply worsens the condition of the poor. One of the strategies employed by rural folks in quest to diversity from farming livelihood is dependence on water resources, which in many ways results in water dearth. Therefore, water as a resource becomes important as an additional natural resource to define household survival. In developing countries rivers provide a direct source of water for domestic use with minimal or no treatment at all. For water scarce countries like Kenya (WRI, 2007), this means that water catchment areas should be managed properly so as to retain their capacity to supply good quality water all year round.

The battle against poverty remains an important priority on Kenya's development agenda as articulated in Vision 2030, the country's development blueprint for the period 2008 to 2030 (Government of Kenya, 2007). The Vision aims to make Kenya a "middle" income country providing high quality life for Kenyans by the year 2030. However, the majority of the poor continue to be concentrated in rural areas, where their livelihoods (Lufumpa, 2005) depend on subsistence agriculture, making poor farmers encroach on water catchment areas leading to water losses. Therefore, Kenya faces the challenge of improving its economic performance and the lives of its citizens without undermining the environment upon which its national earnings and individual people's livelihoods depend (Government of Kenya, 2007). This study aims to determine the impact of livelihood activities of rural households in Kieni East and West Sub counties on water scarcity so that development programmes aim to reduce poverty and promote sustainable water use practices can be achieved.

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METHODS AND DATA

In order to understand fully the phenomenon of this study, a mix of quantitative and qualitative approaches were adopted. This is because from past studies (Cruz-Trinidad, et. al., 2009; Simpson, 2007) the approach is effective for livelihood investigations. Survey techniques were used to collect quantitative information while desk review, focused group discussions, key informant interviews and observations methods assisted to collect qualitative data.

Two sites were used in this study – Kieni East and Kieni West sub counties, in Nyeri County in Kenya. The two sites depict similar farming systems and socio-cultural settings. The study area comprises of four wards in each sub county i.e. Mweiga, Mwiyoyo/Endarasha, Mugunda and Gatarakwa wards of Kieni West; and Naromoru/Kiamathaga, Thegu River, Kabaru, and Gakawa wards of Kieni East Sub County. The area is sandwiched between two major water towers in Kenya i.e. Mt. Kenya and The Aberdares Ranges in Kieni East and Kieni West sub counties respectively. The area is characterized by high temperatures in low altitude areas and low temperatures for areas adjustment to the two water towers.

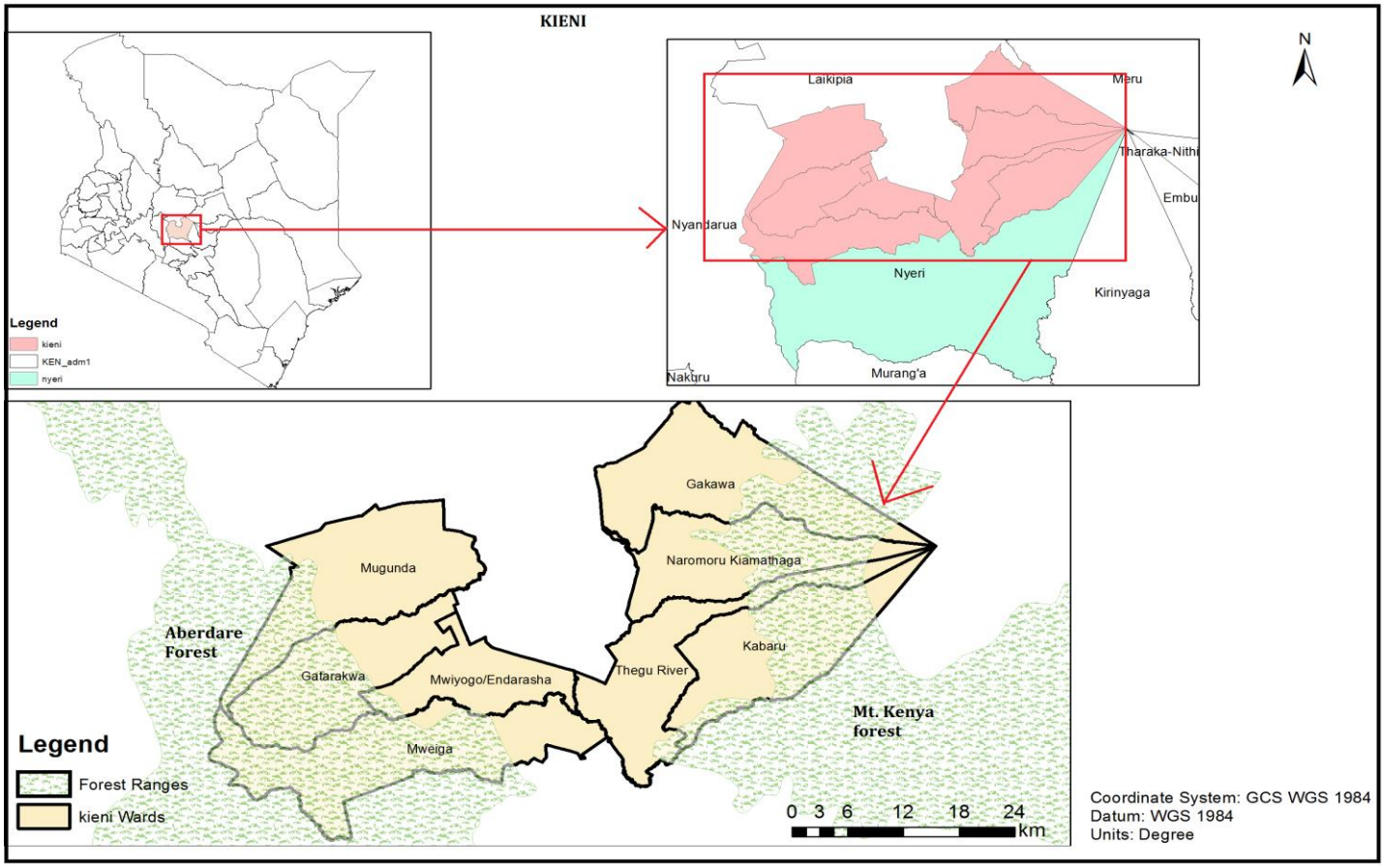

Fig. 3.1 Geographical location of Kieni East and Kieni West sub counties

Source: Author, 2017.

According to the 2009 population census (KNBS, 2010), the population of Kieni, was estimated at 175,812 (51,304 households). Ten sub locations for this study were randomly selected from a total 59 sub locations (clusters) in the eight wards (strata).

Based on Yamane (1967) formula, a sample size of 400 households (200 households for each of the two sites) of study site was considered adequate to balance required level of reliability and cost.

In order to represent the population with sufficient accuracy and to infer the sample results to the population, the target sample households were selected in a random two stage sampling process. In the first stage, the study sub locations were randomly selected using proportionate stratified random sampling technique. This resulted in the

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selection of 10 sub locations; see Table I, appendix 1, each with 40 households according to their respective population strengths. Accordingly, the probability of selecting each of the ten selected sub locations based on population size was determined and varied between 11.1% for Gakanga sub location, and 56.8% for Kamatongu sub location, see Table I. The probability of selecting each household in the selected sub locations based on the population was also determined, and varied from 1.4% for Kamatongu to 10.9% in Bondeni sub location (Table I.). The constant overall weight of 1.3 (see Table I) demonstrate that each household in the population had an equal chance of being selected for the household survey interview. In the second stage, using random sampling techniques, individual households units in the selected sub locations were randomly selected in relation to population. Household lists provided by the local administrators (area Assistant Chiefs) of the sampled sub locations were used as sampling frame for selecting households. Accordingly, 400 households (40 households for each of the ten sub locations) were randomly selected for the study (Table I).

Instruments and Data Collection Procedures

A survey using structured questionnaire was the primary method of investigation employed for this study. However, focus group interviews, key informant interviews, and direct personal observations were also used in order to enrich the investigation with relevant qualitative information. The questionnaire was administered in Kikuyu, the local language which households of both sites speak between April and July, 2017. A team of 5 enumerators was recruited and trained for each study site to collect the data from the sampled households. Two separate focus group discussions were conducted for each study site, with male and female household members. The focus groups composed of between 6 and 9 members of households in both sites. The participants were identified in purposeful selection among the survey samples that were thought to express their views actively in consultation with the enumerators. Village and major town markets in the area were visited to gather information on prices of major traded agricultural, livestock and forest products, including off farm activities. Farm field observation was conducted on some household farms to observe livelihood activities, management practices, and spatial locations in the farmers' land holding.

Data Organisation and Analysis

The data was coded and entered into SPSS in three separate data files; one for Kieni East, the second for Kieni West, and the third for pooled data. To estimate impact of livelihood activities on water scarcity, multiple regression analysis technique was applied to predict the unknown values of water scarcity variables from the known values of the four livelihood activity variables, also called the predictors (see Table II). As shown in Table II, independent sub variable for forest activities (FA) included household annual income from forest activities and proportion (%) that depends on forest for a livelihood. The second category was crop activities (CA) with sub variables that consisted of household annual crop income, and average number of crop varieties per household. In regard to household livestock activities (LA), annual income from livestock sales and livestock numbers in tropical livestock unit (TLU) variables were studied as the third category, while the fourth category of variables consisted of off farm (OA) sub variables that included annual average income from off farm activities and proportion of households who engage in off farm activities. Dependent variables for water scarcity (WS) comprised of the following sub variables i.e. proportion of households who perceived forest tree cover had reduced over the last 5 years; household proportion that belief tree cutting is prevalent in the area, and household proportion that belief timber extraction from forest is by villagers.

Table II. Descriptive statistics of Kieni East, Kieni West, and Pooled Data (all surveyed households)

Variable Description	Kieni East (N= 200)		Kieni West (N= 200)		Pooled Data (N= 400)	
	Mean	**St. Dev.**	**Mean**	**St. Dev.**	**Mean**	**St. Dev.**
Household activities						
% household who engage in forest activities**[FA]**	39.2		52.2		45.8	

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% household who engage in crop activities**[CA]**	64.5		88.5		76.5	
% household who engage in livestock activities**[LA]**	47.0		32.5		39.8	
% household who engage in off farm activities**[OA]**	55.0		66.5		60.5	
Independent variables(livelihood activities)						
[FA]Annual Household income from forest activities (KShs)**	10,459.55	11,653.17	20,995.45	37383.35	31,455.20	21,554.19
[FA]% of household who depend on forest for a livelihood***	96.2		100.0		98.4	
[CA]Annual household income from agriculture (KShs)***	23,056.62	52,615.09	81,033.08	175,790.46	34,430.73	63,077.08
[CA]Average number of crop varieties grown per household	4.8		3.8		4.3	
[LA]Annual Household income from livestock (KShs)**	29064.89	37175.48	37783.08	46821.33	32628.93	41472.23
[LA]Average household livestock number in TLU***	12.48		7.97		10.23	
[OA]Average annual household income from off farm activities (KShs) **	63,672.73	70,353.60	68,490.91	142,522.19	66,300.83	115,263.53
[OA]% of households who engage in off farm activities **	55.0		66.0		60.5	
Dependent variables (Water Scarcity)						
% of households experiencing water shortage**	93.3		87.3		90.34	
% households who experience crop failure due to inadequate water**	88.4		86.6		87.5	

Variables in which sample households of Kieni East have significant differences from those of Kieni West: *** = at 0.01 level of significance ** = at 0.05 level of significance.

MULTIPLE REGRESSION MODELS

Based on general regression model, regression of livelihood activities on water scarcity is noted as follows (Eq. 1):

$$Y_{ws}=B_0+B_{FA}X_{FA}+B_{CA}X_{CA}+B_{LA}X_{LA}+B_{OA}X_{OA}\ldots\ldots\ldots\ldots\ldots\mathbf{1}$$

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where: Y_{ws} = Water scarcity variable; B_0 = Regression intercept coefficient; B_{FA} = Forest activity regression coefficient; X_{FA}= Forest activity variable; B_{CA}= Crop activity on regression coefficient; X_{CA} = Crop activity variable; B_{LA}= Livestock activity regression coefficient; X_{LA} = Livestock activity variable; B_{OA} = Off farm activity regression coefficient, and X_{OA} = off farm activity variable.

Considering water scarcity factors identified in this study, regression coefficients for four livelihood activity variables were computed as shown below in the regression models (2,3, &4) for the water scarcity variables in Kieni East, Kieni West, and overall study area. It is therefore a 3-step hierarchical regression, which involves the interaction between four continuous scores. In this case, water scarcity variables for Kieni East were entered at Step 1 (Model 1). In the second model, variables for Kieni West

Entered (Model 2), while pooled data for the first two models (Model 3) was for the overall water scarcity in the study area.

Model 1:

$$Y_{wske} = B_0 + B_{FA} X_{FA} + B_{CA} X_{CA} + B_{LA} X_{LA} + B_{OA} X_O \ldots\ldots\ldots \mathbf{2}$$

Model 2:

$$Y_{wskw} = B_0 + B_{FA}X_{FA} + B_{CA}X_{CA} + B_{LA}X_{LA} + B_{OA} X_{OA} \ldots\ldots\ldots\ldots\ldots \mathbf{3}$$

Model 3:

$$Y_{ws} = B_0 + B_{FA}X_{FA} + B_{CA}X_{CA} + B_{LA}X_{LA} + B_{OA} X_{OA} \ldots\ldots\ldots\ldots\ldots \mathbf{4}$$

where: Y_{wske} = water scarcity variable in Kieni East; Y_{swkw}= water scarcity variables in Kieni West; and Y_{ws} = overall water scarcity variable.

The data obtained from all respondents (200 from each site including their livelihood activities and water scarcity) were considered in the models. The explanatory variables (X_i) included in the model were household: forest activities (FA), crop activities (CA), livestock activities (LA), and off farm activities (OA). FA, CA, LA, and OA are categorical variables. The dependent variable used in this multiple regression analysis was water scarcity experienced by households. Like explanatory variable, dependent variables are also categorical. In Table III regression analysis results are shown of livelihood activities on water scarcity.

RESULTS AND DISCUSSION

Overall, results (Table III) indicate that the three out of four livelihood activities in the area cause water scarcity. Results show that off farm activities had insignificant effect on water scarcity.

Table III. Hierarchical regression analysis coefficients of livelihood activities predicting water scarcity for Kieni East and West and pooled data

Variables	**Kieni East**			**Kieni West**			**Pooled Data**		
	Model 1: Water Scarcity			*Model 2: Water Scarcity*			*Model 3: Water Scarcity*		
	B	t	Sign.	B	t	Sign.	B	t	Sign.
Const.		-2.127	.035		-1.403	.162	-.129	-2.542	.011**
Forestactivities[*FA*]	.313	4.092	.000***	.231	3.019	.003***	.264	5.053	.000***
Cropsactivities[*CA*]	.112	1.718	.087	.126	1.846	.066	.169	2.641	.009***

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Livestockactivities[*LA]*	.154	2.021	.045**	.233	2.962	.003***	.184	3.579	.000***
Offfarmactivities[*OA*]	.009	.129	.898	-.107	-1.428	.155	-.045	-.897	.370
F		10.51			9.08				
Adjusted R^2		.160			.140				

a. Dependent Variables: Water scarcity.

b. *** Significant at 1% level ** Significant at 5% level * Significant at 10% Level

Forest activities (FA)

Regression results in Table III indicate that forest activities have the greatest impact on water scarcity (B=0.264, t-values=5.053, p<0.01). Results also show that the effect of forest activities on water scarcity in both sites was positive and significant (Kieni East[B=.313, t-values=4.092, p<0.01], Kieni West[B=.231, t-values=3.019, p<0.01]). Consistent with this finding, studies have shown that fuelwood collection is often found in tropical forests and degraded forest areas (Repetto, 1988; 1990; Rowe, *et. al*., 1992) and increases water scarcity in affected areas. Trees help prevent excessive evaporation of water bodies, and so destruction of forests exposes soil moisture to the sun's intense heat, leaving them dried out. Also, farming in the forest involves clearing forest trees and bushes which in turn exposes the soil to direct sunlight leading to evaporation of water from the soil. As a result of these activities, one of the FGD participants aptly noted…....…this area was named "*Kamburaini"* because those days it was a rainy place. But now, the name is meaningless because rain is no longer a frequent occurrence!….(FGD Participant, Kamburaini Sub Location, Kieni East).

This finding is also consistent with World Bank (2007) report that major water catchment areas in Kenya, including the Aberdare Ranges and Mt. Kenya have lost their forest cover over the years with the closed canopy forest cover currently standing at a dismal 2.0%. Furthermore, Mati, *et. al*., (2008) reported that between 1973 and 2000, there was a 32% decrease in forest cover and a 203% increase in agricultural cover in the Mara River basin in Kenya. This affects water source downstream due to exposure of the forest as water catchment. Also grazing of livestock in the forest has a similar negative effect to water availability like crop activities. This is because over grazing leads exposure of the soil in the forest resulting in water evaporation from the soil.

Livestock activities (LA)

Regression results in Table III show that livestock activities result to water scarcity (B=0.184, t-values=3.579, p<0.01). Results in Table 4.8 further show that the effect of livestock activities on water scarcity in both sites was significant (Kieni East [B=.154, t-values=2.021, p<0.05], Kieni West [B=.233, t-values=2.962, p<0.01]). The positive relationship of animal husbandry and water scarcity has been previously studied (Pallas, 1986), in which it is shown that in extensive grazing systems, the water contained in forages is significantly lost to meeting water requirements for livestock upkeep. In dry climates, the situation is even worse as water content of forages decreases from 90 percent during the growing season to about 10 to 15 percent during the dry season (Pallas, 1986). FGD results revealed that some of the households in the area practice zero grazing mode of livestock husbandry, mainly for milk production. Diets for these animals are water intensive because of the huge quantities of water required for their upkeep, exacerbating water availability challenges in the area. In his study on livestock water consumption in Australia, Luke (1987) reported that water requirements per animal can be high, especially for highly productive animals under warm and dry conditions. Furthermore, water scarcity becomes worse in the study area where livestock are allowed to wander free in search of food and water. In extensive systems, the effort expended by animals in search of feed and water increases the need for water considerably, compared to intensive systems where animals do not move around much.

Cropping activities (CA)

Results in Table III show that crop activities cause water scarcity (B=0.169, t-values=2.641, p<0.05). As crop

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farming is mostly accomplished by opening up the soil in preparation of planting, it exposes the soil to water evaporation. Reports from key informants from the Ministry of Agriculture and Livestock Development (MoA&LD) revealed that approaches that could minimise this loss like minimum tillage are hardly practiced in the area. By opening up the soils, farmers also destroy trees and bushes that provide cover to the soil as protection from evaporation. Cropping practices also encourage higher water losses (Clay, 2004) mainly through leaky irrigation systems; wasteful field water application methods; pollution by agrichemicals; and cultivation of 'thirsty' crops not suited to the environment. According to FGDs results, the situation is even compounded by the fact that the area is ASAL where water scarcity is prevalent. Some innovative and resourceful household individuals and horticultural firms/farms have established minor and major irrigation systems, which abstract water from either the forest and under the ground. This has augmented the water scarcity problem in the area, FGD participants argued. However, with continuing population growth and limited potential to increase suitable cropland, as other studies have demonstrated, irrigation has become increasingly important to food security strategies (Wichelns & Oster, 2006). Unfortunately though, increasing levels of irrigation as practiced by horticultural farms and household farmers in the area only augments the cost of water and, this may escalate problems of water scarcity in the area further.

CONCLUSION AND RECOMMENDATIONS

This study investigates the impact of household livelihood choices on water scarcity. It is established that three out of the four commonly practiced livelihoods significantly contribute to water scarcity in the study area, but at different levels of significance at the two sites, vis a viz forest, livestock, and cropping activities. The impact on water scarcity of forest activities in Kieni East was greater than experienced in Kieni West, while livestock activities had a greater impact on water scarcity in Kieni West than in Kieni East Sub County. Consequently. It is concluded that forest and livestock activities are vital components for policy making strategies that aim to promote water conservation in Kieni East and Kieni West respectively.

Therefore policies that target the regulation of these activities can contribute immensely towards water conservation in the area. These may be achieved by focusing interventions in the forest and on household farms respectively. First, policies that target current forest based interventions need review and reformulation. This is particularly important in Kieni East, where forest activities had a higher impact on water scarcity. Such policies should be spearheaded by relevant institutions led by the Ministry of Environment & Forests (MoE&F), Kenya Forest Service (KFS), and the local County government agencies. It is suggested that these institutions take measures to regulate and promote sustainable forest activities that take place in the forest. Therefore, water conservation strategies should focus on regulating activities that lead to forest cover depletion like logging, farming and livestock grazing. This is because these activities expose the forest soils hence leading to evapotranspiration, resulting in water loss. Also logging and grazing leads to loss of vegetation from the forest resulting in water loss through biomass exportation. Secondly and more importantly, in Kieni West, interventions to improve livestock keeping on household farms should be prioritized too, especially by the Ministry of Agriculture and Livestock Development, including the relevant County government agencies. For instance, households ought to be encouraged to adopt intensive rather than extensive modes of livestock husbandry to minimize on water demand by nomadic livestock units.

Conflict of interest

We declare that there is no conflict of interest whatsoever by the authors of the manuscript or any other entities by submitting this paper and by the publication of the same.

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APPENDIX 1

Table I. Sub locations and number of Households randomly selected for questionnaire survey

	A	B	C	D	E	F	G	H
Strata/Ward	**Cluster/ Sub location**	**Sub Location Size**	**Cumulative Sum(a)**	**Clusters sampled**	**Probability 1**	**Household per Sub Location**	**Probability 2**	**Overall weight**
Naromoru/ Kiamathiga	Naromoru	1161	1661	1200	32.4%	40	2.4%	1.3
	Ndiriti	1094	2755					
	Gaturiri	1063	3818					
	Rongai	989	4807					
	Kamburaini	1813	6620	6330	35.3%	40	2.2%	1.3

	Thigithi	666	7286					
	Murichu	762	8048					
	Gikamba	1098	9146					
	Kabendera	830	9976					
Kabaru	Kirima	1505	11481	11460	29.3%	40	2.7%	1.3
	Ndaathi	1719	13200					
	Kimahuri	1961	15161					
	Munyu	1020	16181					
Thegu	Thungari	1811	17992	16590	35.3%	40	2.2%	1.3
	Lusoi	605	18597					
	Thirigitu	1446	20043					
	Maragima	872	20915					
Gakawa	Gathiuru	1609	22524	21720	31.4%	40	2.5%	1.3
	Githima	1363	23887					
	Kahurura	5125	29012					
Mweiga/Mweiga	Bondeni	367	29379	26850	7.2%	40	10.9%	1.3
	Amboni	1194	30573					
	Njengu	784	31351					
	Kamatongu	2915	34272	31980	56.8%	40	1.4%	1.3
Gatarakwa	Watuka	1126	35398					
	Lamuria	1366	36764					
	Embaringo	1217	37981	37110	23.7%	40	3.3%	1.3
	Kamariki	1809	39790					
Endarasha/	Mitero	901	40691					
Mwiyogo	Charity	1456	42147					
	Gakanga	569	42716	42240	11.1%	40	7.0%	1.3
	Endarasha	1907	44623					
	Kabati	701	45324					
	Muthuini	571	45895					
	Labura	1494	47389	47370	29.1%	40	2.7%	1.3
	Mwiyogo	471	47860					

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Mugunda	Karemeno	538	48398					
	Ruirii	993	49391					
	Kamiruri	722	50113					
	Nairutia	1191	51304(b)					
TOTAL	10					400		