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Abstract: *The study was done to assess gender dimensions in relation to climate change attitudes and adaptation strategies among small holder crop farmers, pastoralists and ago-pastoralists of Isingiro and Kiruhura districts, among communities surrounding Lake Mburo National Park in Uganda. The study contributes to the theoretical and conceptual discourse on climate change and varied gender responses. Through the lenses of gender socialization, the study reviewed men and women's attitudinal responses to climate change: a pragmatic research paradigm was used based on a thematic review model. Participatory methods and a questionnaire were used to collect data. Both sexes (99.5%) observed signs of climate change. The major causes of climate change were cutting of trees (39%, p<0.001), drainage of swamps (21.9%, p<0.01), use of solar panels (16.7%) and a curse from God (14.3%). More men (46.9%) than women (31.2%) (p<0.001) said that cutting of trees was the cause of climate change. A highly significant (p=0.003) more women (19.4%) said the curse from God was a cause. The other causes mentioned had no gender differences. The major observed ecological effect of climate change was drought (39%, p<0.001), followed by shifts of crop growing seasons (21.9%, p=0.01), increase in crop diseases and pests (13.5%) and soil erosion (11.3%). Significantly (p=0.0001) more men (18.4%) said soil erosion was the ecological effect of climate change than women (4.4%). There were no significant differences in gender responses identifying coping mechanisms to deal with the effects of climate change. The findings indicate that there were no salient climate change coping strategies adopted. On a low scale, communities, migrated to the neighboring districts and around LMNP in search of pasture and water; found alternative sources of income, sold cattle at salvage prices and reduced daily meals taken. In conclusion, the*

communities were aware that there was climate change but had no sustainable coping strategies adopted; hence the study recommends communal education on how to cope with climate change effects using a gender approach.

Keywords: *Gender, attitudes, practices, knowledge, climate change, Lake Mburo National Park*

Internationally, climate change discourse has engendered debates that have dominated the environmental agenda from the mid-1980s. Since then, it has been increasingly recognized as a global crisis threatening the livelihoods of poor men and women (Sathaye et al., 2012; Babugura et al., 2010; Quisumbing, 2009; Intergovernmental Panel on Climate Change [IPCC], 2014). González and Martin (2007) argue gas emissions from human activities have increased atmospheric concentrations of greenhouse gases, thereby causing global warming. Carbon dioxide (CO_2) emissions from agriculture and industrial sectors have contributed substantially to anthropogenic increases in atmospheric CO_2 concentrations. In sub-Saharan Africa, burning has been done for centuries to clear vegetation and thickets toward the end of the dry season for cultivation and grazing (Banana et al., 2014). Overgrazing of livestock has led to irreversible degradation of rangelands, causing soil erosion, which reduces the carbon dioxide sink provided by soil (Le Quéré et al., 2009). Evidence from global models indicates that farming populations are expected to experience deterioration in their agricultural yields and incomes. Consequently, the incidence of poverty and food insecurity will increase (Karfakis et al., 2012 ; Rai and Gurung, 2005). Interest has arisen in gender perspectives and the involvement of women and men in addressing climate change (Dankelman, 2002).

In Uganda, Magrath et al. (2008) emphasized that climate change was having the greatest impact on the lives of ordinary people, especially women, hence frustrating their efforts to attain better livelihoods. The frequency and intensity of droughts in sub-Saharan Africa have increased. These droughts have caused devastating effects, threatening the ability of communities to meet their basic needs, including food security and health. The droughts have also caused the loss of biodiversity (Barnett & Adger 2007; Sathaye et al., 2012; Djoudi &Brockhaus, 2011; IPCC, 2014; Ekpo & Agu, 2014).

This study was based on gender socialization theory, where different roles of men and women affect the stressors to which one

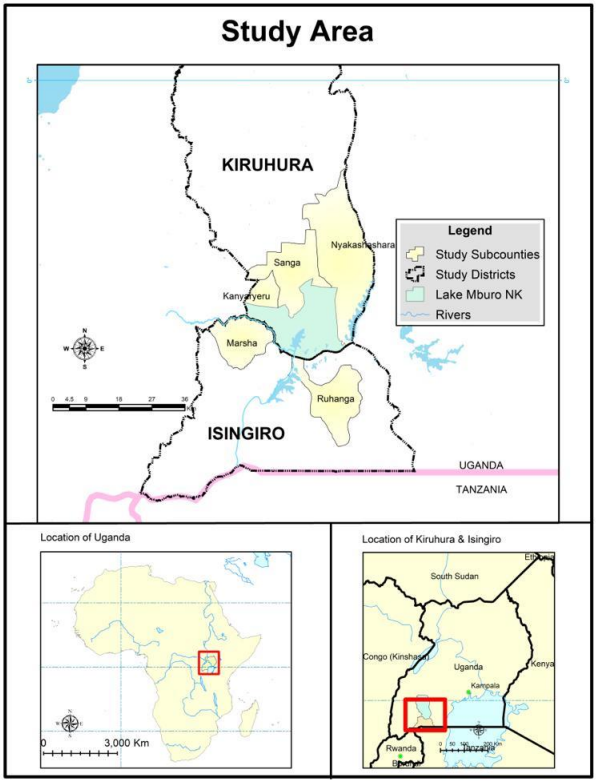
is exposed, constraining the coping behavior Folkman and Lazarus (1980). A gender difference in scientific knowledge helps to explain gender variation in environmental concerns (McCright, 2010). Men and women have different knowledge and attitudes on environmental and climatic change. Scholars, such as Ayesha, (2015), Babugura et al., (2010) & Goluba, (2014), further argue that the influence of the social roles whose performance is gender specific in society had led to different attitudes of men and women which reflect: different experiences, knowledge, interests, competencies and dispositions that arise from these different roles. Therefore, this study hypothesized that there was a difference between men and women's attitudes, practices and knowledge of the causes and effects of climate change. Therefore, despite the frequent occurrence of prolonged dryness in communities around Lake Mburo National Park in Kiruhura and Isingiro districts in Uganda, no studies had been done on the communities to determine their knowledge, attitudes and practices towards coping with climate change (Ocaido et.al., 1996; Kamugisha et al., 1997; Abraham, 2003; Ocaido et al., 2009a; UWA, 2015; & Uganda National Adaptation Programme of Action [UNAPA], 2007). A gender-based study was therefore designed to address this gap. The outputs from the study will be used to develop sustainable community gender -based strategies for mitigating climate change effects.

Materials and Methods

The study was done in communities surrounding Lake Mburo National Park (LMNP) (see Figure 1). LMNP is a small park of about 260 square km, which lies in the cattle corridor stretching from Northern Tanzania in the South to the South Western shores of Lake Kyoga, up to Karamoja in the North-East of Uganda (Ocaido et al., 2009b). The study area has a bimodal pattern of rainfall. The average annual rainfall total was about 750-800 mm. The shorter rains fall between March to May, and the long rains start from mid-September to early December. Normally, short dry seasons occur from late December to February, and the long dry season stretches from late May to September (Bintoora, 2003; Kamugisha et al., 1997; UWA, 2015).

A cross-sectional study was done in the districts of Isingiro and Kiruhura in western Uganda. Kiruhura represented pastoral and agro-pastoral farmers while Isingiro represented crop farmers and mixed crop/livestock farmers. The study was carried out in Nyabushozi County in Kiruhura district. It was also carried out in Isingiro and Bukanga counties in Isingiro district. The study used

A map showing the study area



participatory methods, and the administration of a detailed, structured questionnaire. For both participatory and questionnaire studies, two parishes per sub-county were selected; and from each parish, two villages were selected. A sampling unit was a household from which a man or a woman was chosen. Focus Group Discussions (FDGs) were carried out in all the 20 villages. Three FGDs per village were conducted, which captured women's group, men's group and a mixed group (both men and women). There was a minimum of eight and a maximum of twelve participants for each FGD. All proceedings of the FGDs were recorded for transcription and analysis.

The key informants were community experts who had knowledge and understanding of climatic conditions in the community. These included opinion leaders and district extension staff, such as district Production Officers, Agricultural Officers, Meteorologists, Veterinary Officers, Environmental Officers,

Community Development Officers, Community Wildlife Wardens and the LMNP-Chief Warden. However, there were more male experts compared to the females, as tabulated below.

Table 1: Key Informants

Community Experts		
(f = female)	Kiruhura District	Isingiro District
District Production Officers	1	1
District crop officer	1	1
District livestock officers	1	1
District environment officers	1(f)*	1
Uganda National Meteorological Authority		
Weather station meteorologists	1	1
Uganda Wildlife Authority		
LMNP chief warden	1	1
Community conservation warden	1	
Sub-county Level		
Community development officers	1(f)*	1
Crop extension workers	1	1
Livestock extension workers	1	1
Village level		
Village leaders/opinion leaders	12	8(2f)*

A questionnaire was administered to respondents in the villages selected for the study. A minimum sample size of 384 households was determined using the following equation (Dohoo *et al.*, 2003).

$$n = \frac{Z^2 PQ}{D^2}$$

Where n = minimum sample size
Z = 1.96 at 95% confidence interval
P = Estimated percentage prevalence of 50%
Q = 100 - P
D= acceptable error of 5

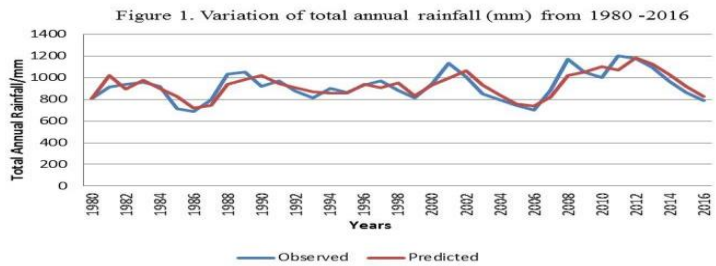
However, to increase the precision, questionnaires were administered to 400 households.

Data were collected using participatory methods, as described by Tadevosyan and Schoenhuth (1997). FGDs were held with men and women using a checklist of questions. In-depth interviews with purposively selected, key informants were conducted. The discussions and interviews were recorded using a tape recorder. A detailed, structured questionnaire was used to solicit the information given by participants. Discussions and interviews captured information regarding knowledge about climate change and variability; historical perspective on trends of climate variability, especially drought; perceived causes of climate change; and how climate change had affected them. Their attitudes and perceptions of climate change, magnitude of the effects, seriousness of concern, and the urgency of interventions were also captured. Qualitative data were coded to identify themes or patterns.

The responses to these variables were ranked on a four-point Likert scale, ranging from 0 to 3: 0 = don't believed, 1 = moderately believed, 2 = believed, 3 = strongly believed (Bertram, 2007). Descriptive statistics of the quantitative data were produced using SPSS version 17.0. The significance of gender differences across different farming systems in attitudes, perceptions, and knowledge of climate change were determined using a Chi-square test at 95% confidence interval.

Results

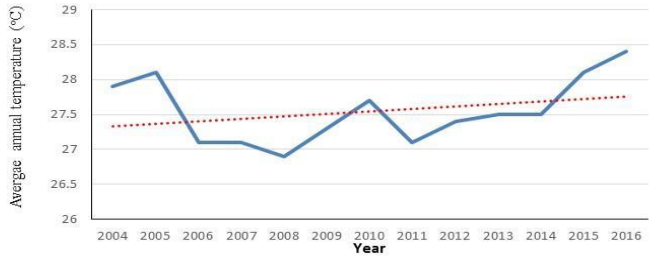
The variation of annual total rainfall (mm) from 1980 – 2016 is as a shown in Figure 1.



Whereas, the mean annual maximum temperatures (^{O}C) from 2004 – 2016 were as shown in Figure 2. There was temperature increase of about 0.5^{O}C during this period. There was a significant negative correlation ($r=-0.58$, $P<0.05$) of maximum temperature and total amount of rainfall received during this period, which could be

predicted using the equation: Total annual rainfall = 8101.7 – 259.4 T ^{O}C (P=0.039).

Figure 2. Variation of average annual maximum temperature (^{0}C) from 2004-2016



It was found that 99.5 % of both sexes agreed climate change was observed in the area, with 68.5% and 85.4% of men and women, respectively, noticing this change in the last five years. Details are shown in Table 1.

Table 2 Perception of Climate Change

Think that climate has changed	Isingiro (N=158)		Kiruhura (N=237)		Overall (=395)	
	Male (N=74)	Female (N=84)	Male (N=121)	Female (N=116)	Male (N=195)	Female (N=200)
Yes	100	100	99.2	99.1	99.5	99.5
No	0	0	0.8	0.9	0.5	0.5

During focus group discussions and key informant interviews, the primary causes of climate change were found to be tree cutting, especially for charcoal business; draining swamps; and from effects of solar panels. Both men and women from the two districts agreed that climate changed when nature was tampered with. A male respondent from Isingiro district reported that "*cutting of trees was done by the refugees in Nakivale refugee camp. Refugees have always had an increase in family growth and they end up moving to cultivate to feed their families and also to earn an income."* The causes of climate change, according to the respondents in both districts, are listed in Table 2.

Table 3 Causes of Climate Change

Causes of climate variability	Isingiro (n=158)			Kiruhura (n=237)			Overall (n=395)		
	Men (n=74)	Women (n=84)	*p* Value	Men (n=121)	Women (n=116)	*p* Value	Men (n=195)	Women (n=200)	*p* Value
Cutting of trees	42	31	0.152	49.9	31.2	0.004	46.9	31.2	0.001
Overgrazing	6	8	0.626	6.8	7.8	0.768	6.5	7.8	0.617
Swamp drainage	18	27	0.179	19.8	23.3	0.513	18.9	24.9	0.15
Effect of solar panels	16	15	0.863	16.6	18.4	0.716	16.5	16.8	0.936
Curse from God	12	19	0.229	6.9	19.4	0.004	9	19.4	0.003
Factory emissions	6	0	0.023	0	0		2.3	0	0.031

Overall, the major cause of climate change identified was the cutting of trees (39% of respondents, $p < 0.001$), followed by the drainage of swamps (21.9%, $p < 0.01$), the use of solar panels (16.7%), and a curse from God (14.3%). More men (46.9%) than women (31.2%) ($p < 0.001$) said that cutting trees was the cause of climate change. A highly significant ($p = 0.003$) number of women said a curse from God was a cause. The other causes cited had no gender differences.

During key informants interviews and focus group discussions, prolonged droughts were the major problem caused by climate change. Women of Isingiro district believed that drought had led to the drying up of banana plantations, food shortages, and high food prices. The men argued that drought had caused young men to migrate to look for jobs, leaving young women and children to survive on their own. However, women in Kiruhura district reported that drought caused reduction of milk production, affecting the production of ghee. The male counterparts in Kiruhura district attributed lack of pasture and water, leading to cattle mobility due to drought. Climate change also increased crop and livestock diseases in Isingiro district and Kiruhura district, respectively. The forestry officer of Isingiro district reported that "*the situation of climate change in Isingiro was worsening every other day, seasons had changed, the weather was no longer predictable and eucalyptus trees had dried up."*

The climate change effects identified are shown in Table 3. Overall, the major observed ecological effect of climate change was drought (39%, $p < 0.001$), followed by seasonal shifts of crop growing season (21.9%, $p = 0.01$), increase in crop diseases and pests (13.5%), and soil erosion (11.3%). Men were highly significantly more likely to identify soil erosion as an effect, as compared to women (18.4% vs 4.4%, $p = 0.0001$). Men who responded in Kiruhura district believe (mean ranking score of 2) that climate change caused prolonged drought, livestock deaths, soil erosion, a shift in crop growing seasons, and strong winds. The rest

of the respondents had moderate beliefs (mean ranking score of 1) about the effects of climate change.

Table 4 Gender Differences in the Ecological Effects of Climate Change

Climate Variability	Isingiro (n=158)			Kiruhura (n=237)			Overall (n=395)		
	Men (n=74)	Women (n=84)	*p* Value	Men (n=121)	Women (n=116)	*p* Value	Men (n=195)	Women (n=200)	*p* Value
Drought	33	35	0.79	28.7	22	0.24	30.3	27.4	0.56
Shift in seasonal crop growing patterns	23.5	23.7	0.98	21.2	20.3	0.86	22	21.7	0.94
Flash floods	0.5	1.2	0.64	0.3	4.3	0.04	0.4	3	0.05
Strong winds	6.2	12.5	0.18	6.9	9.2	0.52	6.6	10.6	0.16
Heavy rains	2.9	3.7	0.78	0.3	1.9	0.24	1.3	2.7	0.32
Soil erosion	17.7	5	0.01	18.9	4	0.000 4	18.4	4.4	0.0001
Increase in crop pests/diseases	3.8	14.4	0.02	16.7	15.8	0.85	11.8	15.2	0.32
Increase in livestock parasites/diseases	2.4	1.9	0.83	3.1	10.5	0.02	2.9	6.9	0.07
Livestock death	0.5	2.5	0.31	2.9	9.9	0.03	2	6.8	0.02
Others	9.5	0	0.004	0.9	2.1	0.45	4.2	1.2	0.07

Men and women's responses to the livelihood effects caused by climate change are as shown in Table 4. Overall, the major livelihood effects ($p < 0.001$) were famine (26.6%), loss of crops (21.6%), loss of income (21.4%), followed by water crisis (15.1%), and school dropouts (7.4%). There was no significant difference in gender responses to the effect of climate change on livelihood.

The key informant interviews and focus group discussions revealed that reduced income, loss of crops and livestock, famine, and water crisis were the major effects of climate variability in all the districts. Women reported they suffered more with the water crisis by facing a heavier load on their reproductive roles. According to children in Isingiro, school attendance was affected, which eventually led to school dropouts. A women-focused group discussion in Isingiro revealed that children could not be sent to school on empty stomachs, because of cases of hungry children stealing packed food from other children.

Respondents reported that climate change is real, and, if not dealt with, there would be loss of livelihoods. All communities thought they were failing to adapt. Agro-pastoral communities had been forced to migrate in search of water and pasture for their livestock. Salvage sales of cattle were rushed to avert the disaster of

the cattle dying. The responses by communities to climate change are as shown in Table 5.

Table 5 Livelihood Effects of Climate Change

Effects of climate on gender	Isingiro (n=158)			Kiruhura (n=237)			Overall (n=395)		
	Men (n=74)	Women (n=84)	*p* Value	Men (n=121)	Women (n=116)	*p* Value	Men (n=195)	Women (n=200)	*p* Value
Water crisis	8.3	14.0	0.26	18.6	19.4	0.86	13.5	16.7	0.38
Famine	22.2	23.3	0.87	32.2	29.0	0.59	27.2	26.1	0.81
Loss of crops	19.4	25.6	0.35	18.6	22.6	0.45	19.0	24.1	0.22
Reduced income	30.6	18.6	0.08	16.9	19.4	0.62	23.8	19.0	0.25
Loss of livestock	0.0	2.3	0.19	3.4	0.0	0.05	1.7	1.2	0.68
School dropouts	16.7	11.6	0.36	0.0	1.6	0.16	8.3	6.6	0.52
Male head migration	2.8	0	0.12	0.0	1.6	0.16	1.4	0.8	0.57
Reduced milk production	0	2.3	0.19	3.4	1.6	0.38	1.7	2.0	0.83
Diseases	0	2.3	0.19	1.7	3.2	0.45	0.8	2.8	0.14
Family disputes	0	0		3.4	1.6	0.38	1.7	0.8	0.42
Unemployment	0	0		1.7	0	0.16	0.8	0	0.21

There were no gender differences in strategies to address climate change effects. However, among the male-headed households in Isingiro district, men who were landless migrated in search for pasture and encroached on the park to access water (25%), changed their working schedules (25%) in search of alternative sources of income, and reduced the meals consumed per day (25%). Female-headed households (n = 18) who owned land migrated in search of pasture, while landless women (n = 33) opted for alternative sources of income and sold their produce at low prices to traders. There were also salvage sales of livestock among female-headed households, of which 50% were landless women.

Among the male-headed households in Kiruhura district, 33% of men who were landless encroached on LMNP for pasture, salvage sold their livestock, changed work schedules, and encroached on the park for water. However, 29% of men who owned land also encroached on the national park for pasture for their livestock during drought. Among the female-headed households, 50% who were landless coped by reducing the number of meals per day and attending fewer social events. In addition, 67% of women changed their work schedules for survival during the drought seasons.

Table 6 Responses to the Effects of Climate Change

Coping Mechanisms	Isingiro (n=158)		Kiruhura (n=237)		Overall (n=395)		
	Men (n=74)	Women (n=84)	Men (n=121)	Women (n=116)	Men (n=195)	Women (n=200)	*p* Value
Migration to look for pasture	11.2	11.1	11.2	11.3	11.2	11.2	1
Encroaching the park for pasture	11.2	11.1	11.2	11.0	11.2	11.1	0.97
Encroaching the park for water	11.0	11.1	11.2	10.7	11.1	10.9	0.95
Alternative sources of income	11.2	11.1	11.2	11.1	11.2	11.1	0.97
Negotiation of price with traders	11.2	11.1	11.2	11.1	11.2	11.1	0.97
Change of work schedules	11.2	11.1	11.1	11.2	11.1	11.2	0.97
Sale of livestock	11.0	11.0	11.0	11.2	11.1	11.1	1
Reduction of meals /day	11.0	11.1	11.0	11.3	11.1	11.2	0.97
Reduced participation in social events	10.9	11.1	10.9	11.1	10.9	11.1	0.95

Discussion

Men and women agreed there had been changes in climate and had predicted that if nothing was done, climate would deteriorate. The meteorological data (Figure 1) showed that there was rainfall variability, which showed cyclic droughts every 9-10 years. Drought occurred in 1986-1988, 1995-1996, 2006-2007 and 2015-2016. A similar finding was observed by Ocaido et al., (1999b). However, there was 0.5ºC increase of maximum temperature experienced from 2004-2016. This indicated that there was atmospheric warming occurring within the area, despite the global efforts to reduce present global temperature by 2.5 ºC to pre-industrial temperatures (UNDP, 2009 & IPCC, 2013). Similar observations were made in areas with the same eco-climate in Tanzania (Swai et al., 2012) and in Malawi (Singini et al., 2015) and, elsewhere in the world, global warming has been observed (Wei et al., 2014; UNDP, 2009; Abound, 2011; IPCC, 2013; Garai, 2016).

The major cause of climate change was perceived by a moderate number of respondents to be cutting of trees. However, overall, there was a gender disparity with more men (46.9%) than women (31.2%) emphasizing it as a major cause of climate change (Table 3). A similar gender disparity was seen in Kiruhura district. Trees were being cut for charcoal burning as a source of fuel for cooking and clearing land for crop cultivation. In Kiruhura, men were cutting trees for charcoal making. This explains why men were more aware of the effects of this activity on the environment.

Similar observations had been made in Malawi (Singini et al., 2015) and in Tanzania (Swai et al., 2012). Like elsewhere in sub Saharan-Africa, the study communities were the poor, who relied on wood fuel for cooking (Swai et al. 2012; Singini et al 2015). They could not afford alternative clean sources of energy for cooking. Charcoal burning and cooking with wood fuel increase carbon dioxide emissions, hence, contributing to the green-house effect increasing atmospheric temperatures. Neither men nor women knew that increased carbon dioxide emissions caused climate change. Therefore, men and women in the two districts needed to be educated about the true causes of climate change to which their activities contributed.

In Kiruhura district, tree cutting was being done to clear land for crop growing. Originally, this district was a rangeland for livestock, but crop farmers from the neighboring overpopulated districts invaded it. In Isingiro district, trees were cut by refugees in the low-lying marginal areas and wetlands for crop cultivation. Cutting trees reduces plant biomass, which plays a vital role as a carbon dioxide sink by absorbing atmospheric carbon dioxide hence increasing greenhouse effect (UNDP 2009; IPCC, 2013). Men and women in both districts need to be educated about the benefits of afforestation with indigenous and multiple-use, quick maturing tree species for wood fuel and to act as carbon dioxide sinks to avert adverse effects of global warming.

The second perceived cause of climate change was draining of swamps for crop and livestock production and planting of trees. In both districts, there was no gender disparity on this issue (Table 3). Additionally, with no gender disparity, the communities falsely believed that climate change was caused by the use of solar panels. They explained that all the changes in climate were observed when a number of solar panels were installed in their community. They believed that the solar panels drew the sun closer to earth, which led to increased temperatures. On the contrary, to avert climate change the use of solar panels is needed as alternative sources of clean energy to replace fossil fuels (UNDP, 2009; IPCC, 2013). In Kiruhura district, there was a gender disparity with more women wrongly perceiving that climate change was caused by a curse from God. From what was observed, men were apparently more enlightened about the causes of climate change than women. However, Kiruhura and Isingiro districts, both genders had little knowledge of the causes of climate change, and this gap needed to be urgently addressed.

According to qualitative investigations and the results of questionnaires (Table 4), prolonged droughts were the major effect of climate change. This observation was in agreement with what has been observed elsewhere (UNDP, 2009; Abound, 2011; IPCC, 2013; Garai, 2016). Long dry spells brought decreased crop yields and livestock production, leading to a famine that resulted in reduced household incomes. In addition, there was a water crisis for domestic use and watering of livestock. These observations were in agreement with what was found within the study area (see Table 5) and elsewhere in Tanzania (Swai et al., 2012) and Malawi (Singini et al., 2015). There were no gender-based perception differences exhibited on the mentioned effects of climate change among communities around LMNP. This was because both men and women, whether crop or livestock farmers, were equally affected by the negative effects of climate change. This finding concurs with an earlier report by Guloba (2014) in Uganda.

Another ecologically significant effect of climate change reported was a shift in crop growing seasons (Table 4). This was due to unpredictable rainfall patterns with short crop and pasture growing periods. These led to massive crop and pasture growth failures. This was observed elsewhere (UNDP 2009; Swai et al., 2012; IPCC, 2013; Singini et al., 2015). It was also noted that climate variability led to an increase in children school dropouts. There were significantly more school dropouts in Isingiro (crop farmers) than in Kiruhura (livestock keepers) with no gender difference on perception on this issue (Table 4). This could be due to lack of money for school fees among crop farmers in Isingiro, as compared to livestock keepers in Kiruhura (Ocaido et al., 2009a; Ademun et al., 2012; UBOS, 2014). Furthermore, during these periods, there was famine, so children could not be sent to school when they were hungry.

The communities also reported soil erosion to be a significant ecological effect of climate variability with a gender disparity in their responses. Significantly, more men than women identified this as an effect of climate change (Table 4). This gender difference in response could be due to primarily owning land, participating in livestock grazing and cutting of trees for charcoal burning and crop cultivation. Men could more easily notice degradation on their land, as compared to women. Vegetation clearing, over-cultivation, and overgrazing increased soil erosion in the study area, leaving the bare ground to be washed by water runoff during the rainy season.

It was also reported that climate variability was increasing incidences of crop diseases and pests (Table 4). There was gender

disparity, with significantly more women in Isingiro district (crop growing) reporting this to be the impact. This could be because women tend crops than men. Women also suffered more stress and anxiety than men when there was crop failure, since women's main role was to avail cooked food to feed the households (UN-HABITAT, 2009).

There were no significant differences in gender responses identifying coping mechanisms to deal with the effects of climate (See Table 6). There were no salient climate changes coping strategies adopted. This finding concurs with earlier reports that Uganda had minimal climate change adaptation strategies and capacity (Berman et al., 2013; FAO, 2008; UNAPA, 2007; Goluba, 2014). At low levels, they coped by migrating to the neighboring districts and LMNP in search of pasture and water, finding alternative sources of income, by salvage sales of their cattle, and eating fewer meals per day.

The landless and women were most affected and, so, had to find methods of coping with climate change. They had to reduce the number of meals eaten, to one meal per day. This observation was similar to what has been observed elsewhere (Swai et al. 2012; IPCC, 2013; Goluba, 2014; Singini et al., 2015). This could cause child malnutrition and death in severe cases (Deressa et al., 2011).

There were salvage sales of cattle at low prices because the cattle risked dying of starvation, and households needed to raise income for buying food. Earlier on, Ocaido et al., (2009b) reported that 16.1% loss of household incomes due to salvage live-cattle sales in Kiruhura district, while the price of grain increased substantially. Subsequently, more cattle were sold to meet urgent household food demands causing a reduction of household cattle herd sizes. During periods of water stress, women-headed households suffered most (FAO, 2008; Ayesha, 2015), as they had to provide water for both domestic human and livestock use. All the landless in Isingiro district and about 30% in Kiruhura cattle keepers invaded Lake Mburo National Park for water and pasture. The park management had designated corridors and issued permits for cattle herders to access these park resources (UWA, 2015). Elsewhere the rural communities facing adverse effects of climate change were depending on natural resources in forests, water bodies and swamps for alternative livelihoods (Swai et al. 2012; IPCC, 2013; Goluba, 2014; Singini et al., 2015). This caused conflict in the conservation of natural resources, in which over-dependency on their use could lead to biodiversity loss (IPCC, 2013). In Kiruhura district, the landless and those with small land holdings hired pasture and water

at a fee from ranchers who had large tracts of land and bigger water dams. The cattle keepers migrated to neighboring districts to search for pasture and water.

Both men and women in Isingiro district went for alternative sources of income for livelihoods. Women provided casual labour at farms of well-off community members, whereas young men migrated to neighboring towns to look for jobs, leaving behind the burden of providing for households to women. This has also been observed in Tanzania (Swai et al., 2012) and Malawi (Singini et al., 2015).

All the key informants (community experts) in both Kiruhura and Isingiro districts explained that human-induced activities were the major causes of climate change, which harmed on ecology and people's livelihoods. This is in-line with other research (González and Martin, 2007; IPCC, 2013; Karfakis et al., 2012 ; Rai and Gurung, 2005). The community experts were knowledgeable about climate change stress within their communities regardless of their gender.

Conclusions and Recommendations

Both men and women in communities around LMNP were aware that their climate had changed. However, the causes of climate change were not clear to them, with women being less enlightened. The informants identified the effects of climate change without gender differences. There were no significant sustainable climate change coping strategies adopted by the communities. Therefore, a multi-stakeholder comprehensive gender-sensitive program should be designed to educate the communities on how their practices contribute to climate change and how they can cope with the changes.

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