

## **Households' climate change adaptive capacity in the Lake Victoria Basin, Kenya**

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**Abstract :** A households' climate change adaptive (CCA) capacity simply refers to the household head's potential to effectively respond to climate change induced forcings. The households' adaptive capacity hinges on several factors. This paper reports the evaluation results of the households' CCA capacity in the Lake Victoria Basin (LVB), Kenya. The knowledge, attitude and practices (KAP) of households are said to be predictors of households' CCA capacity. There is evidence that over the past 30 years, a number of permanent streams in the LVB, Kenya, have dried up. Across sectional survey was conducted in Gwasi and Nyando areas within the LVB, Kenya. The level of education of respondents was 44.2% (n=523) primary, 35% high school and 20.8% diploma training and above. The level of awareness of CC was 62% and 94.6% among the male respondents in Gwasi and Nyando respectively. About 57.9% (n=523) stated that both human activities and natural changes are responsible for the CC. Approximately 27.2% (n=261) and 33.5 % (n=262) in Gwasi and Nyando respectively store roof catchment water. Approximately 35.3 % (n=261) and 22.2% (n=262) in Gwasi and Nyando respectively keep donkeys for water transport. These results reveals that the CCA was positively influenced by household heads' KAP

**Keywords:** *Households, adaptive capacity, climate change and variability.*

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### **I. INTRODUCTION**

Households' climate change adaptive capacity has been defined as the potential of the individuals to effectively respond to local climate variability and change [1]. Households' adaptive capacity processes involve formulating options and making decisions [2]. These processes are driven by several factors i.e. knowledge and information, asset base, innovation, institutions and flexible forward-looking decision-making [3]. Global climate change forcings are already having dramatic effects on rural household's sources of livelihood. The consequence of climate change and variability on households is manifested in the changing rainfall patterns and droughts in certain regions and floods in others [4]. Literature review reveals that majority of climate change adaptive assessments have focused largely on assets and capitals as indicators of household's adaptation capacity. However, asset-oriented approaches typically mask the role of knowledge and information in supporting adaptive capacity [5] In the Lake Victoria Basin for example, studies show that droughts have been more severe, frequent and prolonged in the last 30 years[6]. There is also evidence of dramatic fall in the level of Lake Victoria waters affecting the livelihood of the local riparian communities. Other studies also show that over the past 30 years, a number of streams in the LVB, Kenya, such as Obuso, Atoyien'go, Nyalbiego and Ombeyi which were previously permanent, have become seasonal [7]. The overall objective of this study therefore, was to assess the climate change adaptive capacity of households around the LVB, Kenya. The study specifically assessed the prevailing household's knowledge, perception and practices towards climate change in the LVB, Kenya:

### **II. MATERIALS AND METHODS**

This study was conducted in two regions within the LVB, Kenya, that is; Nyando Sub County in the north and Gwasi Sub County in the South (Figure 1). Nyando Sub-County has high agricultural potential but lies on flood plains. Approximately 750,000 persons reside within the Nyando Sub County [8]. Gwasi sub-county on the other hand suffers from frequent drought although the region is very popular with local livestock husbandry.

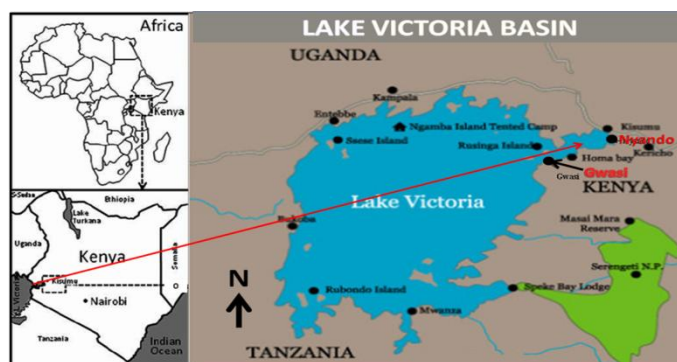


Figure 1: Map showing the study sites in the Lake Victoria basin, Kenya.

### Study design and data collection tools

A cross-sectional study was conducted in Gwasi and Nyando sub counties within The LVB, Kenya. Both quantitative and qualitative techniques were used to collect primary data on the knowledge, perception and practices of household's towards climate change and adaptation. A questionnaire tool containing semi-structured questions was administered on 523 randomly selected household heads in both Gwasi and Nyando. A systematic random sampling technique was applied to identify the respondents.

### III. RESULTS AND DISCUSSIONS

A total of five hundred and twenty three questionnaires (94.3%) were completed. There were 261 and 262 respondents in Gwasi and Nyando areas respectively. Out of the 523 household heads interviewed 393 (75.1%) were males and 130 (24.8 %) were females (Table 1).

Table 1. Households' survey response statistics.

Description	Gwasi			Nyando		
	Male	Female	Total	Male	Female	Total
Household heads contacted	209	55	264	188	76	264
Household interviews refused	3	0	3	1	1	2
Interviews successfully completed	206	55	261	187	75	262
n = 523						

The average age of the respondents was 33.4 (range 19 - 64) years old and a standard deviation of 7.6. About 44.2% had primary level education, 35% reached high school and certificate level training, 20.8% attained diploma education and above. Approximately 15.1% earned < KSh.1, 500, 28.6% earned between KSh.1, 501–4,500, 29.0% earned between KSh. 4,501–9,000 and 27.3% >KSh.9, 000 as summarized in table 2 below.

Table 2. General demographic information of the respondents

Demographic Variables	Gwasi		Nvando		Total	
	n	%	n	%	n	%
<b>Respondents' Gender</b>						
Males	206	78.9	187	73.4	393	75.1
Females	55	21	75	28.6	130	24.9
<b>Respondents' Age</b>						
19–29 years	68	26.0	89	40	157	30
30–49 years	118	45.2	75	42.7	193	36.9
≥50 years	75	28.7	98	37.4	173	33.0
<b>Respondents' Educational Level</b>						
≤ Primary school level	119	45.6	112	42.7	231	44.2
Secondary School	94	36.0	89	34.0	183	35.0
≥Diploma training	48	18.4	61	23.3	109	20.8
<b>Place of residence</b>						
Near market centre	57	21.8	64	24.4	121	23.1

Village	204	78.2	198	75.6	402	76.9
<b>Average monthly household income</b>						
< 1,500	78	29.8	52	22.2	130	15.1
1,501– 4,500	107	40.9	111	36.4	218	28.6
4,501– 9,000	66	25.3	26	26.9	92	29.0
> 9,001	10	3.8	73	14.5	83	27.3
<b>Juvenile's Health Status</b>						
Healthy	69	26.4	91	34.8	160	30.6
Fair	101	38.5	97	37.0	198	37.9
Poor	91	34.9	74	28.2	165	31.5

Households' general awareness towards the prevailing global climate change was assessed through a Yes or No answer. The level of awareness of global climate change was 62% (yes) and 94.6% (yes) among the male respondents in Gwasi and Nyando respectively. However, among the female respondents 53% (yes) and 92% (yes) respondents were in Gwasi and Nyando respectively as shown in table 3 below.

**Table 3.** Households' knowledge with regard to the global climate change phenomenon

Have you ever heard about the prevailing global "Climate change"?				
Response	Gwasi		Nyando	
	Male	Female	Male	Female
Yes	139	29	177	69
No	67	26	10	6
n = 523				

The respondents were asked to comment whether they believe that climate change is a reality. Households in Nyando area had a high level of knowledge about the reality of global climate change phenomenon than those in Gwasi. Table 4 below shows the summary of responses to the question "Is Climate Change phenomenon a reality?"

**Table 41.** Households' knowledge about the reality of global climate change phenomenon

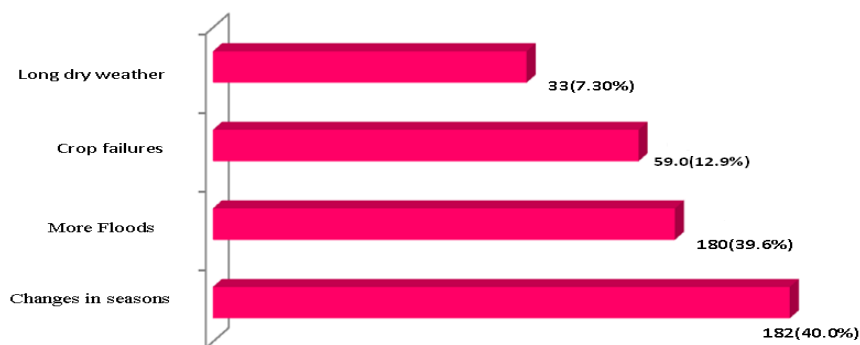
Is Climate Change phenomenon a reality?				
Response	Gwasi		Nyando	
	Male	Female	Male	Female
Yes	177	41	180	60
No	29	14	4	7
Don't know	0	0	3	8
Total	206	55	187	75
n = 516				

Approximately 34.4 % (180) and 34.8 % (182) men in Gwasi and Nyando respectively responded that they were very sure climate change was taking place in the LVB, Kenya (Table, 5). However, only 6.3 % (33) and 11.3 % (59) of women in Gwasi and Nyando respectively responded that they were very sure climate change was taking place

**Table 2.** Households' response to climate change happening in the LVB

How sure are you that climate change is happening in the LVB				
Response	Gwasi		Nyando	
	Male	Female	Male	Female
Very sure	180	33	182	59
Not sure	19	12	1	1
Don't know	7	10	4	15
n = 523				

Those who answered very sure to question (i) (n = 454) above were asked the question; what does "climate change" mean to you? ; Figure 2.



**Figure 2.** What climate change means to study participants?

About 39 % (n =523) of respondents said that climate change is caused by natural changes not human interference while 57.9% stated that both human activities and natural changes are responsible for climate change as shown in Table 6.

**Table 6.** Households' knowledge about the causes of climate change

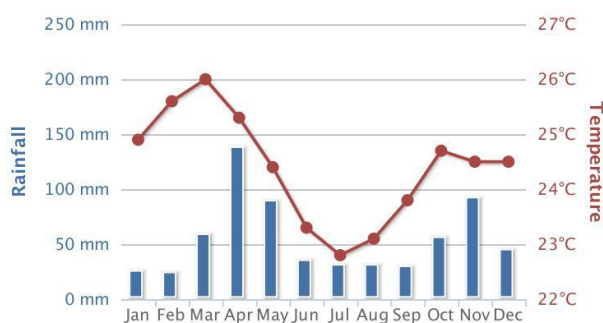
Assuming climate change is happening in the LVB, what do you think is causing it?				
Response	Gwasi		Nyando	
	Male	Female	Male	Female
Both human activities and natural changes	79	8	107	11
Natural changes and no human interference	122	47	70	64
Don't know	5	0	10	0
Total	206	55	187	75
n = 523				

The prevailing households' perception towards climate change in the LVB was assessed through a set of questions as shown below:

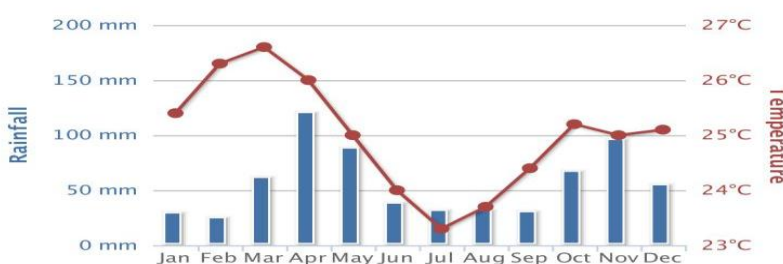
**Table 7:** In your opinion, do you think there have been changes overtime in the pattern of droughts and rain seasons in the LVB?

(iv).In your opinion, do you think there have been changes overtime in the pattern of droughts and rain seasons in the LVB?				
Response	Gwasi		Nyando	
	Male	Female	Male	Female
Yes	204	55	177	66
No	0	0	0	0
Don't know	2	0	10	9
Total	206	55	187	75
n = 523				

The household responses to the question whether there have been changes overtime in the pattern of droughts and rain seasons in the LVB were in agreement with meteorological data for the LVB, Kenya obtained from the Department of Meteorological Research Station, Kisumu (Figures 3 & 4). To understand the climate variation in the LVB, Kenya, monthly mean historical rainfall and temperature data were analysed to show the baseline climate and temperature seasonality by month, for the periods between 1960 - 1990 and the periods 1990 – 2012.



**Figure 3:** The 1960 - 1990 baseline climate and seasonality trend for LVB, Kenya (Data source: Meteorological department, Kisumu).



**Figure 4:** The 1990 – 2012 baseline climate and seasonality trend for LVB, Kenya (Data source: Meteorological department, Kisumu).

In order to understand the attitude of the residents towards climate change and variability, they were asked the question; Who, if any, do you think should be more concerned with climate change issues in the LVB? Their responses were summarized in tables 8 below. Majority of the respondents stated that the national government should take the lead in addressing challenges brought about by climate change in the LVB.

**Table 8.** Households' view of who should be more concerned with climate change problem

Response	Who, if any, do you think should be more concerned with climate change issues in the LVB?	
	Gwasi (Both male and female)	Nyando (Both male and female)
National government	251	250
County government	9	6
NGOs and CBOs	0	0
Religious organisations	0	0
Households and individuals	1	6
<b>Total</b>	<b>261</b>	<b>262</b>

n = 523

Households' practices towards climatic change and variability forcings in the LVB were assessed by asking the participants the question "How does the community cope with severe climatic conditions"? The responses (Table 9) show that 27.2% (n=261) and 33.5% (n=262) in Gwasi and Nyando respectively, harvest rain water in big tanks and store. In Gwasi 35.3% (n=261) and 22.2% (n=262) in Nyando respectively use donkeys to carry water and firewood while 34.9% (n=261) in Gwasi and 43.1% (n=262) in Nyando use river or Lake water during drought. None of the residents of Gwasi migrate during floods, However, in Nyando 11.1% (n=261) reported that they migrate during floods. However, 2.7% (n=261) in Gwasi stated that they do nothing specific during severe climatic conditions.

**Table 3.** Households' coping practices towards severe climatic conditions.

(viii).How does the community cope with severe climatic conditions.		
Responses	Gwasi	Nyando
Harvest rain water in big tanks and store	71	88
Use Donkeys to carry water and firewood	92	32
Use river or Lake water during drought	91	113
Migrate during floods	0	29
Do nothing specific	7	0
Total	261	262
n = 523		

Source: Cross sectional survey by author.

Table 10 below shows the types of animals kept in Gwasi area. The table reveals that 99.2% (n =523) of the study respondents keep at least one local chicken. A bout 88.6% of the respondents own at least one local goat while 80.8% of the respondents had at least one cow. Other domestic animals are kept by less than 36% (n=523) of the study participants i.e sheep (35.6%), donkeys (16.8 %) with pigs at 12.3% and ducks 7.3%.

**Table 10.** Types of livestock kept by households in Gwasi and Nyando

Type of livestock Kept	No. of households owning livestock	Percentage	No. of households without livestock	Percentage
Local chicken	259	99.2%	3	1.1%
Goat	221	84.6%	40	15.3%
Cow	211	80.8%	50	19.1%
Sheep	93	35.6%	168	64.3 %
Donkeys	44	16.8%	217	83.1%
Pig	32	12.3%	229	87.7%
Ducks	19	7.3%	242	92.7%
n = 261				

#### IV. CONCLUSION AND RECOMMENDATIONS

The study assessed the prevailing knowledge, perception and practices of households in the LVB, Kenya and their adaptive capacity. The study revealed that the respondents generally had good knowledge of climate change and variation. There was agreement across the study sites that the climate in the LVB, Kenya has changed overtime. However, the average monthly income of the surveyed households was generally low. The residents in the study sites have various adaptive practices ranging from water conservation to livestock husbandry. The households' heads held the view that the government should take the lead in addressing the challenges brought about by climate change. It is noticeable that the households' CCA capacity is dictated to a large extent by their KAP in addition to the socio-economic factors. It is therefore recommended that any future CCA programmes should be supported both financially and technically in view of the low average monthly household income in the LVB, Kenya. It is also recommended that more surveys be carried out to assess the general impact of CCA on the residents around the LVB, Kenya especially, community livelihood.

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