

Influence of Emerging Economic Interests on Management of Resource Access in Awoja Watershed

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ABSTRACT---- *This study presents the contextual circumstances that define access in Awoja watershed, particularly the constellations of means, relations, and processes that enable various actors to derive benefits from resources in the Watershed. The objective of the study was to identify the influence of emerging economic interests on managing the access to resources in the watershed, thereby linking resource exploitation to watershed degradation. The study was carried out in Soroti, Katakwi and Amuria the hot spots of draughts and floods and the increasing degradation in Awoja. A cross sectional study design using both qualitative and quantitative data collection methods was employed. Factor Analysis and a Logistics Regression Model were used to analyze household survey data gathered from 180 randomly selected households. Focus Group Discussions and key informants' interviews were also used to generate qualitative data used to explain relationships among variables and to analyze local perceptions on the relationships. From the factor analysis seven factors were perceived to have been linked to management of access to watershed resources of which four factors were significantly correlated: Increasing interests in watershed resources ($r=0.425$ $P<0.001$), stakeholder conflicts of interests ($r=0.379$ $P<0.01$), changes in economic trends in the watershed ($r=0.482$ $P<0,001$), and household wealth status ($r=0.253$ $P<0.01$). From the Logistical Regression results, increasing interests in the wetlands had significant negative influence on control of access to watershed resources. While changes in household needs, household wealth status and civil society interests in the watershed had increasing influence on watershed management the rest of the factors had a decreasing influence on watershed management. From focus group discussions and Key Informants Interviews revealed that commoditization rice and charcoal, fuzzy environmental protection rules and elite capture by watershed management institutions were some of the main emerging practices linked escalating degradation in Awoja. Dye to the increasing economic interests by communities and local leaders in Awoja watershed resources, reducing both degradation and marginalization of within the watershed can only be possible if a diversification program with alternative livelihoods are introduced within the watershed.*

Keywords--- Economic Interests, Watershed MAnagement, Climate Change

1. INTRODUCTION

The study of economic interests in watershed management involves the understanding of access and utilization of resources within the watershed. Access is defined as “the ability to derive benefits from things,” broadening from property’s classical definition as “the right to benefit from things” (Ribot and Peluso, 2003). The unleashing of humanity’s productive energies has created a world of unparalleled and unequal consumption that has left a trail of resource depletion, land degradation, environmental pollution and species extinction that has led to shifting of political, social and economic interests (IJNEP 2014). Different watersheds have differing challenges based on the contextual factors facing sustainable management of the watershed. Roder (2002) noted different challenges facing different watersheds. The local communities living in the watersheds are the key stakeholders whose activities impact and are being impacted on by changes taking place in the watersheds especially in view of climate change (Kaltenborn, 2010). Gordon, (2004) noted that community livelihood strategies are inextricably linked to the surrounding watershed resources, without controlling their participation especially in the exploitation of resources, any effort or investment in watershed management will not be able to achieve the desired outcome.

Despite the above, past efforts in watershed management was limited to watershed delineation, which sets an aerial context for rural development activities rather than tackling real watershed problems Ffolliott, (2002). Watershed management often gets caught into the dichotomy of economic development and environment, and well-conceived participatory, integrated watershed management is often constrained by the ambiguity between conservation and development (Karma, 2011). In most cases both conservation and poverty alleviation ambitions are emphasized at the same time (Tennyson and Zingari, 2006), making the actual and political linkages between land and water management and poverty very complex (Swallow *et al.*, 2006). Sustainable use of watershed resources will only be achieved by adopting an integrated approach that recognizes the mutually dependent interaction of various basic elements of a

watershed system, with the direct involvement and participation of the different actors and stakeholders in the exploitation of the watershed resources.

In Uganda there has been an increasing trend of economic activities in wetlands where; by the year 2000, up to 2,376.4km² of wetland area had been reclaimed for agricultural, industrial and related activities (NEMA 2000). This is exacerbated by the high annual population growth rate of 3.3% (UBOS, 2002), and pressure from industrial construction. The underlying cause of rapid land use changes appears to be the insatiable desire of both the rich and the poor to derive livelihood from the wetlands. The communities that access these wetlands and their adjacent catchment areas use them for agriculture and extraction of various raw materials, fishing, charcoal and all forms of cultivation.

While the high rate of depletion in Awoja watershed could be linked to climate change, little is known about the underlying economic interests that could be fueling this degradation. For long, Awoja watershed had been a breeding ground for different indigenous fish species, and birds that were reportedly depleted in and along various other lakes of Uganda. Even in the dry season the ecosystem maintained a steady water discharge providing water for both domestic use and livestock production. The wetland also served as a rich source of fish for subsistence and commercial, fish catch and as a means of transport to the surrounding districts using canoes (Nature Uganda 2005). One major reason of increased human activity in Awoja has been increased human settlements amid the dominant wooded savannah and cultivated gardens (Amaniga Ruhanga and Iyango, 2010). The area has also become a home to migrant cattle farmers in search of lush pastures in what is considered communal grazing lands (Egeru and Majaliwa 2009; DSOER 2004). Competition for the communal grazing land seemed to have intensified (Amaniga Ruhanga and Iyango, 2010) and there has been an influx of farmers moving their farming activities to the lowlands closer to the Gweri wetland especially during the long drought seasons for moisture pasture and fertile lands.

This study set to unravel the emerging economic interests escalating the degradation of the Awoja watershed, a host to one of the major Ramsar sites in Uganda.

2. MATERIALS AND METHODS

2.1 Area of Study

The research was conducted in areas bordering the main water bodies/swamps that constitute Awoja wetlands system. It covered areas adjacent to Lake Opeta and Lake Bisina Complex in Soroti and Katakwi districts as well as lowlands of Amuria District where communities experience considerable climatic variations. The soils are mainly sandy loam with variation from sandy to loamy soils depending on the terrain.

2.2 Research design

A cross sectional survey research design was applied where both the qualitative and quantitative approaches were used. The aim of the study was to generate information on watershed management particularly how the complex interrelationships between actors and their institutions at multiple levels of influences in resource management decisions.

2.3 Study Population

Households within the watershed and the local governance institutions: formal and informal; in Awoja watershed, particularly those involved in the implementation of climate change adaptation activities were mainly targeted. Communities in the areas adjacent to the wetlands systems that constitute the Awoja basin were directly targeted. The Local council committee members were also involved in the study. Household heads were the main target group and the study ensured that households near the wetland were included. Focus Group Discussions were held with participants from the uplands and those near the wetland for purposes of generating varying views for comparative analysis.

2.4 Sample Selection

The districts of Soroti, Katakwi and Amuria were selected due to their proximity to Awoja river basin and their exposure to floods and draughts. The sub counties of Gweri in Soroti, Magoro in Katakwi District and Wera in Amuria District were purposively selected due to their exposure to draughts and floods and due to their participation in demarcation of wetlands exercise carried out by the National Environment Management Authority (NEMA) working with the district local governments in the region. Purposive selection is highly supported by Gay (1996) and applies where the researcher is interested in understanding certain specific variables within the study area.

2.5 Selection of respondents

For quantitative data, systematic random sampling (involving randomly selecting the first household at random with the subsequent households selected at an interval) was used to select a total of 180 household respondents.

To arrive at this number, the following formula adopted from Winters et al (2010)

$$N = \frac{4\delta^2 (Z_\alpha + Z_\beta)^2}{D^2}$$

Where

δ =Variance of the outcome variable for the sample population

Z_α = the confidence level (1.96 or 95% confidence level)

Z_β =the statistical power (1.28 or 80% confidence level)

D=the influence on the outcome variable (watershed management)

For the Household Survey, following a systematic sampling method, 32 household respondents were selected in Omugenya, Village while 28 were selected in Omusia village in Gweri Sub County. In Magoro Sub County, Angisa Parish was selected and two villages; Apopong village was selected from which 31 households were selected. The other village; Angaro was also selected and 29 households were selected to participate in the study. In Amuria; Wera Sub County was selected from which two villages were selected in Wera Parish. These villages are Morungatuny from which 30 households were selected and Okile Villages where 30 households were selected. This made a total of 180 households that participated in the study. One FGD was conducted from each village comprising between 8-12 respondents.

For qualitative data Snowballing technique was used to select Key informants. The use of snowball sampling to compose relevant respondents is supported by Ahuja, (2001) who notes that it is a most appropriate approach for gathering information among participants involved in similar activities. The interviews and Focus Group Discussions (FGDs) were meant to analyze community dynamics and provide an understanding of underlying economic interest issues in watershed management.

3. INSTRUMENTATION

3.1 Household survey Questionnaire.

Data from qualitative study was used to focus the design of household survey questionnaire. The aim of the quantitative survey was firstly, to measure the influence of political, economic and social drivers on watershed management. Secondly the survey also determined the social and economic status of communities in Awoja (livelihoods assets, education). A model that allowed the prediction of how economic factors influence management decisions was generated as observed in the subsequent chapters.

3.2 Documents Review

Literature was gathered on legal, policy, administrative and implementation frameworks related to natural resource management at local government levels. The study also reviewed relevant information and other studies from various sources. Some of the documents reviewed included: The National Climate Change Policy (NCCP, 2012), the Local Government Act (1997), The Decentralization Policy, Wetlands Protection Act, Development Plans, Annual Budgets, Monitoring and Evaluation Reports and many others.

3.4 Key Informants Interview Checklist/Expert Interviews

Primary data used to evaluate the policy framing development and implementation including the key design principles governing natural resource management was collected. The KII tools were also used to measure variations between policy frameworks and real governance practices of natural resource management in a changing climate and influence of stakeholders on institutional practice.

Interviews with civic leaders and leaders of NGOs involved in adaptation to climate change were carried out to achieve the above. Semi structured questionnaires were used to probe for details. Inputs from various stakeholders involved in the environmental protection. Information was also collected from CSOs and extra local institutions (members of Parish Development Committees and members of Disaster Risk Management Committees)

3.4 Focus Group Discussions

Focus Group Discussions were conducted in each sampled parish in the study area. Each parish level FGD had at least 8-12 people selected with the help of Local Government and NGO partners at the sub county. The study ensured that the key socioeconomic groups of women, youth and the elderly were involved. FGDs were meant to capture community perceptions on local participation in resource management as well as the social inclusiveness of policies, and institutions governing adaptation in the study area.

4. DATA ANALYSIS AND INTERPRETATION

4.1 Qualitative Data Analysis

Data collected was grouped into relevant themes in order to enable thematic analysis to be able to make inferences. The study was conducted in such a way that the data analysis was part of the data collection phase so that there were integration of data analysis at all stages. Reflexivity was employed in order to inwardly identify meanings of relationships emerging from the data collected in the field.

4.2 Quantitative data analysis

The data entry template was prepared using epidata (version 3.2). Data entered in epidata was exported to stata software (version 13.1) for cleaning and analysis. The data was then explored for normality by using Kolmogorow-Smirnov normality test and were normally distributed ($p > 0.05$), to decide on the probable statistics if relevant assumptions were met. Since the assumptions for parametric tests were met, the study utilized both descriptive and inferential statistics amenable to parametric analysis. Whereas descriptive statistics involved the use of central tendency (means), frequencies, proportions, standard deviation and variance; the inferential tests employed the use of Pearson r correlation to test the relationships between the main study variables and the nature thereof; as well as to test the hypotheses.

Although the bivariate relationships were examined, logistic regression analysis was performed to establish the influence of the independent variables (local political processes, economic interests, social cultural factors) on the dependent variable (management of the water shed). The study employed factor analysis to identify the independent factors explaining relationships amongst the main variables; factor analysis was performed to establish the strength of the different factors in the model.

The specific goals of factor analysis are to provide/reduce a large number of observed variables to smaller number of factors and to provide a regression equation for an underlying process by using observed variables (Tabachnick and Fidell, 2001; Keskin *et al.*, 2007). Factor scores can be derived such that they are nearly uncorrelated or orthogonal. Thus, using the coefficients can solve the problem for multicollinearity among the variables, which are used to estimate the management of the watershed.

Factor analysis are to determine the number of fundamental influences underlying a domain of variables, to quantify the extent to which each variable is associated with the factors and to obtain information about their nature from observing which factors contribute to performance, on which variables (Tinsley and Brown, 2000). This allows numerous inter-correlated variables to be condensed into fewer dimensions, called factors.

In this study, factor analysis was performed for a set of parameters that described both the dependent variable (management of the watershed) and the independent variables (local political processes, social issues, economic interests, and climate change). The correlation matrix of variables was used to obtain Eigen values. In order to facilitate interpretation of factor loadings (l_{ik}), VARIMAX rotation was used. Factor coefficients (c_{ik}) were used to obtain factor scores for selected factor (Keskin *et al.*, 2007). The factor number equals the number of Eigen values of the population correlation matrix that are greater than unity (Tinsley and Brown, 2000). Therefore, the factors with Eigen values > 1 were employed in regression analysis (Sharma, 1996).

Average values for Eigen values > 1 for each independent factor were obtained and regressed against the dependent variable.

5. RESULTS

5.1 Background characteristics

Age: Of the 180 respondents who took part in this study the youngest was 20 years while the oldest was 75 years. Respondents had an average age of $49 \pm 12.32SD$

The findings show that a greater percentage of the respondent (64.3%) were above 45 years while close to equal proportions of the respondents 18.3% and 17.2% were 20 to 35 years and 36 to 45 years respectively. Most participants in this study were therefore elderly while the youth constituted only 18%.

Sex: More than half of the respondents (66.7%) were male while 33.3% were female.

Occupation: More than three quarters of the respondents (86.5%) were peasant farmers with less than 10% (5.3% and 8.2%) being civil servants and traders respectively.

Education level: close to half of the respondents (58.7%) had attained primary level of education while a substantive percentage (31.3%) had attained secondary level of education. Only 0.6% of the respondents reported to have attained tertiary level of education while 9.5% had not attained any education. Details are given in Table 6.1

Land ownership and Number of acres of land owned: close to all the respondents (98.9%) have land in Awoja either inform of rented, leasehold, customary or freehold. Only 1% of the respondents do not own any land. The numbers of acres vary from respondent to respondents. The findings show that close to equal proportions 27.5% and 29.2% own 1-2 acres and 2-5 acres respectively. Equal proportions of the respondents (12.4%) own 5-10 acres and 10-20 acres respectively. Less than a quarter of the respondents (18.5%) own less than 1 acre of land. No respondent owns 20 or more acres of land. Details are presented in table xx below.

Table 6.1 Socio Economic Characteristics of respondents

Social characteristics (n=180)	Frequency	Percentage (%)
Sex of respondents		
Male	120	66.7
Female	60	33.3
Age category of respondents:		
20-35	33	18.3
36-45	31	17.2
Above 45	116	64.3
Occupation:		
Peasant/Farmer	148	86.5
Civil servant/Government worker	9	5.3
Trader/business person	14	8.2
Education level:		
None	17	9.5
Primary	105	58.7
Secondary	56	31.3
Tertiary	1	0.6
Household Ownership of land:		
(Rented, leasehold, customary)	176	98.9
Don't own anything	2	1.1
Number of acres owned:		
Less than 1 acres	33	18.5
1-2 acres	49	27.5
2-5 acres	52	29.2
5-10 acres	22	12.4
10-20 acres	22	12.4
20 acres or more	0	0.0

5.2 Factor analysis for Economic interest factors

Factor analysis was used to analyze 17 items that describe economic interest. The analysis using principle component factor analysis with Varimax (orthogonal) rotation yielded seven factors explaining a total of 79.6% of the variance for all the items. Principle component analysis was used because the primary purpose was to identify and compute composite factors underlying economic interests. The factors explained 14.9%, 14.7%, 12.7%, 11.8%, 10%, 8.1% and 7.7% of the variance respectively. Factor one based on high factor loadings of the variables; rating of the current status of the watershed, how economic interests have affected working of the staff was labeled “Increasing interests in watershed resources”.

Table 6.2: Factor loadings with communalities based on principle component analysis with rotated factor loadings for economic interests

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Uniqueness
Factor	0.1520	-0.3556	-0.1414	0.3426	0.0514	-0.0521	0.1678	0.3462
Rate	0.8042	-0.3181	0.3157	0.1324	0.0489	0.1942	-0.0211	0.0943
Coping	0.0076	-0.2639	0.0526	0.0053	0.2366	0.8296	-0.0633	0.1793
Chngasse	-0.0559	0.0606	-0.0589	0.1183	0.8379	0.0114	0.1416	0.1093
Chngnee	-0.8473	-0.0382	0.8688	0.1307	0.0233	0.2308	-0.2254	0.1586
Loclgov	-0.1796	0.1425	-0.7715	0.1172	-0.1322	-0.1727	0.0376	0.2898
Business	0.1240	0.8499	-0.2558	0.0226	0.0785	-0.2301	-0.0041	0.1372
Civilsoc	-0.1213	-0.0589	0.2428	-0.0333	-0.0617	0.9071	-0.0116	0.0950
Demand1	-0.1718	0.1337	-0.3529	0.0026	0.4775	0.1582	-0.0119	0.2143
Increase	0.6692	0.1463	0.2716	0.2279	0.3941	0.2507	-0.0247	0.1862
Economic	-0.1690	-0.3415	0.1607	0.9269	0.3818	-0.4563	-0.2354	0.4024
Benefit	-0.2546	0.6152	0.3781	-0.6735	0.0172	0.1921	0.2673	0.2121
Losers	0.1932	0.0486	0.0427	-0.0726	-0.0970	-0.1009	-0.0378	0.1792
Negative	0.3710	-0.1440	-0.2690	0.5761	-0.1434	0.3535	-0.0281	0.2911
Mgtopi0	-0.1131	-0.1395	-0.0422	0.0917	0.5796	-0.1767	-0.0565	0.2211
Affected	0.5433	0.2285	-0.2939	0.3121	0.0123	0.0511	-0.5278	0.1875
Aspects1	0.1512	0.0186	-0.0966	0.1131	0.0728	-0.0218	0.8898	0.1572
Eigen values	3.31090	2.75303	2.29928	1.70819	1.30148	1.16508	1.00132	
Variance	2.52985	2.49739	2.13915	2.00194	1.69188	1.37068	1.30839	
Proportion of variance	0.1488	0.1469	0.1258	0.1178	0.0995	0.0806	0.0770	
Cumulative	0.1488	0.2957	0.4216	0.5393	0.6388	0.7195	0.7964	

LR test: independent vs. saturated: $\chi^2(136) = 635.01$ Prob> $\chi^2 = 0.0000$

Number of observations=71,

Retained factors=7

Method: principal-component factors

Rotation: orthogonal varimax (Kaiser off)

Factor two was labeled “stakeholder interest in the watershed due to high facto loadings of the variables; how business community benefits from the activities of the watershed and main beneficiaries in the watershed. Factor three was labeled “changes in household needs”. Factor four was labeled “changes in economic trends in the watershed”.

Table 6.3 Perception of the male and female respondents on the different economic interest factors

Economic interest factors	Male	Female	Total
<i>Factors for increasing interest in watershed resources</i>			
Increasing economic value of the wetlands	18 (15.0)	15 (25.0)	33 (18.3)
Lack of alternative economic enterprises	9 (7.5)	5 (8.3)	14 (7.9)
Government policy	41(34.2)	14 (23.3)	55 (30.6)
Population pressure on the land	38 (31.7)	23 (38.3)	61 (33.9)
Droughts	14 (11.7)	3 (5.0)	17 (9.4)
<i>Stakeholder conflicts of interest in the water shed</i>			
Community service	3 (2.6)	5 (9.6)	8 (4.8)
More information	4 (3.5)	7 (13.5)	11 (6.6)
Revenue from fines and license feed	31 (27.0)	16 (30.8)	47 (28.1)
Revenue through taxes	77 (67.0)	24 (46.1)	101 (60.5)
<i>Changes in household ability to meet essential needs</i>			
Averagely changed	48 (51.6)	28 (66.7)	76 (56.3)
Low change	44 (47.3)	14 (33.3)	58 (43.0)
No change	1 (1.1)	0 (0.0)	1 (0.7)
<i>Changes in economic trends in the watershed</i>			
Land is now expensive	2 (2.7)	1 (3.0)	3 (2.8)
People are getting poorer	42 (56.8)	22 (66.7)	64 (59.8)
People are getting richer because the own resources	6 (8.1)	2 (6.1)	8 (7.5)
People have average income levels	13 (17.6)	3 (9.1)	16 (15.0)
There is high population growth	2 (2.7)	1 (3.0)	3 (2.8)
Yields are too low	9 (12.2)	4 (12.1)	13 (12.1)
<i>Changes in household wealth status</i>			
Acquired basic household items	33 (29.5)	6 (11.5)	39 (23.8)
Acquired land	20 (17.9)	5 (9.6)	25 (15.2)
Acquired livestock	17 (15.2)	18 (34.6)	35 (21.3)
Bought bicycle/motorcycle	24 (21.4)	11 (21.2)	35 (21.3)
No change	18 (16.1)	12 (23.1)	30 (18.3)
<i>How civil society has benefited from the watershed</i>			
Access to information very easy	36(32.1)	16(34.0)	52(32.7)
Benefit inform of infrastructure	6 (5.4)	1 (2.1)	7 (4.4)
Easy access to labor (workers)	40(35.7)	9 (19.2)	49(30.8)
Easily get donations/funding for projects around the watershed	15 (13.4)	11 (23.4)	26 (16.4)
Learning about the community and the watershed	8 (7.1)	5 (10.6)	13 (8.2)
Tourism and linkages	3 (2.7)	5 (10.6)	8 (5.0)
None	4 (3.6)	0 (0.0)	4 (2.5)
<i>Increasing interests in the watershed resources</i>			
More access to information	6 (5.2)	9 (17.3)	15 (8.9)
More market	65 (56.0)	15 (28.9)	80 (47.6)
More produce obtained	33 (28.5)	22 (42.3)	55 (32.7)
More profit and income obtained	12 (10.3)	6 (11.5)	18 (10.7)

Factor five was labeled “changes in household wealth status”. Items loaded to factor six relate to how civil society benefits from activities in the watershed and was labeled “civil society benefits from the watershed” and factor seven was labeled “Aspects that have gone well in the allocation of resources in the watershed”

5.3 Relationship between economic interest, climate change and watershed management

The relationship between the independent variables (Economic interest factors, climate change factors) and the dependent variable (watershed Management) was tested using the Pearson Product Moment Correlation Coefficient. The results are presented in the following Tables.

Table 6.4 Pearson correlation of the relationship between economic interest, climate change and watershed management

VARIABLE		1	2	3
Watershed management (1)	Pearson correlation	1.000		
	Significance (2-tails)			
Economic interests (2)	Pearson correlation	0.507***	1.000	
	Significance (2-tails)	0.000		
Climate change factors (3)	Pearson correlation	-0.098	-0.082	1.000
	Significance (2-tails)	0.315	0.555	

*** implies sig at 0.001, ** implies sig at 0.01, , * implies sig at 0.05

Table 6.4 shows that there is a significant relationship between the economic interests and management of the watershed. ($r=0.507$, $P<0.001$). The results however indicated a negative relationship between watershed management and climate change factor. This was perceived by the respondents as having been caused by the economic rush for resources that occurs in a changing climate. This rush compromises appropriate watershed management initiatives and resource conservation becomes compromised as communities prioritize livelihoods reduction of vulnerability over environmental protection.

The results indicate that the overall relationship between economic interests and management of the watershed was significant. Table 6.5 shows the relationship between individual economic factors perceived by respondents as related to watershed management as shown by factor analysis results.

Table 6.5: Correlation between watershed management and the economic interest determinants

Economic interest factors	r	Sig
EE1-Increasing interests in the watershed resources	0.425***	0.000
EE2-Stakeholder conflicts of interests in watershed	0.379**	0.002
EE3-Changes in household needs	-0.095	0.441
EE4-changes in economic trends in the watershed	0.482***	0.000
EE5- household wealth status	0.253*	0.038
EE6-civic society interests in the watershed	-0.013	0.916
EE7-Aspects that have gone well in resource allocation	-0.051	0.667

Factors obtained after data reduction, factor analysis and factor loadings

*** implies sig at 0.001, ** implies sig at 0.01, * implies sig at 0.05

Table 6.5 shows that there was a significant relationship with a number of factors including factors promoting increasing interests in wetlands resources such as cultivation in wetlands and increased charcoal burning ($r=0.425$, $P<0.001$) changes in economic trends ($r=0.482$, $P<0.001$), Household wealth status ($r=0.253$, $P<0.05$) and stakeholder conflicts of interests ($r=0.379$, $P<0.01$).

The study further analyzed the influence of each of the factors on management of the watershed. This was achieved by using a logistic regression model as indicated in Table 6.6. The Logistic Regression model was used to show the extent to which each factor influenced watershed management as well as the direction of this influence whether increasing or decreasing. Factors with increasing influences were determined by Odds Ratios; $OR>1$ and those with decreasing influence had Odds ratios; $OR<1$.

Table 6.6: Logistic regression model of the economic factors and management of the watershed

EE1	.1668465	.1291935	0.021	.0365772	.7610694
EE2	.2320017	.1777332	0.057	.0516889	1.041321
EE3	4.263491	2.354122	0.009	1.444665	12.5824
EE4	.545403	.289301	0.253	.1928458	1.542499
EE5	1.891001	.870781	0.166	.7668749	4.662929
EE6	2.158344	1.008143	0.100	.864036	5.391497
EE7					

LR $\chi^2(24) = 52.93$, Prob > $\chi^2 = 0.0000$, Significant variables are bolded

Key: EE1-Increasing interests in the watershed resources, EE2-Stakeholder benefits in watershed, EE3-Changes in household needs, EE4-changes in economic trends in the watershed, EE5- household wealth status, EE6-civil society interests in the watershed

It can be observed from Table 6.6 that, factor EE1-Increasing interests in the wetlands and EE3-Changes in household needs had significant influence on watershed management. The rest of the factors did not influence watershed management significantly.

While factors EE3-Changes in household needs, EE5- household wealth status and EE6-civil society interests in the watershed had increasing influence on watershed management ($OR > 1$); the rest of the factors had a decreasing influence on watershed management ($OR < 1$).

The detailed analysis of the economic factors is presented under various themes below.

5.4 Increasing Interests in the Watershed Resources

Table 6.6 indicates that increasing interests in watershed resources (factor EE1) had significant decreasing influence on management of the watershed ($r = 0.1668465$, $P < 0.01$). This depicts the negative effects of this factor on management decisions.

From the household survey results some of the main reasons for increasing interests in the watershed were: increasing population pressure on land (33.9%), government policy particularly the promotion of rice cultivation by JICA project (30.6%), increasing economic value of wetland particularly during draughts (18%).

From qualitative interviews, participants also mentioned some of the main compounding factors for increasing interest in the watershed namely commoditization of rice cultivation, charcoal burning and firewood trade, elite capture of watershed management processes, fuzzy land property rights and competition among management institutions as some of the major factors linked to increasing interests in watershed resources as discussed below.

i) Commoditization and expanding markets

A probe of the circumstances driving commoditization of natural resources particularly rice production show that rice had become more marketable than any other crop in the area and was highly demanded by institutions such as schools and hospitals.

Increasing interests particularly in the wetlands have also been boosted by the government's promotion of upland rice through JICA, a Japanese agency that has been distributing seed to farmers and demonstrating how to grow upland rice. However, upland rice is not only being grown in the upland but in the swamp fringes due to poor soils in the uplands. In other words, rice was now grown both in the wetlands and on the fringes of the swamp, thereby increasing the exposure of riverbanks to erosion and worsening the problem of degradation. Moreover, upland rice has a higher level of productivity and a similar aroma to the paddy rice and has similar characteristics such as grain size and color. This allows the rice mills and traders to blend upland rice grown in the wetlands with lowland paddy rice and to sell it as pure paddy. As a result, community members have continued to encroach demarcated sections of the wetlands to grow rice. Another factor perceived by respondents to have increased interests in rice production has been the increasing population arising from the refugees of the recent insurgencies in the area who have also taken up rice production and consumption.

ii) Elite Capture of local public watershed management institutions

It was mentioned by Key Informants in all the three sample districts in the study area that members of local government committees were also directly involved in cultivating rice in the wetlands and selling charcoal and firewood. According to a local opinion leader, one of the reasons why local government institutions do not enforce environmental regulations is that they receive bribes from well-off rice cultivators and charcoal traders. Participants felt that increasing interests among the policy implementers was negatively affecting the efficacy of management interventions aimed at protecting environmental resources. Another complicating factor is political patronage, where local leaders protect some political supporters and fear taking action so as not to lose the support of the economic elite during next elections.

The study further examined how economic interests have affected the working of enforcement staff. The findings show different types of behavior exhibited by enforcement staff attributed to "bureaucrats", "politicians" and "community". Regarding the bureaucratic behavior, respondents said that the enforcement staff were usually bribed and compromised during implementation of rules governing resource use. It was revealed that the rich farmers especially the rice growers pay them money and continue using parts of the demarcated lowlands and forest reserves. This was further revealed

during interviews with the leaders in Gweri and Wera sub counties when they explained that environment officers were usually given money and compromised by encroachers. This has however brought challenges because people do not report cases since they know the cases will not be handled accordingly. In addition, it was revealed that enforcement staff favor relatives and friends to the extent that they are not usually punished when they are caught in wrong. One respondent in an interview at Omugenyia explained that,

Even when a person is reported to the environmental enforcement staff, he sleeps in the police cell for only one day or a few hours and in the morning he returns even without being prosecuted. This had created enmity amongst the community members and there was no meaning in reported cases of violation of environmental rules (Field interview, 11th May 2016)

It was reported in the interviews that lack of prosecutions was perpetrated by the problem of bribery where officers are given money or sectarianism where the officers do not want their relatives and friends to be prosecuted and they withdraw complaints by conniving with the police.

During the Key Informants interview one local leader in Omusia Parish revealed that he also had cows in the wetland and so could not adequately enforce the laws concerning wetland management. It was also revealed that local leaders were usually compromised in a number of ways including provision of gifts such as foodstuffs like chicken, crop harvests and many others. There has often resulted in inaction against encroachers.

Second behavior that was identified was that of the local or political leaders who lived amongst the community. It was revealed that instead of guiding the population on resource use, the politicians were just looking on because they feared to compromise their support from the population. It was revealed that in any case, they were also using the same prohibited resources. The situation hence was that both the bureaucrats and the political leadership had compromised their roles for different economic interests.

The third behavior of enforcement staff was the association of enforcement staff with the community. It was revealed by the local leaders that enforcement officers feared to create enmity amongst the population. This was because they are the people they stay with, help one another and cannot afford to have a problem with them. They donot want to confront the community members because of the mutual relationship and the assistance they receive from the community as members.

From the above findings, it can be deduced that economic interest are influencing the rationality for responses being undertaken by both the management institutions and community members. With these trends, some community members have become poorer while others have exploited the existing opportunities to become wealthier through irrational means such as rent seeking.

iii) Taking advantage of fuzzy land rules

Factor EE2- Stakeholder benefits from the watershed had a decreasing influence on resource protection with an Odds Ratio less than 1; ($r= 0.2320017$, $P<0.01$). From the qualitative data, Key Informants perceived that there was conflict of interests among watershed stakeholders arising from the benefits they derived from the watershed resources. Most stakeholders including rice-growers, cattle- herders, fishmongers, charcoal burners, women collecting firewood and thatching materials and others have varying interests and claim different forms of ownership and user rights. Moreover, there were also conflicts over ownership rights between cultural leaders and local government. It emerged that the cultural leaders have strong powers over the control and distribution of land resources. It was reported, for example, that, despite the existence of public laws, the people of Soroti, Katakwi and Amuria were applying their own traditional land regulations.

On ownership of communal land, especially the wetlands, it was revealed that despite existing rules, those who lived near the wetlands had the biggest control over them. In most areas in the watershed participants perceived that those close to the wetlands and forests actually owned them and could use them as much as they wished including selling them. This situation existed despite the existence of government laws concerning the use of wetlands. This has implications for who can access the wetlands for rice cultivation, because those living near them prevented other users, especially cattle-herders, from accessing them. However, it also emerged that in areas where demarcation had taken place, there was equal access to all members of the community except cultivators. Fuzziness does not necessarily mean that users do not understand the existing agreements, but fuzziness challenges the status quo and creates a new equilibrium, which the elites can take advantage of. In Soroti district fuzziness as a weakness in local government institutions has led to the stalling of the demarcation of borders between the cultivated land and wetlands, thereby rendering the wetlands free-for-all. Consequently, extensive production of rice has been carried out until the soils were completely depleted. It was found that in Omugenyia Parish in Gweri sub-county, a massive competitive livestock raising system where all types of

livestock are mixed in one wetland is being practiced. This has given rise to a community free ranch system where everybody has access. Large scale cattle rearing in the wetlands with associated burning of pasture threatens the roosting grounds for this Important Bird Area (IBA).

Participants in the FGDs also felt that NGOs were getting a lot of money from donors claiming they were resolving community problems. It was revealed that most NGOs were involved in climate change management and yet their work was not being felt on the ground. The Chairman Omusia mentioned that NGOs are said to be involved in solving the effects of climate change yet on the ground there is nothing visible that has been done and concluded that the problems of the community were being used as opportunities for NGOs to make money other than conservation and finding solutions to community problems. Most of the NGOs had come to the area to provide relief services following civil strife but later changed into climate change managers which has not worked out well for the community.

Participants also identified tourism as a growing activity in the watershed that has overshadowed the need to solve the plights of people suffering from floods and draughts. Community members felt that the Teso people had become tourism assets. They mentioned that many people these days come to Teso to watch how people respond to floods. A respondent from Angisa reported that tourists often came in helicopters to watch how the people were suffering during floods and had this to say:

“They always come here and drop food for us but the real intention is to see how we are behaving/or how we are managing the challenge of floods. Therefore, we have been turned into tourism assets and the government may not be bothering about our challenges since it is earning from what we are going through”.

The Chairman further explained that many school children have been brought to Angisa to watch how they live. One teacher explained that the reason for many studies in this watershed is that the communities in this area were a special group of people who were living in “concentration camps” when there is no war. They felt that government handmade life difficult for them.

The findings above indicate an increasing suspicion of community members on the roles of NGOs, Government and other external agencies. This perception has far reaching implications on the commitment of the local communities in addressing environmental problems.

iv) Lack of consistence among various local public and quasi-public institutions

It was found that various institutions that manage wetlands in the watershed have different vested interests, which, as the findings show, have not been harmonized with the capacity of the wetland. Many NGOs came together after the 2007 floods to offer relief assistance to flood victims. Now they have graduated to tackling development and income generation. While formally coordinated by the Disaster Risk Management Committee (DRMC) under local government auspices, coordination has declined with time, and many are now pursuing activities that are not necessarily in line with wetland conservation. The DRMC are also subject to intense economic interests from commercial rice-growers and millers and are often easily compromised. The findings of this study revealed that environmental rules and regulations were not being properly implemented. The data also revealed conflicts of opinions from different institutions involved in environmental management. For instance, some CBOs controlled by community members felt that the government should retain the power to control the forests, while the wetlands should be left in the hands of traditional or community leaders. This would create more disastrous ecological consequences, as demonstrated by wetland use in Omugenyia parish, where the wetlands under community management were competitively used for rice production until the soils had been fully exhausted.

5.5 Influence of Changes in House Hold Socio Economic Needs on Management

The Logistic Regression results on table 6.3 above showed variable effects of socio economic factors on watershed management. Factor EE3-Changes in household needs had the likelihood of influencing watershed management four fold, and this was significant ($r=4.262491$, $P<0.01$). This shows the concerns of watershed management systems for household needs such as food security and fuel wood. Other socio economic factors namely EE5- household wealth status had an increasing influence on management though not significant. EE6-civil society interests in the watershed had increasing but insignificant influence on watershed management meaning that as the wealth status of household members increased, their influence on watershed management nearly doubled ($r=1.891001$, $P<0.01$) and for the case of civil society interests the influence was twofold ($r=2.158344$, $P= 0.01$). This influence was however not significant. However factor EE4-Changes in economic trends had a decreasing influence on watershed management, meaning that recent economic changes have also had a toll on the management of watershed resources as improved economic trends contributes less and less to resource conservation

It was observed during the interview that many family members had improved on their livelihoods by acquiring household assets such as bicycles, radios and better housing. This however came at the expense of increased exploitation of the wetlands and forests in the form of increased rice production, charcoal burning, selling big loads of firewood or sale of land. FGD participants said that the households had changed in terms of assets after selling rice produced in the wetlands Others had used the proceeds to buy livestock and while others had acquired basic household assets inclusive of mattresses kitchenware, clothes and others. It was revealed by a number of households that while some had acquired bicycles others bought motorcycles.

It was mentioned during interviews that having a bicycle was an essential part of life in the household because they needed to collect water and firewood from distant places. It was actually revealed that many women and girls knew how to ride a bicycle and were using them for collection of water. During the Key informant interviews, it was revealed that the men were obliged to buy bicycles for their wives because if they did not, the men would collect the water themselves even when it was traditionally a responsibility of women. The men revealed that they had nothing to do other than buying bicycles to the women because if the men had to collect the water, other members of society would scorn them for assuming women's role.

Despite the above trend of increased household assets, some 16.7% of the respondents reported that their lives had not changed in the last five years in terms of assets and that the level of poverty was high and most of the income was being prioritised for food, medicine and school fees than for acquisition of assets.

5.3 Influence of Changing Economic Trends on Watershed Management

Table 6.2 showed a strong correlation between factor EE4-Response to changes in economic trends and watershed management with a Pearson Correlation Coefficient ($r=0.482$, $P\leq 0.001$). However despite the strong correlation, this factor had a decreasing and insignificant influence on watershed management. An examination of respondents perceptions of changes in the economic trends and effects on livelihoods in the watershed showed that people were getting poorer and more dependent on natural resources for their livelihoods. Thirty five percent (35.6%) of the respondents said that the land they have is not enough to enable the majority of households produce enough output for sale and increase household incomes. This challenge was reported in, Omugenya, Wera and Angisa. Land was reported to be now more expensive as mentioned by 76 (42%) of the respondents. A plot of land that cost 200,000/= five years ago is now over 3,000,000/=. One elder remarked that,

“10 years ago, one could bring a goat and he is given acres and acres of land. But now the situation is different to the extent that even where one had money, one may not get land to buy” (Field interview, 10th May 2016)

It was noted, however, that like any other society there were some people who were getting richer. This was reported by 8(4.4%) of the respondents. These mainly included the cattle keepers and rice growers especially in Katakwi where the land was still good in terms of soil fertility.

When asked how human activities and the changing economic trends have affected the sustainable management of the watershed, respondents indicated that the activities had led to soil erosion and soil infertility. These included overgrazing, over cultivation, cutting of trees and burning of gross cover that were all affecting the land. The other negative contributions included removal of forest cover that led to worsening of the effects of drought and floods and degradation of the wetland through rice production especially in Omugenya parish.

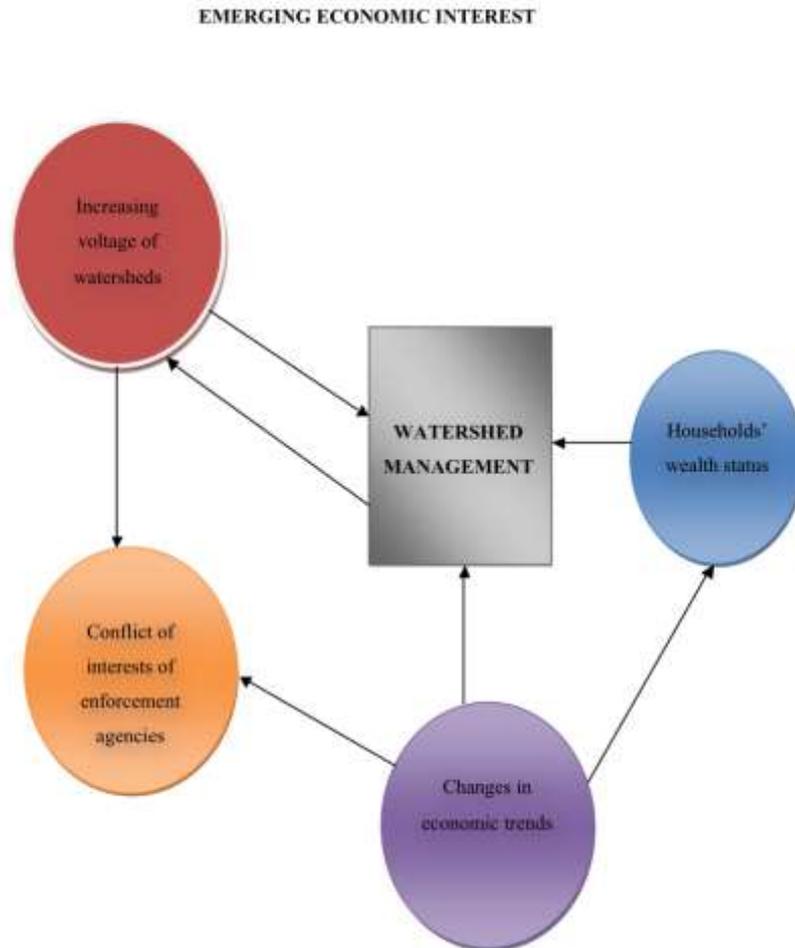


Fig. 5.1 Qualitative model explaining the influence of emerging economic interests on watershed management (Source: Based on author's Field Data, 2015)

6. DISCUSSION

The findings of this study reveal that competing economic interests and changes in household needs of the majority of the natural resource dependent communities have major influences on management of access to watershed resources. The watershed is characterized by increasing interests to cultivate the wetlands, interests of stakeholders to protect their benefits, need to meet new changes in economic trends in the wetlands and the need to improve household wealth status which have all affected the sustainable utilization of this watershed. This finding is in line with Kristen (2005) who observed that despite their importance, wetlands in Africa were being modified or reclaimed driven by economic and financial motives.

While competition for watershed resources have been occasioned by commoditization of rice, charcoal and firewood as emerging enterprises, frequent draughts and floods appear to be the major factor legitimizing interests in these commodities. From the findings, community members site lack of alternatives as the major reason for increased utilization of watershed resources. This finding is in line with Akello *et al*, (2016), who mention that lack of alternatives were among the factors fueling land use changes in the Lake Kyoga Basin of which Awoja watershed is part.

The results indicate how the fuzzy watershed rules was being exploited by the elite and thereby heightening competition in the uplands. This finding is similar to (Moeko, 2010) who found elite capture was setback in watershed restoration managed under participatory approach. In a similar finding, the more privileged community members dominate decision making processes leaving out the poor project targeted beneficiaries, yet this affects their livelihood (Springate &

Blaikie, 2007). The findings also corroborate with those of scholars in other organizational environments where decisions of resource access and utilization were often made in favor of the more powerful. Steinmann, (2008) explains that larger and more powerful agencies often become established to address emerging societal problems, including those involving the environment and how this determines the benefits from resource use across the board.

The inference from this section is that, it has been hard to control access to the Awoja watershed resources due to the competition between survival and development objectives in the watershed where lack of alternatives due to climate change coupled with emerging divergent economic interests are fuelling increased utilization of watershed resources.

7. CONCLUSION AND RECOMMENDATION

Emerging economic interests in Awoja watershed threatens the sustainability of this watershed.

The watershed is currently threatened by considerable damage to or losses of many natural resources, including wetlands and forests due to the commoditization of rice, charcoal and fuel wood. Governance of resources is being constrained by conflicts of interests among enforcement staff who allow the resource to be exploited for commercial gains in the face of extreme climate change. The bureaucrats and the political elite who should enforce the conservation bylaws depend on the local resource users for their survival in electoral politics. As a result, there is laxity in the enforcement of bylaws to the detriment of the ecology of the wetlands.

Changes in economic needs of the households were significantly having an increasing influence on watershed management. Due to frequent draughts in the watershed management was being driven by household needs such as food security and fuel wood, livestock grazing and other socioeconomic activities. It is recommended that an appropriate diversification of livelihoods in the watershed-involving introduction of new economic activities in the uplands is essential to draw communities away from the lowlands.

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