

## SUSTAINABLE WETLAND RESOURCE UTILIZATION THROUGH ECO-TOURISM DEVELOPMENT FOR POVERTY REDUCTION: A CASE STUDY OF KINGWAL SWAMP, KENYA

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### ABSTRACT

**O**ver the years, wetlands' economic, social and ecological benefits have not been fully appreciated leading to their unsustainable use. As a result, wetlands are rapidly declining due to anthropogenic activities. This has further been complicated by high levels of poverty and rapidly increasing human population, more particularly in less developed countries. Using the case study of Kingwal swamp (a once extensive wetland and important breeding site for Sitatunga (*Tragelaphus Spekei*) that has been reduced to a narrow stretch of swamp), this paper evaluates the current utilization practices of the wetland resources and the wetland's ecotourism potential that can bridge the links between environmental conservation and poverty reduction among its host communities. A significantly ( $\chi^2=156.03$ ,  $df=1$ ,  $p<0.05$ ) higher majority (80%) of the community indicated that consumptive utilization practices such as brick making, clay harvesting, crop production and grazing were rampant, even though the income derived from them was low. Moreover, the existing swamp resource utilization practices had contributed to deterioration of the wetland's natural resources and further decrease in its size. Consequently, Sitatunga (*Tragelaphus Spekei*) is under threat of extinction due to the loss and fragmentation of its habitat and a significant ( $\chi^2 = 44.01$ ,  $df = 1$ ,  $P<0.05$ ) majority (65%) of the community lives in abject poverty. In spite of that Kingwal swamp was found to be not only an important biodiversity hotspot (with great diversity of flora, mammal and bird species) but also a customary circumcision site for the resident community with enormous cultural resources which are priceless tourist attractions invaluable for the development of ecotourism. The study recommends the development of a sustainable management plan which not only advocates for environmental education but acknowledges local community's right to use the wetland through environmental-friendly and income generating enterprises such as ecotourism, fish farming, bee keeping, butterfly farming and tree seedling nurseries. Another initiative will be the development of bird watching platform, camp site and an arboretum which will provide an alternative source of income for adjacent communities, making them less dependent on the wetland's resources.

**Keywords:** eco-tourism, wetlands, poverty reduction

## INTRODUCTION

Wetlands, which cover approximately nine per cent of the world's surface, are important ecosystems in terms of making the earth a habitable place to live for humans (Holden, 2008; Macharia, Thenya and Ndiritu, 2010). They not only house a wide range of biodiversity and act as vast carbon-storing areas for the world but also operate as a form of local flood control measure by absorbing vast amounts of water at times of high rainfall and discharging it to adjacent areas in a slow and measured way (Holden, 2008). In addition, they provide habitat to large numbers of species such as diverse flora, fish, amphibians and birds among other varieties of fauna (Macharia *et al.*, 2010). They also offer various ecosystem services such as water purification and nutrient cycling (Zedler and Kercher, 2005; Daniels and Cumming, 2008). When correctly harnessed all these benefits lead to improved human development (Nyakaana, 2008).

In Kenya, wetlands cover approximately 14,000 km<sup>2</sup> or 2.5% of the country's land surface (Macharia *et al.*, 2010). They are rich in living and non-living natural resources. Besides, they are important sources of water, food, medicinal plants, fuel-wood, building materials and handcrafts (Terer, Ndiritu and Gichuki, 2004). According to Visser (1992), the availability of unique animals and plants such as reptiles, water birds, fish and amphibians in wetlands make them popular tourist attractions. In addition, in some communities, selected wetland sites are used to perform cultural and spiritual rituals such as circumcision and prayers (Kareri 1992; Terer *et al.*, 2004; Sitienei, Jiwen and Paix, 2012).

Though, over the years, wetlands have been experiencing rapid degradation, due to negative perceptions of wetlands as 'wastelands', increased settlement of marginalized people on fragile wetland areas adjacent to river banks and waterbeds in search of alternative new means of survival, rapid population increase, high unemployment levels, changing lifestyles, high levels of poverty and shrinking land size for agricultural production. This has been from various human activities such as, clay and papyrus harvesting, and conversion into other land uses for instance, agricultural farms, pastureland and residential and commercial areas that are perceived as being more profitable (Owino and Ryan, 2007).

For example, in Kenya, increasing evidence indicates that the rate of environmental degradation has increased in recent times, with previously wetlands being converted to agricultural lands (Sitienei *et al.*, 2012). Consequently aquatic species such as Sitatunga (*Tragelaphus Spekei*) are under threat from the loss and fragmentation of their habitat. Thus the risk of their extinction is likely to increase, especially with their restricted range (Sitienei *et al.*, 2012).

This goes against the aspirations of millennium development goals especially on environmental sustainability and reduction of extreme poverty and hunger by half. According to Sachs (2005) millennium development goals address extreme poverty in its many dimensions-income poverty, hunger, disease, lack of adequate shelter, and exclusion-while promoting education, gender equality and environmental sustainability. The goal of ensuring environmental sustainability focuses on reversing the loss of environmental resources, along with provision of safe water, adequate sanitation and decent housing while the one on reducing extreme poverty and hunger focuses on halving the proportion of people living in extreme poverty, with less than one dollar a day (Sachs, 2005). Therefore, any case of unsustainable natural resource utilization conflict with the Millennium Development Goals of environmental sustainability.

In practice, there has been significant exploitation of wetlands by host communities in order to meet their basic economic needs, even though, the level of exploitation has been varying from one wetland to another depending on levels of poverty in the host communities (Macharia *et al.*, 2010). As a result, wetlands are now deemed as some of the most threatened ecosystems in the world (Nyakaana, 2008; Macharia *et al.*, 2010). For instance, Kingwal swamp once an extensive wetland and an important breeding site for Sitatunga (*Tragelaphus Spekei*) has been reduced to a narrow stretch of swamp (Sitienei *et al.*, 2012).

Fortunately, nowadays, the significance of wetlands is widely recognized and efforts are being sought to prevent further degradation (Macharia *et al.*, 2010). Indeed, significant progress has been made in the conservation of wetlands since the signing of the Ramsar Convention (the Convention on Wetlands of International Importance) in the early 1970s (Ramsar Convention Bureau, 2000). Even though, the adoption and implementation of these Convention guidelines has been a success for wetlands of international, regional and national significance, the scenario is different for wetlands at subnational and local levels such as Kingwal Swamp (Macharia *et al.*, 2010). They are generally perceived as being less important because of their small sizes. Some of them may be small-sized and sometimes seasonal, but they cover large areas during rainy seasons and are productive and very rich in biodiversity (Chambers, 1999). Moreover, these small-sized and seasonal wetlands are mostly found on community owned land or private land, making government agencies' conservation mechanisms hard to implement. Research has identified various challenges inhibiting prudent management of wetlands key among them being poverty, encroachment and invasion, increase in anthropogenic activities, inability to diversify resources, neglect of indigenous ecological knowledge and environmentally incompatible uses of resources (such as cultivation, brick-making and grazing) (Macharia *et al.*, 2010; Sitienei *et al.*, 2012).

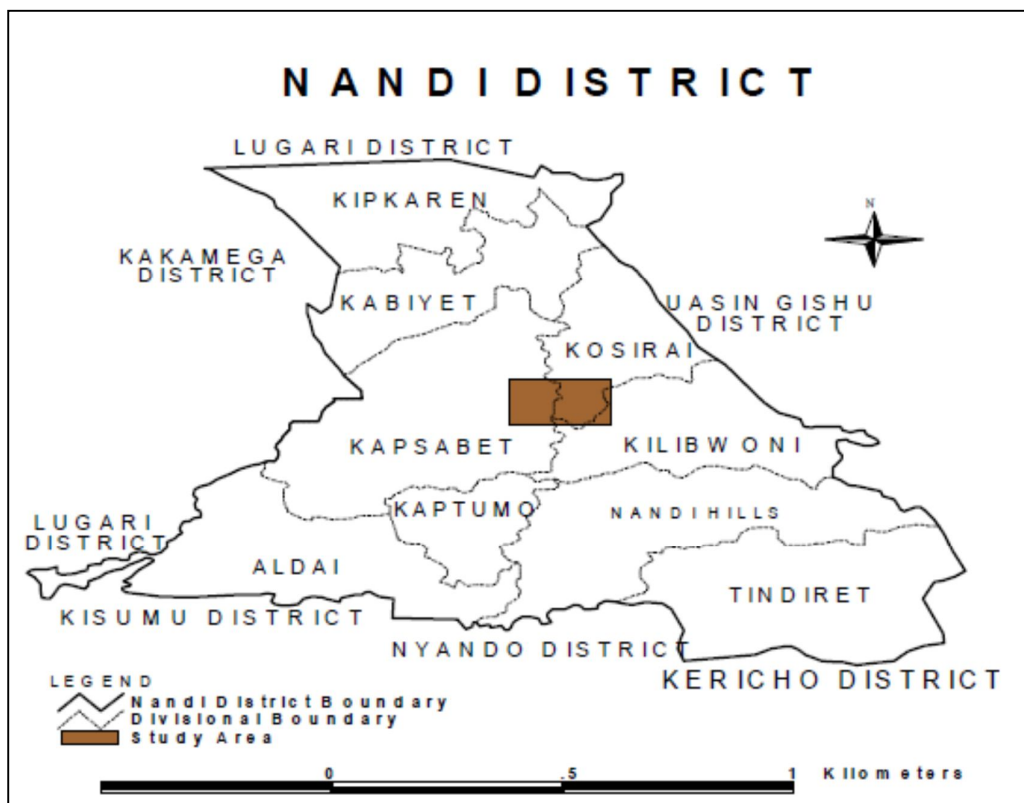
Limiting human access to wetlands in order to minimize their destructive activities is one of the most popular strategies of managing designated wetlands. Unfortunately this is difficult to implement for wetlands that are found on community-owned land. Consequently, wetland resources are increasingly being degraded through various unsustainable uses. It is unrealistic to limit a poor community from accessing a wetland that provides to them food (fish) and income (from brick making) without giving them an alternative means of livelihood. Instead that community will be glad to be engaged in alternative means of livelihood that will afford them a decent and higher quality of life and further conserve their environment.

This paper recognizes that there is an urgent need for alternative and sustainable wetlands' resources utilization and conservation strategies. Using the case study of Kingwal swamp (a once extensive wetland and important breeding site for Sitatunga (*Tragelaphus Spekei*) that has been reduced to a narrow stretch of swamp (Sitienei *et al.*, 2012)); it interrogates the state and causes of poverty, the swamp's socio-economic value, the host communities' utilization practices of the wetland's resources and their awareness of the impacts of their activities. Further, it evaluates the swamp's ecotourism potential. Finally, it concludes with a discussion and recommendations on an integrated approach that can be used to bridge the links of environmental conservation and poverty reduction among communities living adjacent to wetlands.

## STUDY AREA AND METHODOLOGY

### Study Area

Kingwal Swamp is 400 km from Nairobi, on the western part of the Rift Valley. It is a wetland in the upper catchment of River Yala (Raburu, 2005). It is located in Nandi County (formerly Nandi district) (Figure 1) within latitudes  $0^{\circ}$  and  $0^{\circ} 34''$  North and longitudes  $34^{\circ} 44''$  and  $35^{\circ} 25''$  East (Sitienei *et al.*, 2012). The swamp is a habitat for the Sitatunga (*Tragelaphus Spekei*), crested cranes and wetland forest of *Syzygium* species (Raburu, 2005). It occupies an area of 2.73 Km<sup>2</sup> (Sitienei *et al.*, 2012) and is fed mainly by Kesses River flowing in from the East and drained by the Kingwal River flowing out to the West (Raburu, 2005). Its dominant vegetation is forests, derived grasslands, shrubs and scrubland (Sitienei *et al.*, 2012). Dominant grass species include *Andropogon gayanus*, *Heteropogon contortus*, *Panicum maximum* and *Sporobolus pyramidalis*. About 40% of its surface area has been converted into eucalyptus, neem and teak plantations as a result of the creation of a forest reserve (Sitienei *et al.*, 2012). The major human activities in the wetland are farming, grazing, hunting and brick making. Besides, it is an important resource for the community living both in the catchment and those living downstream. More particularly, it is not only an important communal source of pasture especially during dry seasons and food security safety valve but also a customary initiation site for the resident local (*Nandi*) community (Sitienei *et al.*, 2012).



**Figure 1: Location of the Study Area**

Source: Sitienei, Jiwen and Paix (2012)

## Methodology

The target population for this study was communities living adjacent to Kingwal swamp. There were approximately 20,322 living adjacent to the swamp (GoK, 2009). In selecting a study sample, we used two sampling techniques (purposive and systematic). Purposive sampling was used to recruit key informants from the target population for the interviews. The key informants targeted were those people who had the knowledge on resource utilization practices in the study area and were willing to give detailed account of wetland resource utilization and levels of poverty in the host community. Key informants included community leaders (chiefs), village elders and Kenya Wildlife Service officials. A total of 15 interviews were conducted. The interviews lasted between one and one and half hours. All the interview were audio-recorded and supplemented with note taking to cater for items which could not be audio-recorded.

On the other hand, systematic sampling was used to interview respondents with the guidance of a questionnaire. The sample was randomly selected using a list of households based on the 2009 census report. Out of a total of 1, 240 households (GoK, 2009), 384 households were selected for this study. To determine the sample size, social science research method advanced by Mugenda and Mugenda (2003) was used. Its formula is:

$$n = \frac{z^2 pq}{d^2}$$

Where:

n= the desired sample size (if the target population is greater than 10,000)

z= the standard normal deviate at the required confidence level

p= the proportion in the target population estimated to have characteristics being measured

q= 1-p

d= the level of statistical significance set.

Mugenda and Mugenda (2003) further stated that if there is no estimate available of the proportion in the target population assumed to have the characteristics of interest, as was the case in the current study, 50% will be used. In this case, the proportion of the study's target population with the required characteristics was 0.50, the z-statistic was 1.96, and the desired accuracy was at the 0.05 level, thus giving a sample size of 384 as calculated below:

$$n = \frac{(1.96)^2 (.50)(.50)}{(.05)^2}$$

$$=384 \text{ households}$$

We then divided the total number of households (1, 240) with the sample size (384) of which we got a sampling interval of 3 households. Subsequently, with the use of the table of random numbers, we selected every 3<sup>rd</sup> homestead in which we interviewed the head of the homestead. During the survey English, Kiswahili and native (*Nandi*) languages were used. The *Nandi* language was used particularly, with those community members who were neither conversant with English nor Kiswahili.

The questionnaires and interview schedules addressed items on the state of poverty among members of the local community, the swamp's socio-economic value, utilization practices of the wetland, awareness amongst community members of the impacts of their current utilization practices of the wetland and evaluation of the swamp's ecotourism potential. Evaluation of Kingwal Swamp's ecotourism potential was assessed based on Ecotourism Opportunity Spectrum (ECOS) method (Açıksöz, Görmüş and Karadeniz, 2010). According to Açıksöz *et al.*, (2010) the scoring by ECOS does more to assess potential based on the existing realities and structures of the area. It evaluates accessibility, regional attraction, availability of tourism infrastructure, status of users' capability and knowledge, degree of social interaction, acceptance degree of effects and control on utilization, relationship of ecotourism to other resources and type of management developed for long-term protection of the area. The swamp's ecotourism potential was determined taking the biological-physical structure, socio-cultural and economic structure components of the ECOS method as a basis. To this end, 20 criteria were developed for the study area. The degree of significance of each criterion was graded with a point value.

## Data Analysis

Both primary and secondary sources of data were utilized. Secondary data was derived from books and journals while primary data was obtained with the aid of semi-structured questionnaires and structured interview schedules. The study administered 384 questionnaires to local community members aged over 18 years. The questionnaires were administered to the members of the local community at the community meetings (*barazas*), shopping centres and residential sites. Fifteen interviews with key informants, who were community leaders (chiefs), village elders and Kenya Wildlife Service officials, were conducted to validate and complement information gathered from the questionnaires. Data was analyzed with Statistical Package for Social Sciences (SPSS). Statistical tests that included chi-square goodness fit and cross-tabulations were used to test the significance of the responses and establish the relationship between respondents' demographics and responses respectively. Significant differences were deduced based on alpha (type I error of 5%).

## RESULTS

Majority of the respondents (60%) were men while 40% were female (Table 1). On age, 40% were aged between 18-30 years, 30% were aged between 31-45 years, 15% were aged between 46-60 years and another 15% were aged over 60 years. On the level of education, 48% of the respondents had attained primary education, 30% attained secondary school education, 12% had not gone to school, 5% had attained university education while 5% had attained tertiary education (Table 1). Most of the respondents (68%) earned less than Kshs. 4000 a month; an equivalent of less than US\$2 a day. Only 2% of the respondents earned between Kshs.12,000 and Kshs.16,000. On occupation, 51% of the respondents were involved in mixed farming, 15% were involved in subsistence crop husbandry, 10% were involved in charcoal burning, 8% were involved in bee keeping projects, 6% were involved in tree nurseries and 10% were involved in other projects such as selling of firewood (Table 1).

In terms of family size, 45% of the respondents had families with 6-10 members, 30% had families with 1-5 members, 10 % had families with 11-15 members, 10 % had families with 16-20 members while 5% had families with more than 20 members (Table 1).

Further, a significant ( $\chi^2 = 44.01$ ,  $df = 1$ ,  $P < 0.05$ ) majority (65%) of the community were poor (Table 1). They attributed their state to environmental degradation (52%), invasion by wildlife to their farms and destruction of their crops (28%), lack of entrepreneurial skills (15%) and discrimination of women (5%) (Table 2).

**Table 1: Summary of Respondents' Demographic Characteristics**

Information Investigated	Responses given by the community	Frequency (%)	Chi-square goodness of fit test
Gender	Male	230 (60)	$\chi^2=54.03$ , df=1 p<0.05
	Female	154 (40)	
Age (Years old)	18-30	153 (40)	$\chi^2=59.27$ df=3 p<0.05
	31-45	115 (30)	
	46-60	58 (15)	
	Over 60	58 (15)	
Level of Education	None	46 (12)	$\chi^2=84.65$ df=4 p<0.05
	Primary	184 (48)	
	Secondary	114 (30)	
	College	20 (5)	
	University	20 (5)	
Family size	1-5 Children	116 (30)	$\chi^2=105.23$ df=4 p<0.05
	6-10 Children	172 (45)	
	11-15 Children	38 (10)	
	16-20 Children	39 (10)	
	Over 20 Children	19 (5)	
Means of livelihood	Mixed farming	195 (51)	$\chi^2=136.16$ df=5 p<0.05
	Crop husbandry	57 (15)	
	Charcoal burning	38 (10)	
	Bee keeping	30 (8)	
	Tree nurseries	26 (6)	
	Selling of firewood	38 (10)	
Level of Income	Less than 4,000	261 (68)	$\chi^2=107.27$ df=3 p<0.05
	4,001-8,000	96 (25)	
	8,001-12,000	20 (5)	
	12,001-16,000	7 (2)	
State of poverty	Poor	249 (65)	$\chi^2=44.01$ , df=1 p<0.05
	Not Poor	135 (35)	

A significant ( $\chi^2=190.02$ , df = 1, p < 0.05) majority (70%) of the respondents noted that Kingwal swamp had a high socio-economic value (Table 2). Further, respondents identified sources of water (30%), pasture (20%), fish (20%), medicinal plants (10%), control of floods (10%) and habitat for diverse biodiversity as the main value of the swamp (Table 2). On utilization practices, the host community used the swamp for water harvesting (35%), brick making (18%), washing of cars (15%), fodder harvesting (14%), crop production (10%), hunting for game meat (8%) and grazing (5%) (Table 2).

**Table 2: Kingwal swamp's socio-economic value, utilization and awareness of impacts**

Information investigated	Responses given by the community	Frequency (%)	Chi-square goodness of fit test
Causes of poverty	Environmental degradation	200 (52)	$\chi^2=46.88$ df=4 p<0.05
	Invasion by wildlife	108 (28)	
	Discrimination of women	19 (5)	
	Lack of entrepreneurial skills	57 (15)	
Kingwal swamp's socio-economic value	Source of water	118 (30)	$\chi^2=123.63$ df=5 p<0.05
	Source of pasture	76 (20)	
	Source of fish	76 (20)	
	Habitat for diverse fauna	38 (10)	
	Source of medicinal plants	38 (10)	
	Controlling of floods	38 (10)	
Available tourist attractions	Biodiversity	230 (60)	$\chi^2=65.63$ , df=2, p<0.05
	Customary initiation sites	115 (30)	
	Traditional way of life	39 (10)	
Kingwal swamp's utilization practices	Water harvesting	134 (35)	$\chi^2=134.63$ df=5 p<0.05
	Brick making	72 (18)	
	Crop production	38 (10)	
	Washing of cars	56 (15)	
	Fodder harvesting	53 (14)	
	Hunting	31 (8)	
The state of the swamp's resources	Degraded	307 (80)	$\chi^2=14.03$ , df=1 p<0.05
	Not degraded	77 (20)	
Level of awareness amongst the host community on the impacts of their activities on the swamp's resources	Aware	126 (33)	$\chi^2=12.52$ , df=1 p<0.05
	Not aware	258 (67)	

A significantly ( $\chi^2=156.03$ , df=1, p<0.05) higher majority (80%) of the community noted that the existing swamp resource utilization practices had contributed to deterioration of the wetland's natural resources and further decrease in its size. Even though, a significant ( $\chi^2 = 54.01$ , df = 1, P < 0.05) majority (67%) of the community were not aware of the impacts of their activities on the swamp, during interviews however, they hinted that during their lifetime they had observed not only a deterioration of the wetland's natural resources as evidenced in the loss of vegetation cover but also a decrease of its size (Table 2).



### **Relationships between Responses on Kingwal swamp's utilization practices and Community Attributes**

Gender of host community members was an influencing factor on only one response while it was not an influencing factor on the rest (Table 3). Opinions on whether the swamp was used for fodder harvesting was dependent ( $\chi^2 = 0.12$ ,  $df = 1$ ,  $P = 0.04$ ) of gender, with more men agreeing that the swamp was used for fodder harvesting compared to women. Gender did not influence views on whether the swamp was used for water harvesting, brick making, crop production, washing of cars and hunting (all  $p > 0.05$ ) (Table 3). On the other hand, age of community members was an influencing factor on only one response (all  $p > 0.05$ ). Community opinion on whether the swamp was used for hunting was dependent ( $\chi^2 = 0.32$ ,  $df = 3$ ,  $P = 0.005$ ) of age, with those aged 31-45 indicating that the swamp was used for hunting compared to other age groups (Table 3). Age did not influence views on whether the swamp was used for water harvesting, brick making, crop production, washing of cars and fodder harvesting (all  $p > 0.05$ ) (Table 3).

**Table 3: The relationship of responses on Kingwal swamp's utilization practices with gender and age of community members**

Community attributes (Factor)	Responses of the communities on the swamp's utilization practices		Chi – square cross tabulations tests and associated conclusions	
Gender	<b>1. The swamp is used for water harvesting</b>			
		Agree	Disagree	$\chi^2 = 0.35$ , df = 1, P = 0.42 Community opinions on whether the swamp was used for water harvesting was independent of gender of community members
	Male	213	44	
	Female	116	11	
Gender	<b>2. The swamp is used for brick making</b>			
		Agree	Disagree	$\chi^2 = 0.23$ , df = 1, P = 0.21 Community opinions on whether the swamp was used for brick making was independent of gender
	Male	225	32	
	Female	111	16	
Gender	<b>3. The swamp is used for crop production</b>			
		Agree	Disagree	$\chi^2 = 0.46$ , df = 1, P = 0.34 Community opinions on whether the swamp was used for crop production was independent of gender
	Male	208	49	
	Female	112	15	
Gender	<b>4. The swamp is used for washing of cars</b>			
		Agree	Disagree	$\chi^2 = 0.52$ , df = 1, P = 0.35 Community opinions on whether the swamp was used for car washing was independent of gender
	Male	204	53	
	Female	120	43	
Gender	<b>5. The swamp is used for fodder harvesting</b>			
		Agree	Disagree	$\chi^2 = 0.12$ , df = 1, P = 0.04 Community opinions on whether the swamp was used for fodder harvesting was dependent of gender, with more men agreeing that the swamp was used for fodder harvesting compared to women
	Male	201	56	
	Female	117	10	
Gender	<b>6. The swamp is used for hunting</b>			
		Agree	Disagree	$\chi^2 = 0.46$ df = 1, P = 0.06 Community opinions on whether the swamp was used for hunting was independent of gender
	Male	159	98	
	Female	108	19	
Age	<b>1. The swamp is used for water harvesting</b>			
		Agree	Disagree	$\chi^2 = 3.05$ df = 3, P = 0.07 Community opinions on whether the swamp was used for water harvesting was independent of age
	18-30	14	2	
	31-45	195	11	
	46-60	68	12	
	Over 60	8	8	
Age	<b>2. The swamp is used for brick making</b>			
		Agree	Disagree	$\chi^2 = 4.56$ , df = 3, P = 0.50 Community opinions on whether the swamp was used for brick making was independent of age
	18-30	11	4	
	31-45	201	12	
	46-60	42	20	
	Over 60	20	8	
Age	<b>3. The swamp is used for crop production</b>			
		Agree	Disagree	$\chi^2 = 0.34$ , df = 3, P = 0.70 Community opinions on whether the swamp was used for crop production was independent of age
	18-30	13	7	
	31-45	201	21	
	46-60	37	9	
	Over 60	18	12	
Age	<b>4. The swamp is used for washing of cars</b>			
		Agree	Disagree	$\chi^2 = 0.55$ , df = 3, P = 0.73 Community opinions on the swamp was used for car washing was independent of age
	18-30	20	8	
	31-45	228	11	
	46-60	34	8	
	Over 60	6	3	
Age	<b>5. The swamp is used for fodder harvesting</b>			
		Agree	Disagree	$\chi^2 = 0.12$ , df = 3, P = 0.64 Community opinions on the swamp was used for fodder harvesting was independent of age
	18-30	37	9	
	31-45	202	8	
	46-60	40	6	
	Over 60	10	6	
Age	<b>6. The swamp is used for hunting</b>			
		Agree	Disagree	$\chi^2 = 0.32$ , df = 3, P = 0.005 Community opinions on whether the swamp was used for hunting was dependent of age, with those aged 31-45 indicating that the swamp was used for hunting compared to other age groups
	18-30	7	6	
	31-45	232	14	
	46-60	43	10	
	Over 60	5	1	

A significantly ( $\chi^2=46.43$ ,  $df=1$ ,  $p<0.05$ ) higher majority (70%) of the community indicated that Kingwal swamp had ecotourism potential. They ranked highly its topographical structural diversity, unique beauty, wildlife diversity, forest assets and recreational activities (all with high scores) (Table 4). This was further supported with the availability of biodiversity (60%), customary initiation sites (30%) and the host community's traditional way of life (10%) (Table 2). There were other crucial factors for instance, the existence and adequacy of human resources, infrastructure and services that defined the study area as an area with ecotourism potential.

Besides, interviews recommended that there is need for training of guides and building of transport infrastructure, sewer, health, recreation and drinking water in order to enhance the profile of the study area as an ecotourism hotspot.

**Table 4: Evaluation of Kingwal Swamp's ecotourism potential (adopted from Açiksöz *et al.*, 2010).**

**Substantial conditions on which ecotourism can be maintained**

Components	Criteria	Rank
Biological-Physical Structure	Topographical structure diversity <sup>1</sup>	4
	Unique beauty <sup>1</sup>	4
	Wildlife diversity <sup>1</sup>	4
	Forest assets <sup>1</sup>	4
Socio-cultural Structure	Young population potential <sup>1</sup>	4
	Educational status <sup>1</sup>	2
	Level of consciousness for ecotourism <sup>1</sup>	2
	Organizational capability <sup>1</sup>	3
	Human resources (such as guides) <sup>1</sup>	3
	Accommodation for the ecotourist <sup>1</sup>	3
	Quality of transportation infrastructure <sup>1</sup>	2
	Health institutions <sup>1</sup>	2
	Educational institutions <sup>1</sup>	2
	Utilities <sup>1</sup>	2
	Dining <sup>1</sup>	2
	Existing recreational activities <sup>1</sup>	4
	Historical-archaeological values <sup>1</sup>	3
	Distance to Koitalel arap Samoei Mausoleum (Historical site) <sup>2</sup>	2
Economic Structure	Animal production <sup>1</sup>	3
	Plant production <sup>1</sup>	3

<sup>1</sup> high: 4, fair: 3, low: 2, 1: none

<sup>2</sup> Very close: 4, Close: 3, Far: 2, Very far: 1

## DISCUSSION

Kingwal swamp is a contiguous wetland and forms part of a critical river system for Lake Victoria basin. The wetland is endowed with diverse bird species, riverine vegetation, cascading landscapes and unique floral and faunal species; resources which are ideal for ecotourism development. Moreover, it is located in a topographically rich area of the North Rift tourist circuit famous for high altitude climate ideal for sports, cultural attractions, wonderful landforms, forests and wildlife (Kiprutto, Sitati, Ngorianita, Akama and Munyao, 2012). Thus, it can be developed to attract tourists visiting tourist destinations in the North Rift. In spite of that, the swamp is facing insurmountable challenges as discussed below, key among them rapid transformation due to poverty, increasing human settlement and reclamation of land for agricultural purposes.

According to Macharia, Thenya and Ndiritu (2010) anthropogenic activities are blamed for loss of natural habitats, wetlands included. This holds true for Kingwal swamp, which was found by the current study to experience environmental problems related to overharvesting of water, cultivation of the swamp for crop production, dumping of waste, overgrazing, irrigation, washing of cars, harvesting of macrophytes for fodder and mulching, wildlife poaching, collection of water birds' eggs and other improper land use practices. These uses were found to be incompatible with wise use of the wetland; as they were found to have contributed to the deterioration of the wetland's natural resources and further decrease in its size. As a result, Sitatunga (*Tragelaphus Spekei*) is under threat of extinction, particularly with its restricted range. Related results about Sango Bay, Ondiri and Manguo Wetlands are reported by Nyakaana (2008) and Macharia, Thenya and Ndiritu (2010) respectively.

In addition the study results support arguments by other scholars, such as Owino and Ryan (2007), who assert that a negative perception of wetlands as 'wastelands' coupled with increasing human population and changing lifestyles has led to the loss and degradation of wetlands through conversion to other land uses that are perceived to be more profitable for instance agriculture, pastureland and residential areas. Increased human population was in particular found to have contributed to the unsustainable usage of the wetland and further high levels of poverty. For instance, host community's demographic characteristics revealed that majority of the respondents had families of between 6 to 10 members, necessitating the need for more settlement and crop production land. The study findings further revealed that most community members perceived the wetland as a source of direct benefits and failed to appreciate its ecological and life-support non-tangible benefits like being a habitat for rich bio-diversity, water purification, nutrient cycling, carbon sequestration and flood control.

On same note, high levels of illiteracy, with only 10 % of the respondents having attained post-secondary school education, seem to explain why the community fails to appreciate the ecological value of the wetland and thus being unaware of their activities' impact on the wetland. This is consistent with Ndaruga (2009) assertion that the major reason for widespread environmental problems; is that although environmental education is offered in Kenyan schools, colleges and universities, its application has not yet been transferred to the general public. Thus the findings concur with Macharia, Thenya and Ndiritu (2010) argument that environmental education is one way of empowering a society to conserve biodiversity while at the same time alleviating poverty among them.

According to Holden (2008) there is an explicit link between environmental degradation and poverty, in that a degraded environment cannot support bio-diversity and hence reduction in food production leading to more poor and hungry people. This was validated in the current study whereby the findings established that, in spite of increased consumptive utilization of Kingwal swamp, the derived income was low and not sufficient to provide for the community's needs. As a result, majority of the local people live in abject poverty; earning less than US\$1 dollar a day. Thus they were facing inadequate supply of health-care facilities, clean water, low levels of school enrolment and inadequate housing. Consequently, the wetland continues to shrink with no signs of recovery; instilling the poverty cycle. Similar results were reported in Uganda by Nyakaana (2008).

### Kingwal Swamp's potential for ecotourism development

The availability of unique animals and plants such as reptiles, water birds, fish and amphibians in wetlands make them popular tourist attractions (Visser, 1992). In some communities, selected wetland sites are used to perform cultural and spiritual rituals such as circumcision and prayers (Kareri 1992; Terer *et al.*, 2004; Sitienei *et al.*, 2012) which are crucial in the development of cultural tourism. This was found to be the case in the current study whereby Kingwal swamp was found to be not only an important biodiversity hotspot (with great diversity of flora, mammal and bird species) but also a customary circumcision site for the resident community with enormous cultural resources which are priceless tourist attractions invaluable for the development of ecotourism (Table 5). Thus it can be argued that ecotourism is one of the most viable and environmentally friendly activities to undertake in the swamp.

**Table 5: Ecotourism attractions in Kingwal Swamp (Based on interviews and observations conducted during the study)**

- Cultural attractions and dance performances (cultural tourism)
- Customary circumcision site (Cultural tourism)
- Diverse bird species (bird watching/ornithology)
- Fauna- mammals, reptiles and amphibians (wildlife viewing and photography)
- Sceneries (sight-seeing)
- Unique riverine vegetation (nature walks, camping)
- Variety of butterfly species (butterfly watching and farming)
- Variety of fish species (sport fishing)

**Source: Researchers (2014)**

Ecotourism development, which emphasizes environmental conservation, community empowerment and tourist satisfaction, is an appropriate alternative use of wetlands instead of consumptive utilization such as agriculture (Nyakaana, 2008). The development of ecotourism is critical for conservation of wetlands and further alleviation of poverty in the host communities. Ecotourism has more advantages when compared to other forms of consumptive utilization of wetland resources; as it favors maintenance of environmental integrity and improved community livelihoods. It is therefore imperative that Kingwal swamp be conserved and used for non-consumptive purposes such as ecotourism for sustainable environmental conservation and improved socio-economic well-being of host communities.

The development of ecotourism has got a comparative advantage, when compared with other means of consumptive resource utilization, as a tool for poverty reduction and enhancement of community development and biodiversity conservation. First, it depends on natural capital such as wildlife, scenery and culture. Second, it is labor intensive with a higher proportion of benefits such as jobs accruing to youth and women. Third, the customer comes to the product, hence providing opportunities for making and selling souvenirs and finally, it is a diverse industry, thus providing an increased scope for wider community participation, consequently more benefits.

The study findings disclosed that, loss of wetland resources, environmental degradation and poverty need to be addressed to realize sustainable development in Kingwal swamp. Unsustainable natural resource utilization and high levels of poverty conflict with the Millennium Development Goals of environmental sustainability and reduction of extreme poverty and hunger. As such, there is urgent need for alternative and sustainable wetlands' resources utilization and conservation strategies that promote the development of

ecotourism and help reduce poverty of host communities.

Achieving environmental sustainability is fundamental to achieving all the other Millennium Development Goals due to its significant influence on the many aspects of development. Ways of achieving this include finding an appropriate balance between the different uses of a wetland and the variety of benefits it provides. In this regard, the study recommends the development of a sustainable management plan which not only advocates for environmental education but acknowledges local community's right to use the wetland through environmental-friendly and income generating enterprises such as ecotourism, fish farming, bee keeping, butterfly farming and tree seedling nurseries. Educational institutions need to enlighten communities and further arrange for education and awareness campaigns to provide a platform for major stakeholders to interact and exchange experiences on the best way to conserve and restore Kingwal Swamp. Another initiative will be the development of bird watching platform, camp site and an arboretum which will provide an alternative source of income for adjacent communities, making them less dependent on the wetland's resources.

The study interviews recommended that resource utilization in the wetland should be guided by the principles of wise-use, with enforcement from Kenya Wildlife Service. Besides, Kenya Wildlife Service should provide incentives and rewards for land owners who adopt environmentally-friendly practices, and penalties and sanctions for those who degrade the environment. User fees should be introduced and used to demarcate and fence the critical areas as well as improve surveillance by employing guards.

The community should also form an ecotourism and conservation group to oversee registration and formulation of bylaws governing the utilization of the wetland. Critical wetland areas should be fenced, a bird viewing platform built, communities members trained as bird guides and ecotourism accessories such as guide books and binoculars provided to them. Moreover, fish farming, reforestation and tree seedling nurseries can be started in the host communities. This will help restore the wetland with its indigenous vegetation. More importantly, in order to minimize unsustainable wetland use, the host community should form a water resource users association to control water abstraction.

## **Conclusion**

Over the years, wetlands' economic, social and ecological benefits have not been fully appreciated leading to their unsustainable use. As a result, wetlands are rapidly declining due to anthropogenic activities. The study revealed that Kingwal swamp is undergoing rapid transformation due to diverse consumptive practices by the host communities as they struggle to meet their basic needs. Unfortunately, this has been accompanied by increasing levels of poverty and underdevelopment which call for urgent amicable solutions. For instance, adoption of environmental-friendly and income generating enterprises such as reforestation, ecotourism, fish farming, bee keeping, butterfly farming and tree seedling nurseries that offer opportunities to sustainably manage and conserve wetlands. These environmental conservation strategies are consistent with millennium development goals which aim at reducing poverty, conserving the environment and its bio-diversity.

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## APPENDICES

### Appendix I: Questionnaire for Local Community

Questionnaire Number \_\_\_\_\_ Interview Date \_\_\_\_\_

Residence:

Village \_\_\_\_\_ Location \_\_\_\_\_

Dear Respondent,

The information sought by this questionnaire will assist in finding out available resources in Kingwal swamp and whether their utilization has had social, economic and ecological benefits accruing to you. This is aimed at establishing sustainable utilization practices that can reduce poverty and help meet your aspirations.

#### Please follow the instructions below carefully when completing this questionnaire

There are four parts on the questionnaire: PART A, B, C and D. Kindly fill and complete all the parts of the questionnaire. These are: PART A on general information, PART B on the swamp's socio-economic value, utilization and awareness of impacts, PART C on the causes of poverty among the local community and PART D on the evaluation of Kingwal Swamp's ecotourism potential.

The information given will be treated with utmost confidentiality.

Thank you for assisting in this research project.

#### Part A: General Information

1. Age (Tick one):

- |                  |                     |
|------------------|---------------------|
| (01) 18-30 years | (02) 31-45 years    |
| (03) 46-60 years | (04) Above 60 years |

2. Gender (Tick one):

- |           |             |
|-----------|-------------|
| (01) Male | (02) Female |
|-----------|-------------|

3. Number of Children (Tick one):

- |            |                   |            |
|------------|-------------------|------------|
| (01) 1-5   | (02) 6-10         | (03) 11-15 |
| (04) 16-20 | (05) More than 20 |            |

4. Educational Level (Tick one):

- |              |                 |                |
|--------------|-----------------|----------------|
| (01) None    | (02) Primary    | (03) Secondary |
| (04) College | (05) University |                |

(06) Any other (specify): \_\_\_\_\_

5. Means of Livelihood (Tick one):

- |                                 |                     |                       |
|---------------------------------|---------------------|-----------------------|
| (01) Mixed farming              | (02) Crop husbandry | (03) Charcoal burning |
| (04) Bee Keeping                | (05) Tree nurseries | (04) Selling firewood |
| (05) Any other (specify): _____ |                     |                       |

6. How much do you earn per month from the livelihood activities in which you are currently involved?

- |                           |                      |  |
|---------------------------|----------------------|--|
| (01) Less than Kshs. 4000 | (02) Kshs. 4001-8000 |  |
|---------------------------|----------------------|--|

- |                       |                        |  |
|-----------------------|------------------------|--|
| (03) Kshs. 8001-12000 | (04) Kshs. 12001-16000 |  |
|-----------------------|------------------------|--|

7. How do you rate your current economic status?

- |          |          |
|----------|----------|
| (1) Poor | (2) Rich |
|----------|----------|





**Part D: Evaluation of Kingwal Swamp's ecotourism potential**

Using the guide to responses given below, please circle where appropriate the answer that best describes your opinion on the statements given.

**1- None      2- Low      3- Fair      4- High**

**Kingwal swamp's ecotourism potential is rated highly because of:**

29. Topographical structure diversity	1	2	3	4
30. Unique beauty	1	2	3	4
31. Wildlife diversity	1	2	3	4
32. Forest assets	1	2	3	4
33. Young population potential	1	2	3	4
34. Educational status	1	2	3	4
35. Level of consciousness for ecotourism	1	2	3	4
36. Organizational capability	1	2	3	4
37. Human resources (such as guides)	1	2	3	4
38. Accommodation for the ecotourist	1	2	3	4
39. Quality of transportation infrastructure	1	2	3	4
40. Health institutions	1	2	3	4
41. Educational institutions	1	2	3	4
42. Utilities	1	2	3	4
43. Dining	1	2	3	4
44. Existing recreational activities	1	2	3	4
45. Historical-archaeological values	1	2	3	4
46. Animal production	1	2	3	4
47. Plant production	1	2	3	4

48. How do you rate the distance between Kingwal swamp and Koitalel arap Samoei Mausoleum (a renowned historical site)?

(01) Very far      (02) Far      (03) Close      (04) Very close

49. Give any other comment(s) you may have on ecotourism development in this region

**Appendix II: Key Informant Interview Guide (for the community leaders)**

1. Opinion on conservation of Kingwal swamp
  - a. Have the current utilization practices of the swamp resources' in this area improved or degraded the environment?
  - b. How do you involve local communities in biodiversity conservation in this area?
  - c. Have you enlightened the local people on the impacts of their activities on the ecological well-being of this area?
  - d. To what extent is the adjacent community engaged in the conservation of this area (Kingwal swamp)?
2. Opinion on the ecotourism potential of Kingwal Swamp
  - a. Do you think ecotourism is a viable alternative land use for this area?
  - b. Have you initiated any community awareness campaigns on the development of ecotourism enterprises in this area?
  - c. What is your opinion on ecotourism development in this area?
3. What is the most important issue that needs to be addressed in regard to the conservation of this area (Kingwal swamp)?