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Socio-Economic Benefits of Kingwal Wetland to the Local People

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Research Article

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ABSTRACT

Kingwal wetland in Nandi County, Kenya provides numerous benefits to the local people. No research has been done to analyse and document its benefits to the local people to enable people appreciates and hence minimizes its destruction. The objective of the study was to determine the benefits derived by the local people from Kingwal wetland. Descriptive research design was employed in this study. Structured questionnaires, personal interviews, focused group discussions and field observations were used in data collection. Questionnaires were administered to 240 respondents obtained through systematic random sampling of households. Data were analysed using descriptive statistics and chi-square goodness-of-fit test. Results showed that 88.3% of the people derived various benefits from the wetland ranging from economic benefits to nutrient benefits. A higher number of local people derived economic benefits (58.3%) as compared to the rest. Chi-square goodness-of-fit test showed that economic ($\chi^2 = 187.893,\ df = 8,\ p < 0.05$); recreational ($\chi^2 = 45.008,\ df = 4,\ p < 0.05$); nutritional ($\chi^2 = 16.069,\ df = 3,\ p < 0.05$); water ($\chi^2 = 62.295,\ df = 6,\ p < 0.05$) and socio-cultural ($\chi^2 = 5.895,\ df = 1,\ p < 0.05$) benefits were significant. The study has revealed that Kingwal wetland provides numerous benefits to the local people and that economic benefit is highest compared to the other benefits. The study recommends that a strong, active conservation-based educational program should be set and implemented to create awareness to the local people on how they can participate in managing the wetland in order to obtain more benefits from it.

INTRODUCTION

Wetlands provide goods and services to people living around and those far away from them [1]. The goods and services range from food, water, herbal medicine and building materials [2] among others. They are therefore very important ecosystems [1] that should be conserved to meet the needs of the present and future human generations. They are important as they serve as wildlife habitats for resident and migratory wildlife species. Water flow accelerates the formation of the Convention on Wetlands of International Importance (RAMSAR) which was developed in 1971 and put in force in 1975 to ensure proper wetland conservation.

The area occupied by world wetlands range from 8.3 million km^2-10.1 million km^2 [3] and in Kenya, it is roughly 14,000 km^2 [4]. Kingwal wetland is one of the wetlands found in Kenya that has potential to provide most of the afore mentioned wetland benefits to the local people. In spite of the foregoing, the benefits of most wetlands including Kingwal have not been analysed to enable local people understand the importance of conserving them. This lack of knowledge has led to continuous destruction of most wetlands due to pressure from increasing human activities.

Kingwal wetland is one of the important wetlands since it was documented to have the highest number of Sitatunga antelopes (200) in Kenya [5].Their number is decreasing due to habitat degradation and attack by farmers whose crops are damaged by the animals [6] and since they are rare animals [7] and are currently threatened, they are almost driven to extinction. To arrest this, there was a need to determine the benefits that accrue to the local people from the wetland so as to help in developing effective measures to promote sustainable management of the swamp and the Sitatunga antelopes in order to increase its benefits to the local people and minimize its destruction. Findings of this study will inform conservationists on the importance of Kingwal wetland to the local people with a view of garnering local support for wetlands and other protected areas. This will promote sustainability of the wetlands for the survival of the Sitatunga and other wildlife found therein. It is also envisaged that findings of this study will be used by policy and decision makers in coming up with effective measures to successfully conserve and protect wetlands rather than leaving them to be destroyed and degraded. This study aimed to determine the benefits of Kingwal wetland to the local people.

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MATERIALS AND METHODS

Study Area

Kingwal wetland is located in Nandi County, 25 Km from Eldoret town, about 400 km from Nairobi city and covers about 2.73 km^2 [7]. It runs from Kiptenden through Mosoriot towards Nandi North Forest in Mosop Constituency. The wetland receives water mainly from streams and springs around Kesses area and Kesses River flowing from east and drains into Kingwal (Kimondi) River while flowing to the west Kingwal wetland and its surroundings receive rainfall between 1200-2000 mm per annum. The area's average temperatures range from 15°C-20°C during wet seasons and 24°C during dry seasons. It is well known as habitat for the endangered Sitatunga antelope (*Tragelaphus spekei*). Other wild animals found in it are mongoose, foxes, cranes, snakes, frogs, ant bears, and different species of fish. The wetland also harbors plants including trees, grasses, and shrubs [7] among others.

The area around the wetland is largely inhabited by the Nandi, a sub tribe of the large Kalenjin tribe. They mainly practice crop farming of maize, tea among others. Other economic activities done are livestock keeping, agro forestry, bricks making among others. All these activities are sustained by Kingwal wetland [8].

METHODS

The study utilized descriptive research design, a design that involves expressing the features/characteristics of a given place/group/person. This design was employed because the study was interested in describing the benefits derived by the local people from Kingwal wetland and their economic value.

The target population comprised of household heads of people living around Kingwal wetland, as well as community and administration leaders. Out of 2404 households living close to the wetland [9], 240 households were selected from which household heads were chosen to fill questionnaires. This sample size is 10% of the total population and was adopted from Mugenda [10] who advocated a sample size of 10% to 30% of the target population if the study population is below 10,000.

After testing the validity of the structured questionnaires from 15 respondents selected randomly and the outcomes were positive, the study area was divided into three strata: upper, middle and lower Kingwal. Systematic random sampling was then used whereby every fifth household was sampled until a total of sixty from upper Kingwal, eighty four from lower Kingwal and ninety six respondents from middle Kingwal were achieved. Two groups from each of the three parts were organized for focused group discussions. Purposive sampling was employed in selecting key informants among them community leaders, community based conservation leaders, area chiefs, nature Kenya, Kenya Forest Service, Kenya Wildlife Service and National Environmental Management Authority representatives for interviews.

Data were collected from both primary and secondary sources. Primary data were collected using structured questionnaires because they enable the researcher to cover a large area within a short time, those respondents that are not easily approachable can be reached through questionnaires, they are cost-effective and give the respondent time and space to express his/her views fully concerning the issues being sorted since they are made up of both open-ended and closed-ended questions [11].

Personal interviews were also used for the key informants because they allow for verification of facts and more detailed information can be obtained. Focused group discussions were used since they give a wider picture of people's knowledge and opinion concerning various issues and promote active and direct participation of local people in the research. Personal observations were used because first-hand information is obtained and it enables for verification of information given by the respondents.

Data Analysis

Data were analysed using descriptive statistics and chi-square goodness-of-fit test. Descriptive statistic was meant to show the frequencies and percentages of the different benefits derived by the local people from Kingwal wetland. Chi-square goodness-of-fit was used to determine if the specific benefits were significant or not at 95% confidence level of significance.

RESULT AND DISCUSSION

Out of 240 respondents interviewed, 96 (40%) were from the middle Kingwal, 84 (35%) from lower Kingwal and 60 (25%) from upper Kingwal. A high percentage of males (69%) were interviewed than females (31%) and highest number of respondents aged between 45-59 years (41%), followed by those with 30-44 years (31%), then those with 60 and above years (16%) and the least with 15-29 years (12%). A higher number of respondents interviewed had no education (29.6%), followed by those with primary education (27.5%), then those with tertiary education (23.3%) and the least had secondary education (19.6%). Most respondents lived between 1.01-1.5 km away from Kingwal wetland (20.4%), followed by those living between 0.51-1 km (20%) and 1.51-2 km (20%), very few of them lived between 0-0.5 km away from the wetland.

Table 1. Occupation.

Occupation	Frequency	Percentage
Crop Farmer	40	7
Livestock keeper	16	7

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Crop farmer and teacher	2	0.8
Crop farmer and bricks dealer	21	8
Livestock keeper and motorbike/car cleaner	5	1
Crops farmer plus maize roaster and seller	2	0.8
Shopkeeper	8	3.3
Agro forester	7	2.9
Crop farmer and livestock keeper	35	14.8
Crop farmer, livestock keeper and motorbike/car cleaner	2	0.8
Bricks dealer	7	2.9
Livestock keeper and bricks dealer	1	0.4
Crop farmer and motorbike rider	1	0.4
Crop farmer, livestock keeper and teacher	15	3
Teacher	24	10
Car driver	12	5
car/motorbike cleaner	5	1
Motorbike rider	14	8
Mat maker	13	5
Maize roaster and seller	7	2.9
Hair dresser	3	3

On assessing economic activities done by the local people for a living, results showed that most respondents interviewed were crop farmers (16.67%), a number of them combine crop farming with other economic activities for instance 14.8% are livestock keepers and crop farmers among others as in Table 1.

Table 2. Level of income.

Monthly Income	Frequency	Percentage
<20,000 Ksh	10	6.2
20,001-40,000 Ksh	13	6.7
40,001-60,000 Ksh	33	13.7
60,001-80,000 Ksh	27	11.3
80,001-100,000 Ksh	37	15.4
100,001-120,000 Ksh	23	13.7
120,001-140,000 Ksh	22	9.6
140,001-160,000 Ksh	33	9.2
160,001-180,000 Ksh	11	5.4
180,001-200,000 Ksh	15	4.6
Over 200,000 Ksh	16	4.2

From Table 2 above, higher number of respondents earn income of between 80,000-100,000 Kenya shillings per month (15.4%) followed by those earning 100,001-120,000Ksh and 40,001-60,000 Ksh (13.7%). Very few earn over 200,000 Ksh (4.2%).

Table 3. Family size.

No. of members	Frequency	Percentage
2 members	7	2.91
3 members	39	16.25
4 members	62	25.83
5 members	44	18.33
6 members	42	17.5
7 members	28	11.67
8 members	7	2.91
9 members	4	1.67
10 members	5	2.08
Over 10 members	2	0.83

Most households interviewed had family size of four members (25.8%) and a few had over 10 members (0.83%) (Table 3).

Benefits Derived By the Local People from Kingwal Wetland

A significant number of respondents $(\chi^2 = 144.150,\ df = 1,\ p = 0.00)$ declared that they derived one or more benefits from Kingwal wetland (88.3%) while few do not (11.7%). The benefits obtained by the people are as shown in Figure 1.

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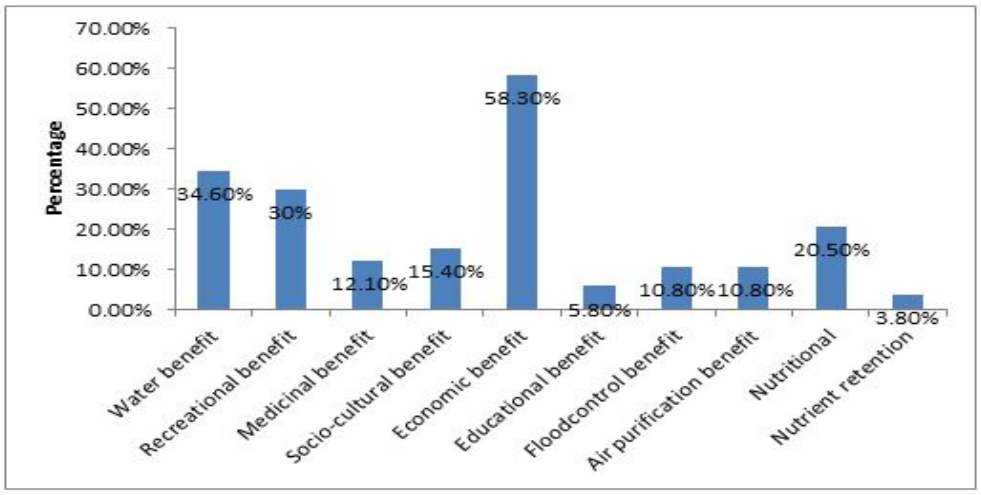

Figure 1. Benefits obtained by the local people from Kingwal wetland.

From Figure 1 above, the benefit highly obtained by most people living around Kingwal wetland is economic benefit (58.3 %). Other benefits obtained include water (34.6%), recreational (30%), nutritional (20.5%), socio-cultural (15.4%), medicinal (12.1%), educational (5.8%), flood control and air purification (10.8%) benefits. Economic benefits are obtained from Kingwal wetland by the local people through harvesting wetland grass for mat making (14.5%), livestock grazing (38.8%) especially during dry seasons, thatching residential houses (21.6%) and thatching business houses (11.8%); usage of water for washing vehicles (13.7%) and watering tree seedlings for income (9.8%); usage of wetland soil for brick making (30%) and smearing houses (12.7%); extraction of firewood (10.8%) and charcoal (3.3%) from wetland trees.

Nutritional benefits were obtained by the local people through the following: eating edible wild fruits (31.3%), eating fish from the wetland or reared using the wetland water (30%), using crop products irrigated using wetland water (40%) and eating game meat/bird meat harvested from the wetland (1.9%). Other nutritional benefits obtained by the local people from Kingwal wetland are the extraction of traditional vegetables like "black night shade (managu) and vine/climbing spinach *Basella alba* (nderema).

Water benefits are obtained by the local people through the use of water from the wetland for irrigation of farms (42.5%), washing clothes (35.8%), washing utensils (38.5%), bathing (36.1%), drinking by livestock (34.9%) and washing car/motorbike (7.2%).

The local people obtained socio-cultural benefits through performing circumcision/initiation rites (15%) within the wetlands and holding prayers (3.8%) near Kingwal wetland.

Recreational benefits are obtained by the local people through photography (32.8%), game viewing (31.4%), bird watching (7.9%) and hiking (6.3%) around and along the wetland (Figure 2).

Figure 2. Some of the benefits derived by the local people from kingwal wetland.

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Figure 2 above shows some of the benefits derived from Kingwal wetland. They include: bricks made by using Kingwal wetland soil, house thatched using grass from the wetland, mat made from reeds extracted from the wetland and livestock grazing on wetland soil.

DISCUSSION

A number of wetlands provide benefits to the local people living adjacent to them. Kingwal wetland forms one of these wetlands enabling local people to derive benefits from it. This study found out that benefits derived from Kingwal wetland include economic, water, recreational, socio-cultural, nutritional, medicinal, education and research, flood control and air purification benefits. Similar benefits were reported by Kakuru [12] from eight wetlands in Uganda.

A high number of local people derived economic/commercial benefits from the wetland. This is because the wetland has natural resources which can be harvested and sold directly, can be used as raw materials to make finished products like mats and/or can be used directly or indirectly to support many economic activities. Raw materials extracted from the wetland include grass for mat making, livestock and roofing houses, clay for brick making, trees providing wood for construction, charcoal burning and firewood extraction and agroforestry among others which to most of the respondents are a source of livelihoods. A higher extraction of economic benefits has also been reported by Oduor [11] in Nyando wetland. Extraction of economic benefits from wetlands like timber, firewood, honey and other raw materials to industries has also been reported by Kakuru [12], Kamukasa [13], Salem [14] and Agatha [15].

The second major benefit derived from Kingwal wetland is water. This is due to the fact that water is a daily need for every individual and also most people living around the wetland are crop farmers and they use water from the wetland for irrigating their crops, especially during dry seasons. Those who are living too close to the wetland also use water for other purposes including bathing, washing clothes and utensils, drinking by people and livestock while others who may not necessarily live too close to the wetland use them for motorbike/car washing and swimming. Agatha [15] found similar findings from Yala swamp that local people were deriving water benefits from the wetland which were used mainly for domestic purposes. Likewise, Oduor [11] reported derivation of water for crop irrigation and domestic use by the local people from Nyando wetland.

Another major benefit derived from Kingwal wetland is recreational and tourism benefit. Kakuru [12] and Oduor [11] reported similar findings from eight Ugandan wetlands and Nyando wetlands respectively. Likewise, Salem [14] and Momanyi [16] have reported that wetlands provide recreational and tourism benefits. Respondents of the current study derived recreational and tourism benefits from the wetland because it contains wild plants, wild animals and water. Wild plants especially papyruses grow very close and form beautiful scenery for taking photographs. The wild animals particularly Sitatunga antelopes and water birds attract game viewing and bird watching. The wetland water provides space for swimming. Hence there is need to widely utilize them to enhance the sustainability of the wetland.

The wetland also enhances nutritional benefits by supporting crops through providing irrigation water and good soil, providing traditional vegetables like black nightshade (managu), providing edible fruits like water berry, and the sustenance of fish and other edible wild game, therefore, improving food security. These findings agree with the findings of Agatha [15] in Yala swamp where the local people derived nutritional benefits in form of fish, crops, and traditional vegetables among others.

Socio-cultural benefits obtained from the wetland are through the use of the wetland by some local community members for carrying out circumcision rites and spiritual prayers. This agrees with the findings of Terer et al., 2004 (Momanyi [16]). Medicinal benefits are derived by the local people from indigenous shrubs and trees whereby their leaves or roots or barks are used to cure a certain disease. This agrees with the findings of Marti [17],Panda [18], Salem [14] and Sarmah et al. (2013).

Another benefit obtained by the local people from Kingwal wetland is flood control. Griffin [19], Marti [17] Kakuru[12], Kipkemboi [20] and Salem [14] reported similar findings that wetlands shelter local people living adjacent to them from floods and therefore protect them and their properties from damages that could have been brought to them by floods.

CONCLUSION

Wetlands were seen in the past as wastelands that should be cleared and used for other purpose because people did not realized how economically beneficial wetlands are to them. This research has revealed that Kingwal wetland provides numerous benefits and that economic benefit is highly extracted by most local people than other benefits. A strong conservation-based educational program should be set and implemented to create awareness to the local people on how they can participate in managing the wetland in order to obtain more benefits from it and minimize its destruction.

RECOMMENDATION

Based on the study, the following recommendations were made:

- National and County governments, Kenya Wildlife Service, Kenya Forest Service, National Environmental Management Authority and other conservation institutions should set up and implement a strong/active conservation-based edu-

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cational program involving local people living around wetlands to create awareness on how people can participate in wetland conservation in order to obtain more benefits and how they should extract them without threatening wetlands

- The government should help the local people around Kingwal swamp in setting the wetland as a protected area own by the local people should be fenced and people owning land within it should be compensated so as to leave the wetland area for conservation purpose to attract more benefits especially in form of tourism
- Once the wetland has been set as a protected area, the monetary benefits accruing from it should be shared with the local people in order to promote their positive attitude toward conservation of Sitatunga antelope and the entire wetland natural resources found in it
- The local government, Non-Governmental Organisation and other conservation organizations should come up with enterprise development projects like bee keeping among other projects for the local people in order to minimize over dependence by the local people on the wetland resources. This will minimize destruction of the wetland through various human activities

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